MURRAY BASIN STAGE 2 MINERAL SANDS PROJECT

ASSESSMENT

under

ENVIRONMENT EFFECTS ACT 1978

Minister for Planning

November 2008
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AAV</td>
<td>Aboriginal Affairs Victoria</td>
</tr>
<tr>
<td>AH Act</td>
<td>Aboriginal Heritage Act 2006</td>
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<tr>
<td>BOCA</td>
<td>Bird Observation &amp; Conservation Australia</td>
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<tr>
<td>C&amp;LP Act</td>
<td>Catchment &amp; Land Protection Act 1994</td>
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<tr>
<td>DEWHA</td>
<td>Commonwealth Department of the Environment, Water, Heritage and the Arts</td>
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<tr>
<td>DHS</td>
<td>Victorian Department of Human Services</td>
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<td>DPI</td>
<td>Victorian Department of Primary Industries</td>
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<td>DSE</td>
<td>Victorian Department of Sustainability and Environment</td>
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<tr>
<td>EE Act</td>
<td>Environment Effects Act 1978</td>
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<td>EES</td>
<td>Environment Effects Statement</td>
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<tr>
<td>EMP</td>
<td>Environmental management plan</td>
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<td>EMS</td>
<td>Environmental management system</td>
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<td>EPA</td>
<td>Victorian Environment Protection Authority</td>
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<tr>
<td>EPBC Act</td>
<td>Environment Protection and Biodiversity Conservation Act 1999</td>
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<tr>
<td>ESD</td>
<td>Ecologically sustainable development</td>
</tr>
<tr>
<td>EVC</td>
<td>Ecological vegetation class</td>
</tr>
<tr>
<td>GWMW</td>
<td>Grampians Wimmera Mallee Water</td>
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<tr>
<td>hab ha</td>
<td>Habitat hectares</td>
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<tr>
<td>ha</td>
<td>Hectares</td>
</tr>
<tr>
<td>HMC</td>
<td>Heavy mineral concentrate</td>
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<tr>
<td>IGAE</td>
<td>Inter-Governmental Agreement on the Environment</td>
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<tr>
<td>Iluka</td>
<td>Iluka Resources Limited</td>
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<tr>
<td>km</td>
<td>Kilometres</td>
</tr>
<tr>
<td>LPPF</td>
<td>Local Planning Policy Framework</td>
</tr>
<tr>
<td>Mallee CMA</td>
<td>Mallee Catchment Management Authority</td>
</tr>
<tr>
<td>m, m³</td>
<td>Metres, cubic metres</td>
</tr>
<tr>
<td>mm</td>
<td>Millimetres</td>
</tr>
<tr>
<td>MEA</td>
<td>Maximum extent achievable</td>
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<tr>
<td>MMFN</td>
<td>Mid-Murray Field Naturalists Inc.</td>
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<td>MRCC</td>
<td>Mildura Rural City Council</td>
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<tr>
<td>MRSD Act</td>
<td>Mineral Resources (Sustainable Development Act) 1990</td>
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<tr>
<td>MSS</td>
<td>Municipal Strategic Statement</td>
</tr>
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<td>NWCHP</td>
<td>North West Cultural Heritage Program</td>
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<td>NVMF</td>
<td>Victoria's Native Vegetation Management – A Framework for Action, 2002</td>
</tr>
<tr>
<td>P&amp;E Act</td>
<td>Planning and Environment Act 1987</td>
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<tr>
<td>PEM</td>
<td>Protocol for Environmental Management</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particles or “particulate matter” with equivalent aerodynamic diameter of 10 micrometers or less</td>
</tr>
<tr>
<td>SEPP</td>
<td>State Environment Protection Policy</td>
</tr>
<tr>
<td>SPPF</td>
<td>State Planning Policy Framework</td>
</tr>
<tr>
<td>TDS</td>
<td>Total dissolved solids</td>
</tr>
<tr>
<td>TSF</td>
<td>Tailings storage facilities</td>
</tr>
<tr>
<td>VicRoads</td>
<td>Victorian Roads Corporation</td>
</tr>
<tr>
<td>VMRG</td>
<td>Victorian Malleefowl Recovery Group</td>
</tr>
<tr>
<td>VNPA</td>
<td>Victorian National Parks Association Inc.</td>
</tr>
<tr>
<td>WRRP</td>
<td>Woornack, Rownack, Rainlover and Pirro deposits</td>
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</tbody>
</table>
# Table of Contents

1 Introduction .................................................................................................................. 1  
1.1 Purpose of this Document ........................................................................................ 1  
1.2 Project Description .................................................................................................... 1  
1.3 Site and Environmental Setting ............................................................................... 6  
1.4 Structure of this Assessment ................................................................................... 7  

2 EES and Statutory Processes ....................................................................................... 8  
2.1 The EES Process ..................................................................................................... 8  
2.2 Public Review Process ........................................................................................... 8  
2.3 Required Statutory Approvals ................................................................................ 8  
  2.3.1 Mineral Resources (Sustainable Development) Act 1990 .................................. 8  
  2.3.2 Environment Protection Act 1970 ...................................................................... 9  
  2.3.3 Planning and Environment Act 1987 .................................................................. 9  
  2.3.4 Cultural Heritage ................................................................................................ 9  
  2.3.5 Radiation Act 2005 ............................................................................................ 9  
  2.3.6 Flora and Fauna Guarantee Act 1988 ................................................................. 9  
  2.3.7 Commonwealth EPBC Act 1999 ........................................................................ 9  

3 Environmental Assessment Context .......................................................................... 10  
3.1 Legislation and Policy Framework ......................................................................... 10  
3.2 Integrated Approach to Assessment ........................................................................ 10  

4 Integrated Assessment ............................................................................................... 12  
4.1 Efficient Mining of Mineral Resources ................................................................ 12  
4.2 Economic and Social Effects .................................................................................. 13  
4.3 Land-use and Rehabilitation ................................................................................... 15  
  4.3.1 Land-use ........................................................................................................... 16  
  4.3.2 Rehabilitation ................................................................................................... 16  
4.4 Public Health, Amenity and Safety ......................................................................... 18  
  4.4.1 Air Emissions .................................................................................................... 18  
  4.4.2 Noise Emissions ............................................................................................... 20  
  4.4.3 Radiation Emissions ......................................................................................... 23  
  4.4.4 Visual and Landscape Character ...................................................................... 24  
  4.4.5 Roads, Traffic and Transport ........................................................................... 25  
4.5 Cultural Heritage ..................................................................................................... 26  
  4.5.1 Aboriginal Cultural Heritage .............................................................................. 26  
  4.5.2 Non-Aboriginal Cultural Heritage .................................................................... 27  
4.6 Terrestrial Ecology, Flora and Fauna ..................................................................... 28  
  4.6.1 Native vegetation ............................................................................................... 29  
  4.6.2 Flora ................................................................................................................ 31  
  4.6.3 Fauna ................................................................................................................ 32  
  4.6.4 Avoidance, Mitigation and Offsets (Vegetation, Mallee Fowl & Regent Parrot) ..... 37  
  4.6.5 Implications for Wetlands of International Importance (Ramsar) ............... 39  
4.7 Surface Water, Water Supply and Groundwater Effects ....................................... 40  
  4.7.1 Surface Water and Water Supply .................................................................... 40  
  4.7.2 Groundwater .................................................................................................... 42  
4.8 Greenhouse Gas Emissions ..................................................................................... 45  
4.9 Ecologically Sustainable Development .................................................................. 46  

5 Response to Inquiry Recommendations ..................................................................... 49
1 Introduction

1.1 Purpose of this Document

On 18 January 2004, the Acting Minister for Planning determined that the Murray Basin Stage 2 Mineral Sands Project (the Project) required assessment under the Environment Effects Act 1978 (EE Act). This decision meant that the Project could not proceed until: (i) the proponent prepared an environment effects statement (EES); and (ii) the Minister subsequently provided an assessment of the environmental effects of the Project for consideration by the relevant statutory decision makers.

This document is the Minister’s Assessment under the EE Act. It provides the Minister’s findings and recommendations on the environmental effects of the Project.

The Assessment will be taken into account by relevant decision makers in decisions under the Mineral Resources (Sustainable Development) Act 1990 (MRSD Act), the Environment Protection Act 1970 (EP Act), and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

1.2 Project Description

Iluka Resources Limited (Iluka) proposes to develop the Project, which is expected to produce approximately 2.4 million tonnes of dry, heavy mineral concentrate (HMC) over 7.5 years. The total life of the project will be approximately 13 years.

The Project focuses on two main areas of mineralisation (refer to Figure 1):

- the Kulwin deposit located about 28km east of Ouyen and 30km west of Manangatang; and
- the combined Woorrack, Rownack, Rainlover and Pirro (WRRP) deposits located about 20km south east of Ouyen.

The deposits are located in two distinct areas and Iluka proposes to mine the deposits in two separate phases, beginning with the Kulwin deposit. The Rainlover deposit may be mined as isolated pits during the mining of the Woorrack deposit if proven economically viable [EES, p4-1].

It is proposed that the ore will be mined by open cut methods with an average rate of approximately 17m per day of linear ore deposit, and processed onsite to produce HMC. The HMC would then be transported to Iluka’s mineral separation plant at Hamilton for processing into rutile and zircon for sale on the world markets.

Key steps in the proposed mining process are as follows:

- Clearing vegetation on the site;
- Removing the topsoil, subsoil and overburden with conventional earth moving equipment;
- Dewatering the mine pit to temporarily lower the watertable;
- Removing and transferring the ore to the mining unit plant;
- Pumping the ore slurry from the mining unit plant to the pre-concentrator plant;
- Processing the ore slurry by wet gravity to produce an upgraded ore;
- Disposing the fines in the tailings storage facility and disposing the by-products to the mine void or co-disposing the fines and by-products to the mine void;
- Processing the upgraded ore by wet gravity at the wet concentrator plant to produce the HMC;
- Transporting the HMC to the mineral separation plant at Hamilton;
- Processing the HMC into rutile and zircon for sale on the world markets;
- Returning the non-saleable by-products from Hamilton to the mine to be disposed of in the mine void; and
- Rehabilitating the mined area and other disturbed areas as the mine path progresses.
The main components of the Project are shown in Figures 2, 3 and 4 and include:

- Five mine pits with the following indicative dimensions:
  - Kulwin: 11,275m long, 40m deep and 100m wide;
  - Woornack: 14,480m long, 23m deep and 100m wide;
  - Rownack: 6,905m long, 14m deep and 55m wide;
  - Pirro: 6,550m long, 20m deep and 45m wide; and
  - Rainlover: 5,845m long, 20m deep and 47m wide.

- Topsoil, subsoil and overburden stockpiles with the following maximum heights:
  - topsoil: 2m for native vegetation topsoil and 5m for agricultural topsoil
  - subsoil: 10m
  - overburden: 15m

- Topsoil and subsoil will be stockpiled separately along the length of the mining area, while overburden will be placed directly into the mine void, behind the mine face, with the exception of the start-up stockpiles of overburden.

- A mining unit plant to screen the ore, remove oversized material and mix the screened material with saline groundwater to form a slurry, and then pump the slurry to the pre-concentrator plant.

- A pre-concentrator plant to upgrade the ore by wet gravity processing methods and to remove the by-products such as clay and sand.

- A wet concentrator plant to process the upgraded ore, to separate light minerals from heavy minerals and to remove non-commercial minerals.

- A tailings storage facility to store and dispose of clay fines from the processing of ore in the pre-concentrator plant and the wet concentrator plant. At the Kulwin deposit, the facility will occupy approximately 112ha on the eastern side of the pit and at the WRRP deposits, the facility will occupy approximately 60ha located on the north-western side of the pits.

- Infiltration basins to dispose of excess groundwater by evaporation and infiltration. One basin is proposed at the Kulwin deposit with a length of approximately 750m located along the southern part of the deposit and another is proposed at the Pirro deposit with a length of up to 1,500m located in the central Pirro deposit.

- Two reverse osmosis plants located next to the wet concentrator plant to provide freshwater requirements. It is anticipated that an average of 30m3 per hour and up to 60m3 per hour will be used at the site.

- Four onsite dams including: a clean saline water dam (100m x 100m) to store groundwater from the dewatering bores; a water process dam (2.5ML capacity) to store water for use in the mining unit plant, pre-concentrator plant and wet concentrator plant; a dam (100m x 100m) to assist with pH adjustment of the process water; and a dam to store freshwater produced by the reverse osmosis plants.

- Non-mining infrastructure includes an administration area and car park, a mining contractor’s workshop, a mining contractor’s compound, laydown areas in a number of locations, mine access roads and haul roads adjacent to the pits. Access to the site will be prevented via a security post located on the access road off the highway and will be fenced.

All infrastructure including the wet concentrator plant and reverse osmosis plants will be relocated to the WRRP deposits following completion of the Kulwin deposit.

Chapter 4 of the EES provides a more detailed description of the main components of the Project.

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1 At the Inquiry hearing, the proponent advised that disposal to salinas as a water disposal contingency ‘will definitely not be required’. Therefore, the use of salinas 1 and 3 at the Kulwin deposit and salinas 3 and 4 at the WRRP deposits are no longer part of the project. The EES defines a salina as a landform where crystalline salt deposits are formed or found [p11-11].
Figure 2. Kulwin Mine Layout & Locations of Reserved Land
Figure 3. KWWR Mine Layout & Locations of Reserved Land
The Murray Basin Stage 2 Mineral Sands Project is located within the semi-arid Mallee region of the Murray Basin. The Murray Basin covers an area of 300,000 km² in north western Victoria and parts of South Australia and New South Wales.

The basin contains sediments deposited during repeated marine incursions. The latest incursion-regression event resulted in the deposit of the Loxton-Parilla Sands, which hosts a number of mineralised strandlines across the basin including the Kulwin and WRRP deposits [EES, p3-1].

The landscape surrounding the deposits varies from flat to undulating and contains linear east-west dunes.

The study area for the Project investigations is located on mainly cleared farming land about 20km south east of Ouyen within the Rural City of Mildura and is predominantly positioned between the Mallee Highway and Sunraysia Highway. The study area is generally defined as approximately 1km either side of the deposits.

The Project area generally has a width of approximately 400m and covers an area of approximately 2,300 hectares (ha). The Project area includes the pits and associated mine infrastructure.

Part of the Kulwin deposit lies beneath the Mallee Highway, the Mittyack-Kulwin railway spur line and several local roads, while part of the WRRP deposits lie beneath the Calder Highway and several local roads (refer to Figures 2 and 3).

There are no defined watercourses within the Project area. The nearest watercourse is the Murray River, which is located approximately 25km north of the Kulwin deposit and 40km north of the WRRP deposits. The Project area is not located within the Murray River floodplain. There are several salinas (landforms with salt deposits) within the vicinity of the deposits.

The Project area and most of the regional landscape has been largely cleared of native vegetation. Remnant vegetation exists mainly within road reserves, McBains Bushland Reserve, Kulwin Bushland Reserve and in six larger areas on freehold land. The vegetation in the south of WRRP deposits links to the Bronzewing Flora and Fauna Reserve [BFFR] to the west through vegetated freehold corridors.
The land is predominantly owned by private individuals and used for broadacre cropping and grazing.

There are 18 residences within 15km of the deposits. Four of these residences are unoccupied and two are owned by the proponent.

1.4 Structure of this Assessment

Section 2 of this document outlines the EES process and approvals required for the Project. Section 3 describes the key considerations underlying this Assessment.

The main part of this Assessment is found in section 4. This considers the environmental effects of the Project within the framework of an integrated set of evaluation objectives reflecting relevant legislation and policy.

Section 5 provides a response to the key recommendations of the Inquiry.
2 EES and Statutory Processes

2.1 The EES Process

The Acting Minister for Planning decided in January 2004 that the Project required an EES under the EE Act, in large measure because of potential impacts on biodiversity values of remnant vegetation and habitat, ground water and surface water, the local community, and transport systems and other infrastructure.

Draft Assessment Guidelines providing direction to the proponent on the scope of environmental matters that should be investigated and documented in the EES were released for comment in late 2004. Following consideration of public submissions, the final Assessment Guidelines were released in March 2005.

As the proponent, Iluka was responsible for preparing the EES while the Department of Planning and Community Development (DPCD) was responsible for managing the EES process, which included providing advice to the Minister for Planning and coordinating advice to the proponent on the preparation of its studies and the EES.

DPCD convened an agency-based Technical Reference Group (TRG) to advise DPCD and the proponent respectively on the scoping, preparation and adequacy of the EES. The TRG consisted of representatives from Aboriginal Affairs Victoria, Environment Protection Authority (EPA), Grampians Wimmera Mallee Water, the Department of Human Services, the Department of Primary Industries (DPI), the Department of Sustainability and Environment (DSE), the Mallee Catchment Management Authority, Mildura Rural City Council (MRCC), the North West Cultural Heritage Program (now defunct), VicRoads. The proponent also attended and participated in TRG meetings.

2.2 Public Review Process

The EES and EPA Works Approval application were jointly exhibited between 19 February and 3 April 2008. Fourteen written submissions were received. Of these 14 submissions, six expressed concerns and/or objections to the Project. Most of the remaining submissions were from government agencies, which raised specific issues and conditions to be further addressed.

On 16 June 2008, the Minister for Planning appointed a three-person Inquiry (Mr Mark Marsden, Mr Geoff Angus and Mr Colin Burns) to consider the proposal and submissions under section 9(1) of the EE Act. The Inquiry held a Directions Hearing on 14 May 2008. The hearing was held over 5 days from 21 to 29 July 2008. Nine submitters were heard by the Inquiry.

The Inquiry’s report was provided to the Minister for Planning on 25 September 2008.

2.3 Required Statutory Approvals

The purpose of this Assessment is to inform and advise statutory decision-makers regarding the likely environmental effects of the Project and their acceptability, as well as appropriate responses.

The key approvals required for the Project are described below.

2.3.1 Mineral Resources (Sustainable Development) Act 1990

Mining works can only occur once the Minister for Energy and Resources grants a Mining Licence and DPI then approves a Work Plan and issues a Work Authority under the MRSD Act. The Work Authority is the formal authority to commence works.

The Work Plan is a key regulatory instrument for giving effect to recommendations from the Minister for Planning’s Assessment. Recommendations can be addressed in the body of the Work Plan and within the required Environmental Management Plan (EMP), or DPI can include Project-specific conditions for the
approval of the Work Plan. The Work Plan for this Project cannot be approved until after both the Minister for Energy and Resources and DPI have received and considered this Assessment.

2.3.2 Environment Protection Act 1970

Aspects of the Project also require a Works Approval under the Environment Protection Act 1970 (EP Act). The proponent has prepared a Works Approval application for the Kulwin deposit in relation to the proposed reverse osmosis plants and the generation of greenhouse gases by the Project. Under the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 administered by the EPA, water desalination plants that have a design capacity to process more than 1,000m$^3$ (1 ML) per day of feed water require a Works Approval.

The Works Approval application was jointly advertised with the EES, under section 20AA of the EP Act.

2.3.3 Planning and Environment Act 1987

Most of the Project does not require a planning permit. Under the Mildura Planning Scheme, a permit is not required for mining if an EES has been prepared under the EE Act and mining is exempt from the requirement to obtain a permit under section 42A of the MRSD Act. Further, no amendment of the Mildura Planning Scheme is needed under the Planning and Environment Act 1987 (P&E Act).

However, a planning permit is required for the creation of new access points along the Calder and Mallee Highways and the accommodation facility at Ouyen. The proponent will need to obtain these permits from MRCC.

2.3.4 Cultural Heritage

Under section 49 of the Aboriginal Heritage Act 2006 (AH Act), a cultural heritage management plan must be prepared for any project for which an EES has been required. Notice of approval of the cultural heritage management plan for the Project was issued on 24 January 2008.

The Heritage Act 1995 protects all non-Aboriginal archaeological sites in Victoria that are older than 50 years, regardless of whether they are recorded under the Victorian Heritage Inventory or not. The proponent will need to obtain consent to authorise the disturbance of an historical archaeological site.

2.3.5 Radiation Act 2005

The Proponent may require a Management Licence under the Radiation Act 2005 (although there is a possibility of an exemption under Section 16). Further, a Radiation Management Plan (RMP) and a Radioactive Waste Management Plan (RWMP) are required in accordance with the relevant code of practice.

2.3.6 Flora and Fauna Guarantee Act 1988

A permit under the Flora and Fauna Guarantee Act 1988 (FFG Act) is not required to remove declared flora, but this exemption does not apply to fauna species that are protected under the FFG Act.

The Governor in Council made a Flora and Fauna Guarantee (Mineral Resources Development) Order (Order) on 20 September 1994, which is still current. In general, this Order authorises any person who undertakes authorised mining works, which have been the subject of an EES, to take protected flora, if the taking is as a result of or incidental to the carrying out of those works. The Order applies to restricted Crown land, unrestricted Crown land, freehold land owned by a public authority, or private land.

2.3.7 Commonwealth EPBC Act 1999

Approval is also required under the EPBC Act. In July 2004, a delegate of the Commonwealth Minister for Environment and Heritage advised that he had decided that the Project was a controlled action as it had potential to significantly impact on matters of national significance. The controlling provisions are:

- Sections 16 and 17B (Wetlands of international importance); and
- Sections 18 and 18A (Listed threatened species and communities).
The EES process was accredited as the assessment approach for this Project under the EPBC Act on 24 September 2004.

3 Environmental Assessment Context

3.1 Legislation and Policy Framework

The key approvals required for the Project to proceed are those under the MRSD Act, the EP Act, the AH Act and the EPBC Act. In addition to specific provisions of these Acts that will guide or determine the acceptability of the Project, there is also statutory policy made under the EP Act that needs to be complied with, including State environmental protection policy.

While the P&E Act is of limited direct relevance, the objectives of this Act, together with planning schemes made under the Act - including referenced strategies and plans, do provide guidance on the suitability of proposed land uses and development, and hence are relevant to the evaluation of the potential effects of the Project.

Several other pieces of legislation are also relevant, though of secondary importance, to the evaluation of the Project, viz:

- *Catchment & Land Protection Act 1994 (C&LP Act)*;
- *FFG Act*;
- *Radiation Act 2005*;
- *Road Management Act 2004*; and
- *Water Act 1989*.

In determining whether and on what basis the Project should proceed, this assessment takes into account relevant legislation and policy, which together form the context against which this Project needs to be evaluated.

3.2 Integrated Approach to Assessment

The EES Assessment Guidelines included draft evaluation objectives, which were suggested as a framework to guide an integrated approach to evaluation of the likely outcomes of the Project within the EES.

These evaluation objectives have now been revised and refined in light of the legislative and policy framework outlined above, as well as the clarification of issues through the EES and Inquiry report. The final set of evaluation objectives is presented in Table 1, together with key legislation that underpins them. Specific aspects of applicable legislation and related policy will be highlighted in the discussion under individual evaluation objectives.

The evaluation objectives provide a set of benchmarks for assessing likely environmental outcomes of the Project. In so far as particular objectives would only be partly or weakly satisfied, the specific statutory context needs to be further considered.

In line with applicable legislation, including the P&E Act, EP Act and EPBC Act, as well as the EE Act, the Assessment has regard to the consistency of the Project with ecologically sustainable development (ESD). The first three of these Acts incorporate objectives and/or principles of “ESD” or “sustainable development”. Further, the Ministerial Guidelines made under section 10 of the EE Act specifically require the assessment of the proposal and its effects to be in the context of the principles and objectives of ESD.
<table>
<thead>
<tr>
<th>Evaluation Objectives</th>
<th>Key Statutes</th>
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<tbody>
<tr>
<td>1. To enable an efficient mining project that contributes to the economic development of the State’s mineral resources while protecting the environment.</td>
<td>- MRSD Act</td>
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<tr>
<td>2. To provide clear overall social and economic benefits for the local region as well as the State.</td>
<td>- P&amp;E Act - MRSD Act</td>
</tr>
<tr>
<td>3. To minimise to the extent practicable, including through avoidance, adverse effects on surrounding land uses during mining, and provide for effective rehabilitation of affected land so as to enable productive use in the long-term.</td>
<td>- MRSD Act - P&amp;E Act - C&amp;LP Act</td>
</tr>
<tr>
<td>4. To minimise to the extent practicable, including through avoidance, adverse effects on residential amenity as well as risks to public safety and health during mine development and operation.</td>
<td>- EP Act - P&amp;E Act - MRSD Act - Radiation Act 2005</td>
</tr>
<tr>
<td>5. To minimise to the extent practicable, including through avoidance, adverse effects on both Aboriginal and non-Aboriginal cultural heritage values.</td>
<td>- Aboriginal Heritage Act 2006 - Heritage Act 1995 - P&amp;E Act</td>
</tr>
<tr>
<td>6. To minimise to the extent practicable, including through avoidance, adverse effects on floral and faunal species and communities protected under either the FFG Act 1988 or the EPBC Act 1999.</td>
<td>- P&amp;E Act - FFG Act - EPBC Act</td>
</tr>
<tr>
<td>7. To minimise to the extent practicable, including through avoidance, adverse effects on the values and sustainability of both surface water and groundwater environments, including on protected beneficial uses.</td>
<td>- EP Act - Water Act - P&amp;E Act - C&amp;LP Act</td>
</tr>
<tr>
<td>8. To minimise to the extent practicable, including through avoidance, the generation of greenhouse gases.</td>
<td>- EP Act</td>
</tr>
<tr>
<td>9. To ensure that mining can be implemented in accordance with a robust and transparent framework for environmental management.</td>
<td>- MRSD Act - P&amp;E Act - EP Act - Aboriginal Heritage Act 2006 - EPBC Act</td>
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4 Integrated Assessment

4.1 Efficient Mining of Mineral Resources

Objective 1. To enable an efficient mining project that contributes to the economic development of the State’s mineral resources while protecting the environment.

Context

One of the objectives of the MRSD Act is to:

“...encourage an economically viable mining industry which makes the best use of mineral resources in a way that is compatible with the economic, social and environmental objectives of the State.”

This legislative intention is complemented by State planning policy. Clause 17.08 “Mineral resources” under the State Planning Policy Framework, which forms part of all planning schemes, states that it is policy “to protect identified mineral resources, to encourage mineral exploration and mining in accordance with acceptable environmental standards and to provide a consistent planning approval process.”

While not a statutory policy document, the Murray Basin Mineral Sands: Investment and Community Opportunities, 2005 document highlights the opportunity to develop mineral sands resources as a key economic development initiative for Victoria. The document highlights that the value of mineral sands in the Murray Basin is estimated at $20 billion with a predicted life of mining in excess of 30 years.

Key Issues

Various other environmental aspects of the mining and mineral processing proposal will be addressed under other evaluation objectives. The key issues that need to be considered in relation to ‘best use’ of the mineral resource are:

- Would the proposed mining methods and design enable efficient access to the mineral sands resource, to enable a high level of resource recovery?
- Would the proposed strategy for mineral processing provide an efficient approach for resource development and management in the region?
- What constraints on the Project could affect its economic viability?

Discussion

The EES outlined that the primary objective of the Project was to profitably mine and process ore from the Kulwin and WRRP deposits and that this will be achieved within a framework defined by the Project’s environmental and social objectives, which were to:

- “Plan, operate and decommission the Project in a manner consistent with good industry practice and in compliance with conditions and standards prescribed by the Victorian and Commonwealth governments; and

- Develop the Project in a well-informed climate of public participation, and in a manner that maximizes the positive effects and minimizes the negative economic, environmental and social impacts” (EES, p1-1).

The confined linear nature of the “beach strandline” mineral sand deposits which are proposed to be mined by conventional surface mining techniques, using earth moving machinery to remove the overburden and access the ore, will provide an efficient mining method. This approach will both minimize the amount of surface disturbance and enable optimal recovery of ore.

In terms of capital expenditure and associated economies of scale, the proposal to utilize Iluka’s Hamilton mineral sands separation plant to process HMC from different mineral sands mines, including the present Project, is an efficient commercial solution. The role of the Hamilton plant as a regional processing “hub”
supports the viability of mines which individually have relatively short lifespans for resource extraction. However, the further expansion of mineral sands mines in northern Victoria and southern NSW may present an opportunity in the medium-term to consider alternative modes of transport of HMC, i.e. railway\(^2\), and/or development of a new mineral separation plant within the region.

While Iluka presented some information in the EES and to the Inquiry on the factors that would affect the economic viability of the Project, the limited detail makes it difficult to evaluate. However, it is apparent that any constraints on mining of the linear ore deposits that caused a repeated “stop-start” to the progressive mining of the deposits, as well as some reduction in the total amount of resource available, would impact on the efficiency of mining operations as well as on the financial rate of return and aggregate revenues for Iluka. Other constraints would include restrictions on operating hours or a requirement to transport by rail. This Assessment needs to be mindful of the potential impacts – albeit at a qualitative level – of any constraints in considering the likely cost-effectiveness of particular environmental mitigation measures, as well as the overall economic, environmental and social outcomes.

**Conclusion**

Having considered the EES, public submissions and the Inquiry Report, it is my assessment that the Project as proposed would enable the efficient extraction and processing, and hence economic use, of the mineral sand resources.

**4.2 Economic and Social Effects**

**Objective 2. To provide clear overall social and economic benefits for the region as well as the State.**

**Context**

In addition to the purpose of the MRSD Act, relevant objectives of planning in Victoria under section 4(1) of the P&E Act include:

- (a) to provide for the fair, orderly, economic and sustainable use, and development of land;
- (c) to secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria;
- (e) to protect public utilities and other assets and enable the orderly provision and coordination of public utilities and other facilities for the benefit of the community; and
- (g) to balance the present and future interests of all Victorians.

*Growing Victoria Together, 2005* is the State Government’s 10 year vision for building a better society. Relevant goals include more quality jobs and thriving, innovative industries across Victoria and protecting the environment for future generations and efficient use of natural resources.

**Key Issues**

The Project has the potential to create both positive and negative economic and social effects. Potential economic effects identified in the EES include:

- The creation of investment, employment, revenue and purchase of goods and services;
- The encouragement of other mineral sand developments;
- The loss of agricultural productivity associated with both the severance and direct disturbance of properties; and
- Competition with the agricultural industry for workers.

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\(^2\) I note that two of the recommendations of the *Switchpoint: Victorian Rail Freight Network Review* released in December 2007 relate to (i) upgrading the Mildura and north-west railway branch lines to potentially capture mineral sands and other traffic and (ii) on commitment by Iluka of sufficient tonnages of mineral sands from the Euston mines to their mineral separation plant at Hamilton, that rail be the preferred mode of transport and that north-west lines be standardised to accommodate required traffic.
Potential social effects of the Project include:

- The relocation and displacement of residents;
- Health impacts on local residents;
- Impacts on social infrastructure, services and facilities; and
- Impacts on the availability of accommodation in Ouyen.

Economic effects

The EES estimated that the Project would require a total capital investment of approximately $180 million and generate total revenues of approximately $1,000 million. The total operating cost is expected to be approximately $660 million. Total royalties and taxes are estimated at approximately $130 million over the life of the Project. While these estimates do not in themselves enable an assessment of the likely net State and regional economic benefits of the Project, they do establish that it represents a major injection of investment and income which will have important flow-on effects in the regional and State economies.

The EES estimated that the Project will create up to 250 jobs during the six-month construction period and approximately 130 jobs during the operational period. It is envisaged that a majority of the non-professional workforce will be sourced locally. It also notes that the Mineral Separation Plant at Hamilton requires an ongoing supply of HMC. If HMC is not supplied then there is also potential for a loss of 70 jobs. Approximate annual salaries for proponent staff and mining contractor staff are anticipated to be $17 million during the operational period of the Project, a large proportion of which would be spent within the region.

In terms of loss of agricultural productivity, the mining works and associated infrastructure will directly affect 18 properties via severance and direct disturbance. The EES estimated if 300ha of agricultural land was removed from agricultural production then there would be an annual loss of approximately $49,000 and a total loss of approximately $370,000 over 7.5 years from cropping and grazing.

I note that no substantive evidence was submitted to either question or augment the EES assessment of likely economic effects. Further, no substantive evidence was presented in relation to the likely stimulus to other mineral sand developments or potential competition with the agricultural industry for local workers or impacts on local infrastructure, services and facilities.

Social effects

The EES anticipated that the Project will have some adverse social effects, particularly at the local level and in the Ouyen Township. In 2006, Ouyen had an estimated total population of 1068, while the EES estimated that a total of 31 residents live within the Project area.

As mentioned above, 18 properties would be directly affected by the mine works and associated Project elements. The EES indicated that Iluka had agreed to purchase land from 6 affected landowners and had purchased one residence (refer to Figures 2 and 3). Since the preparation of the EES, Iluka has clarified that it has purchased all of the properties affected by the Kulwin mine and associated Project elements except for two. In the case of the WRRP mine, Iluka has purchased one property and is negotiating to purchase another. All of the directly affected properties will be subject to landowner compensation agreements, which will address damage and improvement to land, loss of amenity, loss of opportunity and professional costs. It is also likely that some residents from properties affected by the WRRP mines may be temporarily relocated.

In addition to actual displacement of residents, there are potential impacts on local residents from dust, noise and radiation, which are discussed respectively in sections 4.4.1, 4.4.2 and 4.4.3 of this Assessment.

The EES recognised that some additional local infrastructure, services and facilities would be required as a result of the Project, though it contends that most urban infrastructure and services would cope with the increased population. Nevertheless, there may be a need for additional childcare services, teacher/s at the local schools and health and community services which may not be easily met.

As there is some uncertainty regarding the capacity of local services to meet the on-going needs of the operational workforce and their families, it will be appropriate for Iluka to liaise with Mildura Rural City Council, as well as schools, health and emergency services to identify the likely increased demand for services and ensure necessary resources are available.
The Inquiry acknowledged that a sudden influx of largely male workers could potentially cause some disruption to the local community. Though it made a finding that “social impacts particularly on the Ouyen township need to be carefully managed”, it did not make a specific recommendation. It did express support for the proponent’s intended response of encouraging the workforce to use local recreation services in Ouyen and to support these services through community partnerships.

Project-related demand for existing local housing is expected to be minimised by accommodating the workforce in a purpose-built accommodation facility in Ouyen and by using local motels/hotels for short periods of time. The Inquiry agreed that the proposed accommodation facility would address the housing supply issue.

The Inquiry noted both that while potential social effects are more subjective than economic effects, no submissions were received from local farmers or residents that raised concerns on social impacts. The Inquiry considered that Iluka had appeared to have consulted widely and that this had lead to an adequate local understanding of “the issues”. It strongly supported the establishment of an Environment Review Committee to monitor the environmental impacts of the proposal.

It is likely that development of the Project will cause some changes and stresses in the local community, which it is not practical to predict with confidence. For this reason, it will be appropriate to monitor impacts on both social infrastructure facilities and community well-being through a consultative process. If the Environment Review Committee doesn’t provide a suitable mechanism, as its focus will be on the environmental performance of the mine, an alternative approach will be needed.

Conclusion

Having considered the EES, public submissions and the Inquiry’s Report, it is my assessment that:

- The Project will have a net economic benefit at the regional and State level as a result of investment, taxes and royalties, direct employment and project-related demand for goods and services and
- The Project will have a net social benefit to the Ouyen township and regional community provided that potential adverse social effects are effectively monitored and managed.

Further, it is my assessment that:

- An Environmental Review Committee be established by DPI to monitor the environmental performance of the mine including off-site effects, in relation to implementation of the required Environmental Management Plan (EMP);
- Iluka establish a consultative arrangement with MRCC, together with DPCD, the Department of Human Services and Police and Emergency Services, to monitor community well-being and service capacity issues related to the presence of the mine and its workforce, and to guide appropriate action. Iluka should consider entering into a partnership agreement with MRCC and committing financial support to local services such as childcare.

4.3 Land-use and Rehabilitation

**Objective 3.** *To minimise to the extent practicable, including through avoidance, adverse effects on surrounding land uses during mining, and provide for effective rehabilitation of affected land so as to enable productive use in the long term.*

Context

The MRSD Act addresses land use and rehabilitation issues related to mining by establishing a framework aimed at ensuring that:

- Mineral resources are developed in ways that minimise impacts on the environment;
- Mined land is rehabilitated; and
- Just compensation is paid for the use of private land - refer to sections 2(b)(i), (iii) and (iv) respectively of the MRSD Act.
The MRSD Act specifically requires that a rehabilitation plan be prepared as part of the Work Plan and then approved by DPI.

The P&E Act is also relevant to addressing land use and sustainability issues related to mining. Its purpose is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. The key objective of the P&E Act under s.4(1) is to provide for the fair, orderly, economic and sustainable use, and development of land.

The management of land and water resources is the particular focus of the C&LP Act, which sets up a framework for the integrated management and protection of catchments, including to encourage community participation and to provide a system to control noxious weeds and pest animals.

**Key Issues**

In addition to direct displacement of land uses by mining and related works, these activities can affect adjoining land uses. Some of the factors that can affect adjoining land uses are severance, dust, noise and the spread of weeds and pest animals. Issues related to noise and dust are addressed in section 4.4.

The temporary loss of agricultural land is a direct consequence of mining, while the recovery of agricultural production will depend on effective rehabilitation after mining. An equivalent situation applies to the removal of native vegetation as part of mining.

Effective rehabilitation depends on the re-establishment of suitable soil and drainage conditions, as well as equivalent productive potential or vegetation.

### 4.3.1 Land-use

Approximately 80 percent of the Project area is currently used for dryland agriculture and 20 percent supports native vegetation. Cereal production is the main agricultural activity with some grazing of sheep and cattle. A dog breeding business is also located within the Project area near the WRRP deposits.

The EES concluded that the project will impact on residences, local businesses and farming activities in the immediate vicinity of the mine site, but is not expected to have any impact on the existing use of agricultural land beyond the mine site. The EES notes that liaison between Iluka, the construction contractor and relevant landholders will be needed to determine the most appropriate measures to minimise impacts on farming operations, including in relation to property access, stock movement and rehabilitation.

The EES indicated that compensation packages will be negotiated with affected landowners in accordance with s.85 of the MRSD Act to address anticipated losses to production, amenity and opportunity as a result of direct disturbance or severance of properties. However, it is important to note that Iluka has purchased the majority of the properties likely to be affected by the proposed mining.

### 4.3.2 Rehabilitation

The total area of land to be disturbed by project works is approximately 2,500ha, including 256.2ha of native vegetation. All plant facilities, offices and carpark areas, stockpiles and ancillary infrastructure will be located on cleared agricultural land, in order to minimise the loss of native vegetation.

The EES indicated that the general aim of rehabilitation will be to restore land capability to pre-mining conditions, while specific objectives are to be developed in consultation with stakeholders prior to and during mine site rehabilitation. Iluka proposes to conduct revegetation trials during the operation of the project to assess the feasibility of different rehabilitation techniques. Decommissioning procedures are proposed for infrastructure, equipment, facilities, onsite dams, infiltration basins and tailings storage facilities (TSF).

Different strategies are to be applied for agricultural land and areas under native vegetation. Prior to land disturbance, the proponent proposes to conduct a baseline agricultural productivity assessment in consultation with landowners for each affected property. The intention is that agricultural land ‘will be returned as closely as possible to its pre-mining condition (or where possible, to an even better condition than that which was specified by the pre-mining agricultural productivity assessment.’ (EES, p7-242)
The EES outlined a number of options to restore native vegetation on private land, including rehabilitating land to its former state, revegetating adjacent areas of land owned by the proponent and conserving native vegetation by land purchase or protection via agreements or planning scheme provisions. The proponent’s preferred option was to revegetate other sites in order to enhance habitat, corridors and farm shelter belts.

Several submissions raised issues relating to rehabilitation. The main focus of the submissions was whether effective rehabilitation of areas containing native vegetation was possible. Specific concern was expressed that rehabilitation would be difficult given the semi-arid nature of the Project area, the ongoing drought and the longer-term implications of climate change. DSE expressed concerns about both the feasibility of achieving adequate rehabilitation and the reliance on testing revegetation techniques during the mining operation.

In relation to rehabilitation of land for native vegetation, the Inquiry commented that the re-establishment of native vegetation should be successful. The Inquiry found that the proposed on-site trials will be useful in determining actions to improve rehabilitation of land and to optimize techniques for native vegetation. The Inquiry was also of the view that the re-establishment of native vegetation was a long term process, which would be affected by climate change and the impacts of an extended drought.

DPI outlined a number of requirements for the Work Plan relating to landform, soils and materials management. The Inquiry agreed the requirements were appropriate.

DPI also expressed concern about the rehabilitation of the TSF and suggested that the proponent identify alternative end use options or alternative topsoil if the final surface was too saline to support pasture. The Inquiry also found that the establishment of pasture over the TSF may not be the best option and suggested that more salt-tolerant plant species might provide a more persistent cover.

The EPA also expressed concern that the EES did not outline the proposed rehabilitation of the infiltration basins post mining. This issue will need to be incorporated into the revised rehabilitation plan forming part of the Work Plan.

Overall the Inquiry concluded that the basis of the proposed rehabilitation appeared sound. However, the Inquiry expressed surprise that more evidence of successful rehabilitation was not provided by the proponent, especially as it had substantial experience in rehabilitating mined land. The Inquiry found that long term monitoring well beyond 10 years after the mine closure may be required and that the proposed closure criteria need further development.

Conclusions

Having considered the EES, Inquiry Report and other relevant information, it is my assessment that:

- The Project’s direct impact on residences, local businesses and local agriculture, will be able to be adequately addressed through a combination of impact mitigation measures, compensation payments and property purchases.
- Iluka’s proposed approach to rehabilitation of land impacted by the Project is sound and, in general, should enable successful rehabilitation of land to agricultural use.
- The proposed rehabilitation of the TSF requires further assessment, including a material balance to explain how rehabilitation materials will be provided for the pit voids and for capping the TSF, taking into account volumes of saline and non-saline overburden;
- The Rehabilitation Plan required under the MRSD Act incorporate specific closure criteria for the completion of rehabilitation, a monitoring regime of necessary duration (possibly exceeding 10 years where rehabilitation to native vegetation with particular EVC characteristics is required) to assess progress against these criteria, reporting of monitoring results to DPI and DSE, and provision for independent audit to determine compliance with the closure criteria. The closure criteria for rehabilitation of native vegetation on Crown land are to be endorsed by DSE. Closure criteria for all areas are to include landform completion and soil profile characteristics;
- The Minister for Energy and Resources set a substantial rehabilitation bond, sufficient to enable any residual measures necessary to complete rehabilitation of land to either agricultural use or native vegetation, consistent with the closure criteria under the approved Rehabilitation Plan, if this is not achieved by the holder of the Mining Licence.
4.4 Public Health, Amenity and Safety

Objective 4. To minimise to the extent practicable, including through avoidance, adverse effects on residential amenity as well as risks to public safety and health during mine development and operation.

Context

Potential health, safety and amenity effects are inherent aspects of environmental effects to be considered as part of the assessment process under the Environment Effects Act 1978. One specific legislative basis for considering these type of effects of development is an objective of the Planning and Environment Act 1987: “to secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria” 3.

The EP Act provides a statutory framework for the protection and maintenance of environmental quality sufficient to protect existing and anticipated beneficial uses of the environment. It also establishes the Environment Protection Authority (EPA) and allows the creation of subordinate legislation, including State Environment Protection Policies (SEPPs) that set out the beneficial uses and required environmental quality of the environment.

The EP Act outlines a number of relevant principles of environment protection, including:

1B. Principle of integration of economic, social and environmental considerations;
1C. Precautionary principle;
1D. Principle of intergenerational equity;
1E. Principle of conservation of biodiversity diversity and ecological integrity;
1I. Principle of wastes hierarchy; and
1J. Integrated environmental management.

Key Issues

The project has the potential to have a number of effects on the local community, in particular the residents in close proximity to the mine deposits. These effects include:

- Air emissions generated from the use of earthmoving equipment and transportation of HMC.
- Noise emissions generated from construction activities (including earthworks and buildings) and mining operations (including the extraction of ore and overburden, operation of the processing plants and temporary use of diesel-powered generators).
- Radiation exposure through direct exposure to radioactive material and internal exposure through ingestion or inhalation of radioactive material.
- Visual and landscape character impacts from a modified landscape due to the location of project components, including buildings and stockpiles, and provision of lighting on buildings and vehicles.
- Traffic impacts generated by additional traffic, increased road maintenance, restricted access, changed road environment, diversions and detours of local roads and cleared native vegetation in road reserves.

4.4.1 Air Emissions

SEPP (Ambient Air Quality) and SEPP (Air Quality Management (AQM)) provide for the protection of beneficial uses dependent on air quality, in particular:

- Life, health and well-being of humans;
- Life, health and well-being of other forms of life including the protection of ecosystems and biodiversity;
- Local amenity and aesthetic enjoyment;

3 Under s.4(1)(c) of the P&E Act.
• Visibility;
• The useful life and aesthetic appearance of buildings, structures, property and materials; and
• Climate systems that are consistent with human development, the life, health and well-being of humans and the protection of ecosystems and biodiversity.

Emissions of the indicators defined in the SEPP (AQM) must be managed to ensure that the beneficial uses outlined above are protected. Emissions can be controlled by applying best practice or to the maximum extent achievable where class 3 indicators may be emitted.

The Protocol for Environmental Management: Mining and Extractive Industries, December 2007 (PEM) sets out the requirements for assessment and management of emissions to the air environment from the mining and extractive industries. An air quality assessment in accordance with the PEM is required when a project requires an EES or Works Approval.

The PEM was finalised after the preparation of the EES and outlines the process for industry to demonstrate compliance with SEPP (AQM). A Level 2 assessment was required for the Kulwin deposit and a Level 1 assessment was required for the WRRP deposits.

The air quality investigations in the EES concluded that the most significant air emissions from the project would be dust associated with stripping, stockpiling, backfilling, transporting and wind erosion. Other potential emissions included vehicle exhaust emissions and radioactive gas emissions.

The air quality assessment prepared for the project included monitoring of existing and background air quality, estimating mine-related dust emissions, modelling dust and metal dispersion and recommending management and mitigation measures. The modeling predicted PM$_{10}$ and PM$_{2.5}$ concentrations and annual average dust deposition rates at the 18 closest residences. The modelling assumed a dust control of 90% except for those areas where dust was unable to be controlled, i.e. areas being actively mined or reshaped.

The following indicators were assessed: PM$_{10}$ (particles with mean aerodynamic diameter less than 10 microns), PM$_{2.5}$ (particles with mean aerodynamic diameter less than 2.5 microns), respirable crystalline silica (based on highest predicted PM$_{2.5}$ concentration) and heavy metals.

When compared against the EPA criteria, the EES concluded that exceedances of the predicted average 24-hour PM$_{10}$ concentrations were likely to be exceeded at two unoccupied and three occupied residences being 3K(u), 6K(u), 7W(o), 8W(o) and 9W(o). The EES predicted that the EPA goals for PM$_{2.5}$ and for dust deposition would not be exceeded at any of the residences. The highest predicted annual average PM$_{2.5}$ concentration was at unoccupied residence 6K(u), which the proponent has acquired.

The EPA submission raised a number of issues with the assessment. Firstly, that it was unclear how a dust control of 90% was to be achieved and how it related to best practice and maximum extent achievable (MEA) for the site. The EPA recommended that best practice and MEA control of emissions must be identified and included in the EMP for the project. The EPA is also of the view that dust emissions where active mining was being undertaken or where the mine is being reshaped should be controlled and uncontrolled emissions should not occur.

The EPA also raised issues about the modelling and explained that the PEM required modelling of PM$_{10}$ and PM$_{2.5}$ as a gas rather than assuming deposition from the plume. The EPA explained that the use of deposition in the modelling of PM$_{10}$ was likely to underestimate the off-site impacts. The EPA indicated that modelling PM$_{10}$ as a gas would increase predicted levels 1km from the site by 14% and this could lead to a greater number of exceedances at some residences.

The EPA also pointed out that the results of modeling NO$_2$ and CO were not included but agreed that it was unlikely that levels of NO$_2$ and CO would exceed the assessment criteria in the PEM. The EPA also agreed that the predicted levels of respirable crystalline silica were well below the assessment criteria at most residences.

At the Inquiry hearing, the EPA advised that under the PEM, a Level 1 assessment would be required for the WRRP deposits unless residence 7W(o) was acquired then a Level 2 assessment would be required. As previously mentioned, the proponent advised that it was negotiating to acquire residence 7W(o). If these negotiations are successful then the EPA agreed that only two residences were likely to be impacted by air emissions from the project namely residence 8W(o) and residence 9W(o).
Given that the modelling predicted a significant number of exceedances of the PM$_{10}$ assessment criteria, the EPA has also recommended that a reactive management strategy with real time monitoring of PM$_{10}$ be implemented.

Submissions on air quality were also received from DPI and DHS. DPI made several comments in relation to ensuring the EPA was satisfied with the assessment, requiring the proponent to undertake further risk assessment in relation to the sites where exceedances will occur, requiring a detailed strategy to address potential exceedances and ensuring compliance with applicable standards was a condition of the work plan.

The submission from DHS commented that no residents adjacent to mining shall be subjected to air quality parameters in excess of the specifications contained with the SEPP (AQM) and the PEM.

The Inquiry concluded that the modelling undertaken had been thorough and well documented. It also concluded that the modelling of PM$_{10}$ indicated a real likelihood of some exceedances. The Inquiry noted the changed status of some of the residences and indicated that there still two residences - 8W(o) and 9W(o) - which would be likely to be exposed to PM$_{10}$ concentrations in excess of the prescribed limit. The Inquiry also noted that the modeling results indicated exceedances were not likely to be only once or twice but more likely for several or more days at a time depending on the time of year.

In relation to the likely crystalline silica concentrations, the Inquiry considered the assessment was acceptable and agreed with the EPA that the proponent needed to demonstrate ‘maximum extent achievable’ for this Class 3 pollutant. Similarly, Inquiry also agreed that the level of control for several heavy metals would also need to be ‘maximum extent achievable.’

The Inquiry accepted that the air quality consultant had attempted to identify ‘best practice’ and ‘maximum extent achievable’ control methods but had not followed the process in the PEM as required. The Inquiry concluded that such justification could be included in the EMP for each mine. The Inquiry also indicated that the proponent must have the required reactive management strategy in place to avoid exceedances of the PM$_{10}$ criteria at residences 8W(o) and 9W(o).

Having considered the EES and the Inquiry’s Report, it is my assessment that:

- There is a likelihood that the Project will result in unacceptable air quality impacts at two residences (possibly three residences if residence 7W(o) is not purchased by the proponent);
- The proponent will need to have a reactive management strategy in place to avoid exceedances of the PM$_{10}$ criteria at the affected residences; and
- The proponent will need to provide adequate information in the EMP to satisfy the requirements of the Protocol for Environmental Management – Mining and Extractive Industries.

### 4.4.2 Noise Emissions

The SEPP [Control of Noise from Commerce, Industry and Trade] No. N-1, 1989 [SEPP N-1] is the Victorian standard for noise emissions for commercial, industrial and trade premises within the metropolitan Melbourne area [EPA submission]. SEPP N-1 outlines a procedure for determining noise limits and aims to protect people from the effects of noise in noise sensitive areas.

The Interim Guidelines for Control of Noise from Industry in Country Victoria, N3/89 apply to industries outside of Metropolitan Melbourne and provides guidance in relation to setting noise limits in regional Victoria. The guidelines adopt the SEPP N-1 for use in regional Victoria where background noise levels are comparable to metropolitan Melbourne. Building construction and physical plant works are also subject to the Noise Control Guidelines TG302/92.

Given that there is no equivalent SEPP for regional Victoria, the noise limits outlined in the SEPP [N-1] have been applied to this project. The Interim Guidelines allow the decibel limits to be increased by 10dB[A] for the daytime period during the construction of an industry provided the new limit does not exceed 68dB[A].

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The project will operate 24 hours a day, 7 days a week. There are 18 residences located within a 15km radius of the Kulwin and WRRP deposits. The residences are located between 190m and 8.45km from the deposits. The closest residence 7W[o] is located approximately 190m from the WRRP deposits. Four of the residences are unoccupied.

The EES assessed the impact of noise from the project and included background monitoring and noise modelling which predicted noise impacts at each of the 18 residences for normal and adverse weather conditions for 13 mining stages along the deposits.

The noise modelling concluded that the noise levels generated by the project would not exceed the EPA noise limits at any occupied residence near the Kulwin deposit but would exceed the limits at two unoccupied residence [residences 3K[u] and 6K[u]]. At the WRRP deposits, the noise limits would be exceeded at three residences [residences 7W[o], 8W[o] and 9W[o]] and one unoccupied residence [residence 6W[u]]. For residence 7W(o), the noise limits will be exceeded during the day, evening and night time periods in stage 4 and during the night time period under adverse weather conditions in stage 5 of mining WRRP. At residence 8W(o), the noise limits will be exceeded during the evening and night periods for stage 1 and night period under adverse weather conditions for stage 6. At residence 9W(o), the noise limits will be exceeded during the night periods for stage 1.

The EPA submission highlighted that the noise assessment did not compare predicted noise levels to higher construction noise limits and recommended that building and plant construction should be limited to the day period. The EPA also commented that physical feature construction should be limited to the day period or not be audible at night.

The EPA expressed concern that the noise assessment did not show a summary of enhanced [downwind] propagation conditions and that the likely impact on sensitive areas during the day or evening periods was underestimated during these times. Further information was provided by the proponent’s Air Quality Consultant, which concluded that wind enhanced noise propagation could increase noise levels by up to 3.5dB[A] and there would be no additional exceedances at residences near the Kulwin deposit but one additional exceedance at residence 8W[o] near the WRRP deposits.

The EPA also expressed concern although exceedances were predicted that a full analysis of practicable noise mitigation measures had not been provided, in particular the option of day time extraction only. The EPA recommended that a full assessment of the practicable range of noise control measures and source treatment occur, that the proponent provide a clear commitment and strategy to protect the amenity of residents from noise impacts, and that best practice noise source controls be implemented.

Four other submissions also addressed noise impacts. DHS stated that no resident shall be subject to noise levels in excess of the relevant criteria. DPI indicated that detailed management plans to mitigate or address exceedances would be required and suggested that a noise management strategy be prepared as part of the work plan. DPI also commented that where exceedances had been identified all practicable efforts should be made to reduce noise before moving to mitigation and negotiation.

The Victorian Malleefowl Recovery Group [VMRG] and DSE addressed the impact of noise on native fauna. Whilst the Inquiry agreed that potential impacts on noise had not been addressed, it concluded that such impacts would be expected to be minor.

The Inquiry noted the agreement between the proponent and the regulatory authorities regarding the use of N3/89 as the basis for the setting of noise limits to apply to the project. The application of TG 302/92 and the definition of construction activities were also accepted.

The Inquiry concluded that the matters of significant concern were not the limits but the suggested application that exceedances are allowed in some circumstances by negotiation with affected residents. The Inquiry found that this approach was unacceptable. The Inquiry noted that compliance with N3/89 does not result in elimination of adverse impact but limits it to what can be expected to satisfy most people most of the time.

The Inquiry was of the view that some modification to the N3/89 night limits could be allowed without comprising residential amenity. The Inquiry recommended that an internal noise limit for the N3/89 night limit of 47dB[A] be substituted subject to the agreement of owners/occupiers, an independent assessment

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[5] This is a maximum noise levels (Lmax measured in dB(A) using the fast time weighting) applicable to a single event in a bedroom, to protect against sleep disturbance.
and monitoring of compliance. The Inquiry suggested a maximum external noise level of 57dbA without modifications to the residence and up to 62dB(A) if modifications were made and that windows and doors are shut at night.

The noise survey was considered adequate with the inclusion of additional information provided by the air quality consultant on the noise impacts during the day and evening periods under enhanced [downwind] propagation conditions.

In relation to the adequacy of mitigation measures, the Inquiry indicated that the range of measures available could produce the required outcomes, i.e. compliance with the noise limits. The Inquiry provided further comment that it was difficult to see how restricting mine operating hours to day only during one stage of six stages of the WRRP mine [assuming residence 7W(o) is purchased] could threaten the viability of the project as a whole as indicated by the proponent.

Having considered the EES and the Inquiry's Report, it is my assessment that:

- The Project should meet the noise limits as specified in the *Interim Guidelines for Control of Noise from Industry in Country Victoria, N3/89* during the day and evening periods subject to the application of both best practice noise source controls and appropriate mitigation at the three affected residences namely 8W[o] and 9W[o] and at residence 7W[o] if not purchased by the proponent.
- The N3/89 night limits are unlikely to be complied with at these affected residences at certain stages of mining the WRRP deposit and an alternative night limit may be warranted to address the protection of sleep within bedrooms of these affected residences.
- In order to address this issue, a Noise Management Plan (or Strategy) be prepared, as part of the Work Plan, to minimise adverse noise impacts and provide adequate protection of the acoustic amenity at nearby residences. The plan must outline specific measures that will be adopted to meet N3/89 limits over the life of the project. The plan must also include best practice noise control and treatment, where possible, and specific agreed mitigation for each residence for the life of the project.
- Once the proponent has demonstrated best practice noise control and mitigation will not comply with N3/89 night limits at the three affected residences for specified periods during the life of the project then it may be practical to adopt an alternative criterion of ‘Lmax 47dB(A)’ or less for all habitable rooms for the purpose of sleep’. The criterion should protect key night-time use of a residence for sleep however other amenity expectations such as relaxing and quietude may not be met. The departure from the N3/89 night limit should only occur for the three affected residences if:
  - There is evidence of the owner/occupier providing informed consent;
  - A proposed monitoring program has been prepared in consultation with the EPA; and
  - There is evidence, assessed in consultation with the EPA, that the 47dB(A) maximum noise level can be achieved in the habitable rooms.
- For the three affected residences where the 47dB(A) limit is adopted, a maximum external night limit of 57dB(A) should also be applied assuming an open bedroom window. In exceptional circumstances where 57dB(A) is unable to be met outside with best practice noise control and mitigation in place, a maximum night limit of no more than 62dB(A) may be applied under the following conditions:
  - There is evidence of the owner/occupier providing informed consent, which clearly acknowledges that all windows and doors need to remain shut at night time to ensure that operational mining noise does not impact on sleep;
  - A proposed monitoring program has been prepared in consultation with the EPA; and
  - There is evidence, assessed in consultation with the EPA, that the 47dB(A) maximum noise level can be achieved in the habitable rooms and that appropriate mechanical ventilation is in place with closed windows and external doors.

---

6 This is a maximum noise level (Lmax measured in dB(d) using the fast time weighting) applicable to a single event in a bedroom to protect against sleep disturbance.
4.4.3 **Radiation Emissions**

The Radiation Act 2005 provides a framework for the transporting, mining and processing of radioactive material and waste. The regulations, amongst other things, prescribe the radiation dose limits.

The Code of Practice and Safety Guide outlines the requirements to protect human health and the environment from radioactive wastes in mining and mineral processing industries. The Code also requires preparation and implementation of a radiation management plan. A radiation management plan and a radioactive waste management plan was exhibited with the EES (refer to Appendix K).

The EES included an assessment of the radiological impacts of the project (refer to Appendix J). A background survey was conducted to establish background dose rates and the natural levels of background radioactivity in the soil, groundwater, ore and overburden.

The EES outlined that all “heavy mineral sand deposits contain traces of uranium and thorium, which are naturally occurring radioactive materials” (EES, p7-117) and most of the radioactivity is associated with the occurrence of monazite.

The assessment found that typically the background radiation dose rates were low throughout the site. Whilst the levels at the Kulwin Test pit were considerably higher than the background levels they were still well below the global average external dose rate. The assessment concluded that the expected radiation exposure levels for both workers and the public would be low and well below established limits.

Four submissions addressed radiation issues. The DHS submission advised that the radiation management plan and radioactive waste management plan addressed the required elements of radiation protection for the project. DHS also indicated that the proponent may need to apply for a Management Licence or to vary its current licence under the **Radiation Act 2005**.

The Ouyen Inc. submission sought clarification regarding radiation risk and Mr Hopkins’ submission expressed concern that there seems to be less concern for radiation hazards with this project than with others and potential impacts of radiation on water tank supplies and crops.

The DPI outlined that the handling and disposal of monazite waste must be closely managed to minimize post closure risks associated with exposures to radiation from this material. The submission highlighted that the proponent proposed to bury “monazite waste at a depth of 4m based on its assessment that when it is buried at depths greater than 1m, surface exposures to radiation were minimal” (DPI submission). DPI accepted that accidental exposure to radiation post mine closure was very unlikely.

The Inquiry concluded that the radiation assessment was adequate, that the occupational and public dose rates will be well below the prescribed limits. In reaching this conclusion, the Inquiry commented that the adequacy of the radiation assessment should not be compared against others given that projects vary quite considerably.

The Inquiry also took comfort in the fact that a Radiation Management Plan and a Radioactive Waste Management Plan had already been prepared to the satisfaction of DHS. The Inquiry also found that the proposed methods proposed in relation to appropriate handling and disposal of monazite waste were adequate and did not understand DPI’s concern.

The Inquiry did not consider that further clarification could be provided in relation to potential radiation risks and did not believe that the concerns about water tank supplies and crops raised by Mr Hopkins were significant on the basis that predicted dust deposition rates outside the mine site were low and only a small fraction would be radioactive.

In light of the above, it is my assessment that:

- The radiation impacts from the Project will be minimal, particularly given that a Radiation Management Plan and Radioactive Waste Management Plan be are to be implemented.

In addition, it is my assessment that:

- DHS should clarify whether the proponent requires a Management Licence for the project or variation to its existing Licence under the **Radiation Act 2005**;

23
• If a management licence is required, that DHS and DPI work together to ensure that the management licence is compatible with the mining licence; and
• The proponent detail in the work plan how monazite waste will need to be managed.

4.4.4 Visual and Landscape Character

The existing landscape is described in section 1.3 of this document. The EES depicts the regional landscape surrounding the Project area as:

“… generally undulating with topography varying by 30m over 1km. The landform comprises dunal forms that have been modified by dryland agriculture into strong rectilinear patterning and cleared of trees for broadacre crop production and grazing. Native vegetation is confined to Crown land and road reserves.” (EES p7-133).

A visual and landscape character assessment was prepared for the project, which evaluated the impact of the project based on the degree of visual modification in the context of the visual sensitivity of surrounding land uses from which the project may be visible (refer to Appendix L of the EES). The assessment included a quantitative assessment of the project’s visibility from 22 viewpoints, being residences and the Calder and Mallee Highways, and a qualitative assessment of how sensitive viewers would be to landscape changes as a result of the project.

The EES indicated that the project will have a high visual impact at residences 3K(u) and 6K(u) near the Kulwin deposit and residences 2W(o), 7W(o), 8W(o) and 9W(o) near the WRRP deposits due to the location of stockpiles and infrastructure. A high visual impact will also occur where the Calder and Mallee Highways cross the Project area. The EES identified a medium visual impact at residence 3W(o) and a low visual impact at the 5 other residence viewpoints.

The EES anticipates that “lighting emissions” will appear as a gentle glow.

No submissions were received on visual and landscape character.

The Inquiry found that the project will result in significant visual impacts to three residences 2W(o), 8W(o) and 9W(o) at the WRRP deposits given that the proponent had advised that it has purchased 3K(u) and 6K(u) and was negotiating to purchase 7W(o).

The Inquiry commented that the visual impact would be limited to defined periods of time and agreed that the temporary nature of the visual impact reduces the adverse amenity impact.

It was also recognized by the Inquiry that vegetation screening will have a limited part to play given the semi-arid environment and supported the proponent's proposal to establish a community comments and complaints procedure. The Inquiry also agrees that the decision to not divert the Calder and Mallee Highways and the retention of roadside vegetation at these locations will assist in reducing the visual impact of the project for road users.

I note that the EES states that:

“… visual impacts will remain high for these residences until pre-mine vegetation cover is restored and the landform recontoured.” (EES p7-139).

Having regard to the above, it is my assessment that:

• The Project will have significant visual impacts on views from residences 2W(o), 8W(o) and 9W(o), and possibly 7W(o) if it is not purchased, at the WRRP mine and that it may be some time before the adverse visual impact is reduced given the slow growth rates of new plants in the semi-arid environment.

It is also my assessment that:

• The proponent and DPI give further consideration to other mitigation measures including artificial screening to reduce visual impacts at these residences.
• The proponent establish a “community comments and complaints procedure” to respond appropriately to community concerns about the effects of the Project.
• An Environmental Review Committee, as recommended by the Inquiry, be established to monitor environmental impacts including visual impacts of the Project.

4.4.5 Roads, Traffic and Transport

The Roads Management Act 2004 (RM Act) sets out a statutory framework for the management of the road network in Victoria. All road works need to be carried out in accordance with the RM Act; the Worksite Safety - Traffic Management Code of Practice and the AS1742.3 - Traffic Control Devices for Works on Road.

The road network adjacent to the Project area includes the Calder and Mallee Highways and a number of local roads and private roads. The Kulwin deposit also crosses the Kulwin to Mittyack Railway Line.

The EES included a traffic impact assessment, which can be found in Appendix M. The EES concluded that the construction and operational phases of the Kulwin and WRRP deposits will affect the Mallee and Calder Highways by increasing traffic volumes by 20 to 30% per day. This increase will not affect the service level of either highway as they will still be operating within their carrying capacity of 1,500 vehicles per day. Additional traffic will predominantly be in the form of operations, employee traffic and haulage.

Haulage operations along the Mallee, Calder, Sunraysia and Henty Highways will use the existing State Highway network and approved B-double routes, both along the route and through towns. The EES found that it is unlikely that these additional truck volumes will impact upon the operation or overtaking opportunities of the four highways.

The EES proposed that all heavy vehicle traffic generated during the operation will access the Kulwin and WRRP deposits from a single point located on the Mallee or Calder Highways. The construction of a single access point to the deposits will minimise the creation of noise and dust impacts on residential properties.

The EES proposed four local road detours and/or diversions in the vicinity of the Kulwin deposit and one within the vicinity of the WRRP deposits. The diversions, in conjunction with the road detours, will be constructed on private property adjacent to road reserves. The EES concluded that these changes may inconvenience local road users by disrupting preferred routes and limiting access to some areas of private property for the duration of mining in that area. It is also proposed that local roads will not be used by the operational mine traffic.

The EES outlined that all highway intersections and access points will be designed and constructed in accordance with VicRoads requirements and local road detours will be designed and constructed in accordance with Mildura Rural City Council guidelines and standards. A traffic management plan for the project will be developed before construction commences in consultation with VicRoads, Mildura Rural City Council and emergency services.

Three submissions addressed potential road, traffic and transport issues. VicRoads agreed that, based on traffic volumes provided in the report, the additional traffic should not impact significantly on the level of service of any of the arterial roads along the route. However, VicRoads sought further clarification and that:

- The mine-related traffic will not have a detrimental impact on the safety and level of service of the arterial road network; and
- A traffic hazard will not be created where the mines’ access roads intersect with the Mallee and Calder Highways.

Ouyen Inc. sought clarification as to who will ensure the quality of road surface and other bitumen surfaces impacted by the increased mine traffic with particular reference to the Mallee and Calder Highways and Sunraysia Highway as part of the route to the truck route to the processing plant.

Mr Hopkins did not directly object to or seek any further clarification of any matters related to roads, traffic and transport but advised that the project must be environmentally, socially and economically sustainable. During the Inquiry hearing, Mr Hopkins also submitted that the project provided an opportunity to utilise rail transport infrastructure as a means of shifting the HMC.

The Inquiry considered that the EES identified the range of measures that will need to be addressed in relation to road, traffic and safety issues and noted that the detail would be included in the Transport Management Plan.
The Inquiry considered that it was more difficult to resolve the issue of rail usage rather than road to transport the HMC to Hamilton. The Inquiry considered that significant environmental benefits would be achieved if a feasible rail option was selected in accordance with the State Government’s *Growing Victoria Together* policy.

The Inquiry found that the Work Plan for the project should include a requirement for a Transport Management Plan and that plan include actions to be taken to investigate the option of transporting HMC to Hamilton by rail.

Having considered the EES and the Inquiry report, it is my assessment that:

- The Project should not have a significant impact on road traffic and safety given a suitable Traffic Management Plan is to be prepared and implemented in consultation with the relevant authorities. However, some inconvenience is likely to be experienced at the local level because of the local road detours/diversions required in the vicinity of the deposits.

### 4.5 Cultural Heritage

**Objective 5.** *To minimise to the extent practicable, including through avoidance, adverse effects on both Aboriginal or non-Aboriginal cultural heritage values.*

**Context**

The project has the potential to affect Aboriginal and non-Aboriginal cultural heritage by:

- Destroying or partial destroying known cultural heritage sites or known zones of archaeological sensitivity;
- Destroying unknown sites or objects; and
- Impacting on existing landforms, i.e. disposal of excess groundwater to salinas.

#### 4.5.1 Aboriginal Cultural Heritage

The Project area appears to have been occupied by the Dadidadi, Wergaia and Jarijari language groups and it was thought that the occupation would have been in the form of temporary camps used on a seasonal basis due to a lack of permanent water bodies in the Project area (p15 of the Appendix O - Historical Heritage Assessment).

The EES identified ten registered Aboriginal sites within the Project area. One of the sites was of high scientific significance, four of moderate scientific significance and five of low scientific significance. Together three sites (AAV 7427-174, 7427-175 and 7427-176) are believed to be of high scientific significance “due to the range of Aboriginal activities represented and the potential for the places and objects to represent a variety of different phases of Aboriginal occupation.” (EES, p7-163)

A majority of the sites were associated with the salinas and most of the sites occurred within the three zones of Aboriginal sensitivity identified for the Project area. The sites consist primarily of stone artefacts. No burial sites were found but the EES indicated that there was potential for burial sites, particularly in the lunettes and dunes.

The EES concluded that the project will destroy five known Aboriginal sites, partially destroy two known Aboriginal sites and partially destroy three zones of archaeological sensitivity. Two sites of high scientific significance will only be partially impacted following mitigation measures (approximately 80% of AAV 7427-174 and 60% of AAV 7427-176 will be protected). The project could also potentially impact on Kulwin Salina 1, Kulwin Salina 3 and WRRP Salinas 3 and 4 if groundwater disposal to the salinas extended above the shoreline or associated material became exposed. There was also the potential that the project could destroy unknown sites and objects.

At the Inquiry hearing, the proponent advised that groundwater disposal to the salinas was no longer a contingency option.
No submissions were received on Aboriginal cultural heritage.

Under the *Aboriginal Heritage Act 2006* (AH Act), the proponent cannot commence works until a Cultural Heritage Management Plan (CHMP) has been approved under the Act. A draft CHMP was exhibited with the EES. The final CHMP has been submitted and assessed by Aboriginal Affairs Victoria. On 24 January 2008, a delegate of the Secretary of the Department of Planning and Community Development approved *Murray Basin Stage 2 Mineral Sands Extraction Project, Ouyen, North West Victoria Cultural Heritage Management Plan No. 10025*.

Based on advice that a CHMP had been approved, the Inquiry concluded that Aboriginal cultural heritage matters had been resolved and made no specific recommendations.

Having considered the EES and the Inquiry’s Report, it is my assessment that the potential effects on Aboriginal cultural heritage can be effectively managed through the implementation of the CHMP that has been approved under the AH Act.

### 4.5.2 Non-Aboriginal Cultural Heritage

The EES outlined that European settlement of the area began in the 1840s and that “*agriculture was not seriously undertaken until the 1880s, when the invention of the Mallee roller made it possible to clear large areas of Mallee scrub*.” During the 1900s, an extensive system of water channels was constructed to assist with agricultural development.

The EES identified three non-Aboriginal cultural heritage sites within the vicinity of the deposits which are listed on the Victorian Heritage Inventory. They are known as Hancock Homestead (7327-15), Green’s Homestead (7427-9) and O’Callaghans Homestead (7427-8). These places consist of “*structural remains in varying stages of decay*”. All are of low to moderate scientific significance and of local historical importance.

The field survey undertaken as part of Historical Cultural Heritage Assessment also identified features and locations associated with water channels, a former homestead known as Henderson’s homestead and a former Army barracks that was used as a barn within the Project area. Whilst a scatter of remains was identified at the location of the former Henderson’s homestead, no other archaeological evidence was identified.

Three zones of historical archaeological sensitivity were also identified in association with the three recorded sites. The historical cultural heritage assessment (Appendix O of the EES) concluded that the potential for other archaeological sites within the zones was low.

The project will destroy the remains of the unnamed homestead and partially impact the site of Green’s homestead. The remains of the Hancock homestead will be avoided.

No submissions were received in relation to non-Aboriginal cultural heritage.

The Inquiry also concluded that non-Aboriginal cultural heritage matters had been resolved and made no specific recommendations.

Having considered the above, it is my assessment that the non-Aboriginal cultural heritage impacts associated with the Project would be low provided that:

- The proponent obtains consent to disturb O’Callaghans Homestead from Heritage Victoria;
- The archaeological components of Green’s Homestead and Hancock Homestead sites are protected by site buffering as recommended in the Historical Cultural Heritage Assessment;
- Any induction program for staff and contractors includes cultural heritage awareness; and
- Heritage Victoria are notified of discovery of any unidentified cultural heritage site.
4.6 Terrestrial Ecology, Flora and Fauna

Objective 6. To minimise to the extent practicable, including through avoidance, adverse effects on native vegetation and biological diversity, including effects on floral and faunal species and communities protected under either the FFG Act 1988 or EPBC Act 1999.

Context

Victoria’s Biodiversity - Directions in Management (1997) – this strategy was prepared under the FFG Act to protect Victoria’s biodiversity. It provides a framework for responding to biodiversity challenges in different bioregions. In addition, some action statements prepared for species listed under the FFG Act, including for the Malleefowl and Regent Parrot, are directly relevant to the assessment of potential effects of the Project. At a National level, equivalent to the latter statements are the recovery plans prepared under the EPBC Act for species listed under that Act.

Victoria’s Native Vegetation Management – A Framework for Action (2002) (NVMF) gives effect to the native vegetation goals of Victoria’s Biodiversity, as well as reflecting Victoria’s commitments to the National Strategy for the Conservation of Australia’s Biological Diversity (2001). The NVMF is the principal document setting out Victorian Government policy for the protection of native vegetation. One of the guiding principles established in the framework is that ‘the retention and management of remnant vegetation is the primary way to conserve the natural biodiversity across the landscape’. The primary goal identified for native vegetation management is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a ‘net gain’.

Under the NVMF, net gain is to be achieved by following a three-step approach when considering particular development proposals:

1. As a priority, by avoiding the removal of native vegetation;
2. If removal cannot be avoided, by minimising the loss of native vegetation; and
3. By identifying appropriate offset actions.

Where offsets are an acceptable response to compensate for the loss of vegetation, the extent of the offset is determined on the basis of both the extent and quality of the vegetation to be removed and its conservation significance. A quantitative methodology of calculating habitat hectares (hab ha) is used, which takes account of site’s condition and landscape context.

The NVMF is largely implemented through the P&E Act, and in particular, clauses 15.09 and 52.17 under the Victoria Planning Provisions and all planning schemes in Victoria. While a planning permit is not required for the Project, the policy framework is still relevant, with the primary means of implementation being the Work Plan process or conditions under the MRSD Act.

One relevant objective of the EPBC Act is “to promote the conservation of biodiversity”, which closely aligns with an objective of ESD within the Commissioner for Environmental Sustainability Act 2003: “to protect biological diversity and maintain essential ecological processes and life-support systems”. The assessment of effects on EPBC Act listed species needs to take into account relevant recovery plans that have been prepared for threatened species under the EPBC Act.

Key Issues

The project has the potential to impact on biodiversity and habitat by:

- Removing native vegetation, most of which is of at least high conservation significance;
- Removing habitat for Malleefowl, Regent Parrot and other protected species;
- Fragmenting habitat areas and reducing habitat connectivity;
- Increasing weed invasion;
- Reducing the number of hollow-bearing trees and habitat availability; and
- Increasing predation on native fauna.
The EES included an assessment of the biodiversity and habitat effects of the Project (refer to section 7.3 and Appendices D, E, F and G). An addendum providing revised requirements for offsets for Regent Parrot habitat was also prepared.

### 4.6.1 Native vegetation

The mineral sand deposits are located within an area that has largely been cleared of native vegetation. The vegetation within the vicinity of the Kulwin deposit is largely confined to road reserves, the Kulwin Bushland Reserve and three larger parcels on freehold land. In the vicinity of the WRRP deposits, vegetation remains within three large parcels including a central block of public land (known as F1 block) adjoining McBains Bushland Reserve and freehold land. The vegetation in the south of the WRRP deposits provides links to the Bronzewing Flora and Fauna Reserve (BFFR) through vegetated corridors on freehold land. Refer to Figure 5.

#### Figure 5. BFF Reserve and Vegetated Habitat Corridors

The study area spans the Murray Mallee bioregion and the Lowan Mallee bioregion. Within this area, eight ecological vegetation classes (EVCs) have been identified, which broadly align with ten plant communities which have previously been identified.

The EES indicated that the Project will result in the clearing of 256.2ha of native vegetation in 29 patches (12 percent of the total mining footprint), comprising 116.84ha on freehold land, 13.63ha on roadside reserves, 120.6ha on unreserved Crown land (39 percent of F1 block) and 5.13ha on reserved Crown land (23 percent of Kulwin Bushland Reserve and 4.5 percent of McBains Bushland Reserve). Seventy percent of the native vegetation proposed to be cleared is in the Lowan Mallee bioregion and the other 30 percent is in the Murray Mallee bioregion.

As highlighted by DSE’s submission, the extent of clearing is very significant and almost unprecedented in terms of a proposal to clear native vegetation on public land to facilitate a private development (i.e. approximately 140ha, which is over 54 percent of the 256ha of vegetation to be cleared).

The native vegetation proposed to be cleared includes habitat for two species (29.3ha of Malleefowl habitat and 250ha of feeding habitat including 19.4ha from seven vegetated flight paths for Regent Parrot) listed under both the EPBC Act and FFG Act and another species (Bitter-bush Blue Butterfly) listed under the FFG Act. The project will also reduce the habitat values of current areas of native vegetation by separating
the McBains Bushland Reserve from the unreserved Crown land (F1 block) as well as dissecting the Kulwin Bushland Reserve.

The Project would also involve clearing 2630 large old trees, including 90 isolated large old trees within cleared paddocks. Large old trees are particularly important for fauna habitat, including for Regent Parrot.

The area of each EVC impacted by the project is summarised below in Table 2. A revised habitat hectare (hab ha) assessment for the Project, which was included in the Addendum to EES presented to the Inquiry, is summarised in Table 3.

### Table 2. Areas of impacted EVCs  
(Source: EES, p7-42 Table 7.6)

<table>
<thead>
<tr>
<th>EVC</th>
<th>Lowan Mallee Bioregion</th>
<th>Murray Mallee Bioregion</th>
<th>Area impacted (ha)</th>
<th>Balance remaining in study area (ha)</th>
<th>% of total area impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woorinen Sands Mallee</td>
<td>Least concern</td>
<td>Least concern</td>
<td>11.1</td>
<td>76.4</td>
<td>12.7</td>
</tr>
<tr>
<td>Woorinen Mallee</td>
<td></td>
<td>Vulnerable</td>
<td>6.0</td>
<td>81.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Chenopod Mallee</td>
<td>Least concern</td>
<td>Vulnerable</td>
<td>18.9</td>
<td>163.4</td>
<td>10.9</td>
</tr>
<tr>
<td>Loamy Sands Mallee</td>
<td>Least concern</td>
<td>Least concern</td>
<td>77.2</td>
<td>648.6</td>
<td>10.6</td>
</tr>
<tr>
<td>Loamy Sands Mallee/Red Swale Mallee</td>
<td>Least concern</td>
<td>Least concern</td>
<td>129.7</td>
<td>202.1</td>
<td>39.1</td>
</tr>
<tr>
<td>Red Swale Mallee</td>
<td>Least concern</td>
<td>Least concern</td>
<td>4.6</td>
<td>74.1</td>
<td>5.8</td>
</tr>
<tr>
<td>Sandstone Ridge Shrubland</td>
<td>Least concern</td>
<td>Least concern</td>
<td>3.4</td>
<td>21.6</td>
<td>13.6</td>
</tr>
<tr>
<td>Samphire Shrubland</td>
<td>Least concern</td>
<td>Least concern</td>
<td>5.3</td>
<td>108.7</td>
<td>14.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>256.2</td>
<td>1376.8</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Habitat hectare estimates for impacted EVCs  
(Source: Addendum to the EES)

<table>
<thead>
<tr>
<th>EVC</th>
<th>Conservation Significance</th>
<th>Area to be cleared (ha)</th>
<th>Hab ha Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woorinen Sands Mallee</td>
<td>High</td>
<td>11.1</td>
<td>6.64</td>
</tr>
<tr>
<td>Woorinen Mallee</td>
<td>Very High</td>
<td>6.0</td>
<td>2.86</td>
</tr>
<tr>
<td>Woorinen Mallee</td>
<td>High</td>
<td>0.73</td>
<td>0.29</td>
</tr>
<tr>
<td>Chenopod Mallee</td>
<td>Very High</td>
<td>18.9</td>
<td>12.54</td>
</tr>
<tr>
<td>Loamy Sands Mallee</td>
<td>High</td>
<td>77.2</td>
<td>93.11</td>
</tr>
<tr>
<td>Grasslands/Shrubland Mosaic</td>
<td>High</td>
<td>129.7</td>
<td>-</td>
</tr>
<tr>
<td>Red Swale Mallee</td>
<td>High</td>
<td>4.6</td>
<td>2.85</td>
</tr>
<tr>
<td>Sandstone Ridge Shrubland</td>
<td>High</td>
<td>3.4</td>
<td>2.63</td>
</tr>
<tr>
<td>Samphire Shrubland</td>
<td>High</td>
<td>1.65</td>
<td>0.66</td>
</tr>
<tr>
<td>Samphire Shrubland</td>
<td>Low</td>
<td>2.18</td>
<td>1.09</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>256.20</td>
<td>122.67</td>
</tr>
</tbody>
</table>

Under the NVMF, clearing of the area of very high conservation significance EVCs (15.4 hab ha) will require approval from the Minister for Environment and Climate Change. Normally, clearing of very high conservation significant vegetation is not permitted unless exceptional circumstances apply (i.e. impacts are an unavoidable part of a development project, and only with approval of the Minister for Environment and Climate Change based on considerations of environmental, social and economic perspectives from a Statewide perspective). Where a project is subject to assessment under the EE Act, the latter Minister’s decision is informed by the Minister for Planning’s Assessment.

All other native vegetation within the mining footprint, except for the Samphire Shrublands, is considered to be of high conservation significance due to it being habitat for Regent Parrot (approximately 250 ha or
121.6 ha). Under the NVMF, clearing of native vegetation of high significance is not generally permitted.

Section 5 of the EES included a number of alternatives or variations for the Project, as called for by the Assessment Guidelines. Several alternatives avoided key areas of native vegetation, including Malleefowl habitat, which would effectively reduce the overall amount to be cleared. Table 5.1 in the EES outlined the various consequences of the alternatives, including environmental benefits and impacts, as well as the impacts on the Project.

At the Inquiry hearing, DSE outlined further options to reduce the amount of native vegetation to be cleared. Options included not mining the Kulwin Bushland Reserve and avoiding the Malleefowl habitat in the southern end of the WRRP deposits, in light of the significant biodiversity benefits of doing so. The DSE submission to the Inquiry also highlighted alternatives 5, 8, 9, 10 and 11 as outlined in section 5 of the EES as examples of options to avoid some portion of the proposed clearance of native vegetation. However, the proponent rejected these alternatives in the EES.

A key question in relation to the Project is whether Iluka has sufficiently addressed the three-step approach to achieve net gain, especially the first step of avoidance.

The Inquiry noted the decision by Iluka to reduce the amount of native vegetation to be removed from 505ha to 256ha and highlighted a range of mitigation measures, which will minimise the amount of native vegetation to be cleared. The Biodiversity and Habitat Assessment in Appendix D to the EES indicated that the first mine plan dated March 2006 for the Project proposed removal of 505.33ha of remnant vegetation. Subsequently the plan was revised to retain as much native vegetation as possible - apparently without particular difficulty - by avoiding a large patch of vegetation on freehold land dissected by the Rainlover deposit and relocating stockpiles and roads to avoid native vegetation. Consistent with this, the EES indicates that the Rainlover deposit would be mined as isolated pits.

The habitat values of areas of vegetation affected by the proposed works, as well as the availability of offsets, will be considered further in the following pages. This information will enable conclusions to be drawn on the appropriate measures to avoid and/or minimise the extent of clearing.

### 4.6.2 Flora

The EES stated that a total of 260 plant species were recorded in the study area. It noted that though three EPBC-listed species (Club Speargrass, Desert Greenhood, Yellow Swainson-pea), one of which is also FFG-listed (Desert Greenhood), may occur in the study area. However, these latter species were not found during the EES surveys. Further, no EPBC or FFG-listed plant communities have been identified within the study area.

Ten species listed by DSE as extinct, endangered or vulnerable on the Statewide advisory list of rare or threatened plants were found within the study area or in the immediate surrounds. An additional 12 species of State significance may occur within the study area but were not recorded (EES, p7-42). Sixteen species of regional significance were also found within the study area.

Club Speargrass is a tufted perennial tussock grass up to 0.5m tall that grows on gypseous (copi) rises. Suitable habitat for Club Speargrass exists near the southern end of the Rainlover deposit, though the species was not found at this location during the targeted searches in 2004, possibly due to prevailing drought conditions.

Yellow Swainson-pea is an erect perennial forb up to 1m tall that grows in Mallee vegetation on sandy or loamy soils. The Biodiversity and Habitat Assessment identified the nearest occurrences of the species as approximately 20km northwest and 25km east of the Kulwin deposit. This report noted that suitable habitat...
may exist at the southern end of the Kulwin Deposit and surrounding roadside reserves as well as on properties to the south within the WRRP deposits.

The Desert Greenhood is a rare orchid found in semi-arid woodland and Mallee vegetation (Appendix D, p98). The only known locations of the Desert Greenhood in the vicinity are located 30km north of the Kulwin deposit at the Wemen Flora and Fauna Reserve and 45km southwest of the WRRP deposits at the Wyperfeld National Park. However, the cryptic nature of occurrence of Desert Greenhood effectively means that the species could be found in any vegetation community within the study area. Iluka made a commitment in the EES to undertake targeted searches for the Desert Greenhood prior to vegetation clearance and to translocate any plants if found (EES, p7-61). While some other orchid species have been successfully translocated, Desert Greenhood is understood not to have been previously translocated and its viability is uncertain, especially in mallee conditions.

Having considered the EES and other available information, it is my assessment that:

- The Project is unlikely to have a significant adverse impact on Club Speargrass, Desert Greenhood and Yellow Swainson-pea; and

- The EMP forming part of the Project ‘s Work Plan needed under the MRSD Act, require:
  - pre-works surveys to detect any occurrence of Club Speargrass, Desert Greenhood or Yellow Swainson-pea; and
  - application of specified contingency measures to mitigate impacts if any of these species are detected.

### 4.6.3 Fauna

The EES identified 159 vertebrate species, consisting of 109 bird species, two frog species, 28 reptiles and 20 mammals within the study area.

Eight species of State significance were recorded or have the possibility of occurring within the study area. Six of the eight species were listed under the FFG Act (Ground Cuckoo-Shrike, Crested Bluebell, Australian Bustard, Yellow-bellied Sheathtail Bat, Amethyst Hairstreak Butterfly and Bitter-bush Blue Butterfly). The two other species, the Little Pied Bat and the Common Dunnart, were known to occur within or immediately surrounding the study area.\(^9\)

Thirteen species of regional significance\(^10\) were known to occur within or immediately surrounding the study area and another 19 species may occur but were not recorded.

A targeted survey of the FFG-listed Orange Sun-moth did not record the species within the study area, probably due to the sandy soils underlying the grassland habitats.

Three EPBC Act listed threatened species were recorded by EES investigations within or adjacent to the study area (Malleefowl, Regent Parrot, Swift Parrot), while a further four have the potential to occur there (Eastern Long-eared Bat, Mallee Emu Wren, Black-eared Miner and Australian Painted Snipe). The EES predicts that two of these EPBC Act listed taxa – Malleefowl and Regent Parrot – will be directly affected by the project, whereas the others only have the potential to be affected.

No EPBC-listed threatened ecological community was identified in the study area. However, the Victorian Mallee Bird Community is listed under the FFG Act and members of this community (Malleefowl, Regent Parrot and Mallee Emu-wren) were found within the study area.

The above EPBC Act listed species that will be considered in further detail below, as well as the FFG Act listed Amethyst Hairstreak Butterfly and the Bitter-bush Blue Butterfly.

#### Malleefowl

The Malleefowl (*Leipoa ocellata*) is a large, ground-dwelling bird that builds nest from mounds of sand and leaf litter. Its eggs are laid in the mounds and are incubated by the heat produced by decomposing leaf litter as well as the heat from the sun. The male spends considerable time regulating the temperature of

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\(^9\) The authors of Appendix D of the EES considered the Little Pied Bat to be of State conservation significance. The Common Dunnart is listed as vulnerable in Victoria by DSE.

\(^10\) Refer to Table 8.05 for threat status on p130 of Appendix D of the EES.
the mound, which involves removing and adding leaf litter. While the Malleefowl is a sedentary species, their home ranges extend from one to several square kilometres.\textsuperscript{11}

The Malleefowl is listed as vulnerable under the EPBC Act. The main reasons for the decline of Malleefowl are loss of habitat from clearing of native vegetation, unsuitable management of many remaining habitats (for example, by grazing of livestock, and too frequent burning), and predation of birds by introduced predators especially foxes. Declining rainfall and food availability and the effects of fire may also be contributing to the decline of the species.

The primary objective of the approved National Recovery Plan for Malleefowl made under section 269A of the EPBC Act is:

"to secure existing populations across the species’ range and achieve down-listing of Malleefowl from Vulnerable to Conservation Dependent within 20 years."

There are specific objectives and actions under the recovery plan, the potentially relevant actions being to reduce permanent habitat loss, fire threats and isolation of fragmented populations. Other locally relevant actions are reducing predator loss and road kills. The first objective is to reduce habitat loss and the relevant action involves retaining areas that support either Malleefowl or Malleefowl habitat and protecting them from clearing.

Action Statement No. 59 under the FFG Act provides information on current threats to the Malleefowl and management actions required for the future protection for the species in Victoria. These actions include the protection of habitat and the implementation of the fire protection plan for public land and refinement of the plan when critical Malleefowl habitats are identified and mapped.

The EES noted the critical impact of clearing and fragmenting existing remnant habitat occupied by small populations of the species, which prevents dispersal of these isolated groups and significantly reduces their chances of survival, particularly as mature birds usually breed in the same areas for many years in succession.

The EES surveys detected several breeding mounds, tracks and individual Malleefowl, largely in the south of the WRRP deposits, most of which would either be cleared or impacted during the proposed mining activities (see Figure 5, as well as Figure 9-03 of EES Appendix D). Approximately 650 ha of Malleefowl habitat/vegetation on or between the two mineral sands deposits (mostly to the east of the WRRP deposit) may be directly or indirectly affected by the project, of which 29.3ha of Malleefowl habitat would be removed (i.e. mostly near the southern end of the WRRP deposits).

The EES identified that a critical resident population of the Malleefowl (approximately 150 – 500 pairs) occurs in the BFFR, approximately 4 km to the west of the study area. The 29.3ha of Malleefowl habitat proposed to be cleared on or near the WRRP deposits includes habitat for approximately two pairs of Malleefowl (on private land and potential habitat on public land). This represents approximately 0.2 percent of the total estimated Victorian population (EES, p7-74). In addition, the east-west linkages between the BFFR and the areas to the east of the WRRP deposits will also be severed. The mine then has the potential to greatly restrict movement of the different Malleefowl populations between the BFFR and the above mentioned large habitat patches to the east.

Further to this, the Biodiversity and Habitat Assessment in Appendix D predicted that the project could also indirectly impact on up to 120ha of Malleefowl habitat through noise, lighting and other mining related hazards, which may cause a further five pairs to disperse or relocate (if that is possible).

No Malleefowl were recorded within the vicinity of the Kulwin deposit.

Table 5.1 of the EES indicated that the project “alternative 11" would avoid approximately 18ha of Malleefowl habitat in the southern end of the WRRP deposits (as well as minimising noise impacts for two residences), but Iluka would be unable to access 6.2 percent of the economic WRRP ore. However, subsequent correspondence dated 12 August 2008 from Iluka to the Inquiry indicates that the net present value of the resource that would be sterilised under alternative 11 would constitute 12.5 percent of the value of the WRRP deposits and affect the project life of the mine and possibility the viability of mining this deposit. The letter did not provide any substantive economic analysis or basis to support these assertions.

\textsuperscript{11} National Recovery Plan for Malleefowl Leipoa ocellata
Alternative 10 in the EES would involve retaining the Malleefowl habitat but recommencing mining south of this area, leading to a loss of access to 1.4 percent of the economic ore within the WRRP deposit. This alternative is not proposed to be adopted, partly due to the need for an almost three km length of services corridor and road to reach the area south of the habitat.

DSE’s submission commented that it was not known whether the resident Malleefowl would have sufficient remaining habitat on private land near the southern end of the WRRP deposits to survive in the long term, particularly since the existing habitat was considered suboptimal. At the Inquiry hearing, DSE also outlined a number of options to reduce habitat impact, which including not mining the latter habitat area. In a letter to the Inquiry dated 8 August 2008, DSE confirmed its advice that avoiding the Malleefowl habitat (particularly in the south of the WRRP deposit) was the preferred course of action.

DSE also expressed concern about the protection of the Malleefowl along the haul route to Hamilton and recommended that warning signals in high risk areas should be investigated.

A comprehensive submission on the Malleefowl was presented by the Victorian Malleefowl Recovery Group to the Inquiry. The presentation highlighted the challenges that the species faced in surviving in the Mallee region and stated that the habitat linkages to the BFFR were critical in enabling dispersion of the species, including the areas that would be cleared or potentially impacted by the project.

The proponent’s conclusions regarding impacts on the Malleefowl included the following:

- The BFFR is the local stronghold for the species;
- The 29.3ha of Mallee vegetation in the south of the WRRP is a habitat fragment with tenuous links to the BFFR;
- The future of the remaining pair(s) of birds in this area is uncertain though the existing birds could survive the mining operations;
- Rehabilitation is predicted to provide feeding habitat in 12 months and breeding habitat in 30 years;
- The cleared area will not be cleared in one go;
- Mitigation measures will be necessary;
- There are opportunities for offsets in the local region; and
- There is merit in targeted funding to implement the National Recovery Plan.

During the course of the Inquiry, Iluka proposed a financial offset of $300,000 for impacts on the Malleefowl, i.e. to implement the National Malleefowl Recovery Plan.

The Inquiry supported the conclusions of the proponent and considered that the proposal to remove 29.3ha of Mallee vegetation in the south of the WRRP deposits would have little impact on the overall survival of the Malleefowl, particularly given the fragmented nature of the habitat in the area and the existing lawful rights to use the land for grazing. The Inquiry’s general conclusion was that the project would not have a significant overall adverse impact on the Malleefowl, having regard to the offset $300,000 funding offered by Iluka. However, I note that the removal of the above vegetation would *prima facie* be inconsistent with the National Recovery Plan for Malleefowl with respect to the priority of retaining areas that support Malleefowl.

**Regent Parrot**

It was estimated in March 2008 that the Australian population of the eastern subspecies of the Regent Parrot (*Polytelis anthopeplus monarchoides*) Regent Parrot to be 2,900 birds, with approximately 900 in Victoria. The subspecies’ range extends through north-western Victoria and adjoining areas of NSW and South Australia.

The breeding season of the Regent Parrot (eastern) extends between September to November. During the breeding season, the Regent Parrot depends on River Red Gum and Black Box communities close to water for nesting and adjacent Mallee vegetation for foraging. Two discrete breeding locations occur along the Murray River between Boundary Bend and Colignan and at Outlet Creek - the northern extension of the Wimmera River - and associated lakes. The Project study area lies between these two breeding locations. Hence the ability of parrots to move between these two locations via the study area may be an important contribution to the viability of and contact between these two breeding ‘populations’.
During the non-breeding period, the parrots disperse through Mallee areas, travelling large distances including to access remnant patches of Mallee vegetation in agricultural landscapes. Following the EES, a further one day survey by the proponent (released just prior to the Inquiry), recorded 27 individual Regent Parrots at three locations within the study area. This data was indicative of the importance of the study area as part of the wider Victorian Mallee feeding area for the species during late summer-early autumn. While the numbers recorded were relatively low, the survey occurred on a hot day which was suboptimal for observing the parrot.

The Regent Parrot appears to be reluctant to fly over open ground in search of feeding areas and prefers to move between Mallee areas or along vegetated corridors (or ‘flightpaths’). A gap in vegetation in excess of 200 m appears sufficient to prevent the birds from using them. Indeed, according to the EES Appendix D (p.172): “When flying over small areas of open ground, the birds stay close to ground level – they would be extremely unlikely to fly over a void (such as a mine pit), even if the non-vegetated gap was considerably less than 200 metres.”

In general, the main threats to the Regent Parrot include the clearing, fragmentation and modification of breeding and foraging habitat. The draft Action Statement for the Regent Parrot under preparation by DSE (under the FFG Act) lists a number of threats and conservation objectives for the species. The main threats to the Regent Parrot (eastern) are the clearing, fragmentation and modification of riparian River Red Gum and Black Box woodlands that are used for breeding and mallee areas within 20 km of nesting colonies that are used for foraging. The breaking of flight path corridors and clearing of remnant blocks for altered land uses are ongoing threats. The conservation objectives proposed in the draft action statement include improving the breeding and non-breeding habitat of the Regent Parrot, by preventing any further vegetation loss and promoting the regeneration of vegetation for both breeding habitat and flight paths.

The Project would directly intercept seven vegetated corridors and five partially vegetated corridors. However, the extent of use by the parrot of particular vegetated corridors, which form an east-west and north-south grid in the area surrounding the Project ore deposits, is largely unknown.

Removal of native vegetation from the seven, vegetated corridors would involve a loss of 19.4ha of feeding habitat for the Regent Parrot. In addition, as noted by DSE’s submission, approximately 250ha of the 256.2ha of native vegetation proposed to be cleared for the Project is suitable feeding habitat for the species.

In light of the information summarised above, it is clear that the Project has the potential for significant impacts on the use of both local areas of feeding habitat and vegetated “flightpath” corridors by the Regent Parrot, and hence access to key habitat areas. The magnitude of potential impacts is uncertain, in light of the limited available information on: local habitat use by the species, its adaptability in adopting alternative flightpaths, and the practicability of restoring or enhancing suitable habitat.

Iluka proposes to revegetate 50 km of linear habitat, amounting to 173 ha, of vegetated corridors that might be utilized by the Regent Parrot, including two east-west links to the north and south respectively of the WRPP deposits and two north-south links to the east and west respectively of the Kulwin deposit. In addition, parts of the rehabilitated mine pits as well as vegetation corridors interrupted by mining would be revegetated with native vegetation to provide habitat suitable for Regent Parrot. Iluka has acknowledged the necessity for an early start to the establishment of corridors, as well as careful management of the revegetation and monitoring of Regent Parrot usage of alternative flightpaths.

Having considered the EES and other available information, it is my assessment that:

- The Project could have a significant adverse impact on the regional population of the Regent Parrot if effective mitigation measures were not successfully implemented.

Measures to mitigate or offset impacts on the Malleefowl and Regent Parrot, as well as native vegetation, are addressed in section 4.6.4.

**Mallee Emu-wren**

The Mallee Emu-wren (*Stipiturus mallee*) is listed as endangered under the EPBC Act and is also listed under the FFG Act. The EES Biodiversity and Habitat Assessment indicated that the species was specifically targeted during the survey because potential habitat existed within the study area but it was not recorded. The report recommended targeted monitoring of the species before, during and after mining.

35
Having considered the EES, it is my assessment that:

- The Project is unlikely to significantly impact on the Mallee Emu-wren;
- Further monitoring for the Mallee Emu-wren is to occur before, during and after the Project, as a requirement of the EMP; and
- A contingency plan for mitigation of impacts on the Mallee Emu-wren be prepared as a requirement of the EMP, for implementation if the bird is detected in the vicinity of the Project works area.

**Swift Parrot**

The Swift Parrot (*Lathamus discolor*) is listed as endangered under the EPBC Act and is also listed under the FFG Act. Less than 1,000 pairs are thought to remain in the wild. This is a migratory species that migrates to southern-eastern Australian woodlands to feed in flowering eucalypts during the autumn and winter (Appendix D, p139). The EES survey recorded one individual to the east of the study area feeding in planted and remnant eucalypts. While this occurrence was outside the usual range of the species, it illustrates the importance of remnant vegetation which may be utilised intermittently (Appendix D, p139).

Having considered the EES and other relevant information, it is my assessment that:

- The Project is unlikely to significantly impact on the Swift Parrot; and
- Further monitoring for the Swift Parrot is to occur before, during and after the Project as a requirement of the EMP.

**Eastern Long-eared Bat (syn. Greater Long-eared Bat)**

The Eastern Long-eared Bat (*Nyctophilus timoriensis*) is listed as vulnerable under the EPBC Act and is also listed under the FFG Act. The Biodiversity and Habitat Assessment indicated that this bat species was not recorded in the study area but may occur there (Appendix D, p139). The report recommended targeted searches for roost sites of bats should be undertaken in all areas prior to clearing.

Having considered the EES and other relevant information, it is my assessment that:

- The Project is unlikely to significantly impact on the Eastern Long-eared Bat;
- Targeted searches for roost sites for the Eastern Long-eared Bat and other bats are to occur prior to the clearing of native vegetation, as a requirement of the EMP; and
- A contingency plan for mitigation of impacts on the Eastern Long-eared Bat be prepared as a requirement of the EMP, for implementation if the species is detected in the vicinity of the Project works area.

**Black-eared Miner**

The Black-eared Miner (*Manorina melanotis*) is listed as endangered under the EPBC Act and is also listed under the FFG Act. The EES indicated that the species may occur within the study area but was not recorded. No detail about this species was provided in the Biodiversity and Habitat Assessment.

Having considered the EES and other relevant information, it is my assessment that:

- The Project is unlikely to significantly impact on the Black-eared Miner; and
- Further monitoring for the Black-eared Miner is to occur before, during and after the Project, as a requirement of the EMP; and
- A contingency plan for mitigation of impacts on the Black-eared Miner be prepared as a requirement of the EMP, for implementation if the species is detected in the vicinity of the Project works area.

**Australian Painted Snipe**

The Australian Painted Snipe (*Rostratula australis*) is listed as vulnerable under the EPBC Act.

The EES stated that the species may occur within the salina in the EES study area but was not recorded. No detail about this species was provided in the Biodiversity and Habitat Assessment. The EES outlined that water disposal contingencies included disposal to a number of salinas. At the Inquiry, the proponent advised that this contingency was now no longer part of the project.
Having considered the EES and other relevant information, it is my assessment that:

- The Project is unlikely to impact on the Australian Painted Snipe.

**Amethyst Hairstreak Butterfly and Bitter-bush Blue Butterfly**

The EES also included a survey for Orange Sun Moth (*Synemon nais*) (refer to Appendix E). Whilst this species was not recorded, a breeding population of Amethyst Hairstreak Butterfly (*Jalmenus icilius*) was discovered at ‘F1’ block near the northern end of the Pirro deposit. The Amethyst Hairstreak Butterfly is listed under the FFG Act and the occurrence of this species at this site is the only known breeding population of the true (inland) senna-feeding ‘*J. icilius*’ in Victoria.

The survey also identified a comparatively large population of Bitter-bush Blue Butterfly (*Theclinesthes albocincta*) at ‘F1’ block. The Bitter-bush Blue Butterfly is also listed under FFG Act.

The Project proposes to locate stockpiles and infrastructure at least 50m outside areas where Amethyst Hairstreak Butterfly populations are known to occur and, where possible, outside areas where large populations of Bitter-bush Blue Butterflies are known to occur. It was also proposed to use the topsoil from the immediate vicinity of the Bitter-bush Blue Butterfly’s larval host plant in rehabilitation.

A follow up survey was also proposed to determine if additional populations of Amethyst Hairstreak Butterfly occur on or near the study area. If additional populations of the Bitter-bush Blue Butterfly were identified, the proponent proposed to implement conservation measures in consultation with DSE.

DSE indicated in its submission that the net impact on the Bitter-bush Blue Butterfly was unclear given that the EES did not provide details of how much habitat is to be cleared. I note that Appendix E in the EES does not discuss the impact of dust on these two butterfly species.

Having considered the EES and other relevant information, submissions and Inquiry Report, it is my assessment that:

- The Project will not have a significant impact on the Amethyst Hairstreak Butterfly if an adequate separation of works from habitat areas is maintained;
- Specialist advice be obtained on (i) the appropriate separation of Project works from Amethyst Hairstreak Butterfly habitat areas and (ii) measures to control dust impacts and enhance habitat for both Amethyst Hairstreak Butterfly and Bitter-bush Blue Butterfly;
- The Project’s Work Plan require that the stockpiles and infrastructure are located outside areas where large populations of Bitter-bush Blue Butterflies are known to occur; and
- Further monitoring for the Amethyst Hairstreak Butterfly and Bitter-bush Blue Butterfly is to occur before, during and after the Project, as a requirement of the EMP;
- The Native Vegetation Management Plan required as part of the EMP specify measures to enhance habitat for the Bitter-bush Blue Butterfly.

### 4.6.4 Avoidance, Mitigation and Offsets (Vegetation, Malleefowl & Regent Parrot)

Ultimately, in the context of the NVMF and *Victoria's Biodiversity Strategy*, the priority to be given to avoidance of clearing specific areas of native vegetation of high or very conservation significance needs to take account of:

- The specific biodiversity values and significance of the affected vegetation;
- The specific economic values of the affected area and the implications of foregoing these on the overall economic development opportunity, i.e. the Project;
- The flexibility in siting of the project works to avoid or minimise the loss of particular patches of vegetation;
- The availability, quality, certainty and timeliness of ecological offsets; and
• The principles of ecologically sustainable development\textsuperscript{12}.

Similar considerations will need to be applied in the decision by the Australian Government Minister for Environment, Heritage and the Arts whether to approve the Project under the EPBC Act.

In the case of the Project, the proposed clearing of 250ha of vegetation of high or very high conservation significance:

• Involves a substantial reduction from the 505 ha of clearing that would have been entailed by the initial draft mine plan, though this reduction does not appear to have had a significant impact on the efficiency or economics of the proposed mine development;
• Involves clearing of 140 ha of native vegetation on Crown land;
• Would significantly reduce the availability of feeding habitat for Regent Parrot and other listed species, as well as having a long-term impact on available breeding habitat for a few pairs of Malleefowl;
• Would entail a significant impact on available vegetated flightpaths for movement of the Regent Parrot between key habitat areas;
• Could not be readily further reduced with respect to the vegetated flightpaths as well as habitat patches, as there is limited flexibility in siting of the project works to further reduce the clearance of vegetation;

I note that:

• The EES identified five potential vegetation offset sites on freehold land adjacent to Crown land reserves. At the Inquiry hearing, Iluka clarified that six properties had been identified as potential offset sites. Four of the six potentially provide suitable Malleefowl habitat and are located adjacent to existing Crown land. Potential sites adjoin Wyperfeld National Park, Blue Hills Bushland Reserve, Pier Millan Bushland Reserve, Denning Channel Bushland Reserve, and Annuello Flora and Fauna Reserve.

• While DSE acknowledged that the offsets proposed by Iluka could create an overall increase in available habitat for Malleefowl, Regent Parrot and the Bitter-bush Blue Butterfly, this would take many years to achieve. DSE also expressed concern that past attempts to revegetate areas of Mallee vegetation have sometimes not been successful, due to a number of reasons including drought and lack of ongoing management.

• Timeframes for revegetation of corridors to form suitable flightpaths for Regent Parrot, as well as the creation of vegetation offsets providing suitable feeding habitat, would be critical to the outcomes for this species in the area. The achievement of suitable replacement habitat will be essential to prevent exacerbating the on-going decline in aggregate population numbers as a result of multiple stresses.

• Similarly, the 30+ year timeframe to achieve vegetation maturity providing optimal breeding habitat for Malleefowl presents a significant constraint on the adequacy of an offset response.

• Avoidance of clearing the 29.3ha area of Malleefowl habitat at the southern end of WRRP would have a direct impact on gross mine revenue. However, it has not been demonstrated that this specific measure – in particular if mining resumed south of this habitat area - would compromise the Project's viability, in terms of the reduction of resource access relative to the overall quantity of resource and the required infrastructure for mine development.

• A key ecological priority, including for Malleefowl and Regent Parrot, is to provide effective habitat links between core habitat areas.

• The approval of the Minister for Environment and Climate Change will be needed for any clearance of very high conservation significance vegetation as well as for any clearing in bushland reserves.

\textsuperscript{12} Specific principles of ecologically sustainable development (as, for example, articulated in the \textit{Environment Protection Act 1970}) that are relevant here are:

• Principle of conservation of biological diversity and ecological integrity;
• Precautionary principle;
• Principle of integration of economic, social and environmental considerations.
In light of the foregoing, it is my assessment that:

- It is preferable that the Malleefowl habitat at the southern end of the WRRP deposit not be cleared. However, if project approvals are granted - including a Work Plan for the Project under the MRSD Act - allowing the clearance of this vegetation, these are to require Iluka to enter into a legally binding agreement providing for a $700,000 financial offset for implementation of measures to protect Malleefowl habitat or other actions under the National Recovery Plan for Malleefowl. This offset is to be additional to vegetation offsets required as part of a Vegetation Offset Management Plan to meet NVMF obligations, though these may also protect or provide other Malleefowl habitat. The parties to this agreement should include Iluka and DSE. The specification of a program of offset measures should be endorsed by DSE, who should also administer the allocation of funds and monitor its implementation. However, the Victorian Malleefowl Recovery Group should advise on the formulation of the program and would be an appropriate organisation to undertake it. The Mallee Catchment Management Authority should also be invited to participate;

- A Vegetation Offset Management Plan be prepared for native vegetation to be directly removed by Project works, consistent with the NVMF. This plan should form a component of the Work Plan that will need to be approved under the MRSD Act. It should incorporate a framework for compliance, including a schedule for implementation, performance criteria, a monitoring and reporting regime and contingency measures to be applied should performance criteria not be met. It should be endorsed by the Minister for Environment and Climate Change prior to its approval under the MRSD Act

- In relation to the Regent Parrot, a legally binding agreement (which might be separate from the agreement for Malleefowl conservation) or other legal instrument, that is to the satisfaction of the Minister for Environment and Climate Change, be required as a condition of approval (under the MRSD Act or other applicable legislation) to establish an obligation for Iluka to:
  - Implement and maintain the revegetation or enhancement of either: (i) a total of approximately 50 km of linear habitat corridors within and/or outside the Mining Licence area that will allow the dispersal of Regent Parrot and other avifauna; or (ii) an area of breeding and/or foraging habitat near the Murray River, if the latter can be demonstrated to provide at least equivalent value for the conservation of Regent Parrot numbers. This program is to be implemented and maintained to the satisfaction of DSE, with the required period of habitat management extending for at least 10 years. The program might be undertaken through agreements with one or more relevant public sector or community organisations and/or landholders. These agreements should also incorporate or be linked to measures (e.g. covenants) that will provide long-term security for the re-established habitat corridors or areas. This offset is to be additional to vegetation offsets required as part of a Vegetation Offset Management Plan to meet obligations under the NVMF, though these may also protect or provide feeding habitat for Regent Parrot;
  - Provide a $5 million bond for the management of offset habitat located outside the Mining Licence area, to be drawn down at the direction of the Secretary of DSE if prescribed standards of habitat management are not complied with;
  - Either fund or undertake monitoring of the Regent Parrot in the vicinity of the Project, including in the surrounding area, before, during and after Project works, to the satisfaction of DSE. This monitoring should assess the importance of the feeding habitat and flightpaths within and adjacent to the proposed mining footprint, as well as restored habitat corridors outside the mining area.

4.6.5 Implications for Wetlands of International Importance (Ramsar)

One of the two controlling provisions for the Australian Government’s decision that the project is a controlled action decision under the EPBC Act is under sections 16 and 17B, which relate to Wetlands of international importance listed under the Ramsar Convention.

The EES notes that there are no defined watercourses or any substantial surface water flow paths in the area of the proposed mine site that could affect downstream wetlands. Further, groundwater modelling for the EES demonstrates that the Project will only have highly localised effects near the mined deposits, and there will be no measurable impact on either the Murray River or Ramsar wetlands in the region, including the Hattah-Kulkyne Lakes (the nearest point being approximately 27 km northwest of the Kulwin deposit), Lake Albacutya or the Kerang Lakes.
4.7 Surface Water, Water Supply and Groundwater Effects

Objective 7. To minimise to the extent practicable, including through avoidance, adverse effects on the values and sustainability of both surface water and groundwater environments, including on protected beneficial uses.

Context

The SEPP (Waters of Victoria) (SEPP (Waters)) sets the framework for the protection of the environmental quality of Victorian aquatic environments, as well as a program for government agencies, businesses and the community to work together, to further protect and rehabilitate them.

The SEPP (Groundwaters of Victoria) 1997 (SEPP (Groundwater)) provides a framework for the protection of groundwater in Victoria. The policy defines the beneficial uses to be protected for groundwater, i.e. water suitable for agriculture.

The project has the potential to impact on surface water by:
- Increasing salinity in natural ephemeral water flows;
- Contaminating land and the salinas; and
- Impacting on RAMSAR wetlands.

The project has potential to affect the water supply that exists within the study area by:
- Reducing availability of water; and
- Disrupting the supply of other water users.

The project has the potential to affect groundwater by:
- Changing the level of the watertable;
- Reducing groundwater quality as a result of dewatering, storage, disposal, seepage and use of saline water associated with the operations;
- Changing groundwater chemistry as a result of groundwater oxidation;
- Contaminating the salinas and listed RAMSAR sites; and
- Contaminating non-saline soils due to mounding or spillages.

4.7.1 Surface Water and Water Supply

The SEPP (Waters) identifies that the project is located in the Murray and Western Plains segment and the following beneficial uses of water environment must be protected:
- Aquatic ecosystems that are slightly to moderately modified; and
- Water suitable for recreation, aesthetic enjoyment, cultural and spiritual values, agriculture and irrigation, aquaculture, industrial and commercial use, human consumption after appropriate treatment and fishing.

Clause 56 of the SEPP (Waters) states that “construction works need to be managed to minimize land disturbance, soil erosion and the discharge of sediments and other pollutants to surface waters.”

In addition, “operators of extractive industries such as mines and quarries need to manage their operations so that sediment and other pollutants in runoff to surface waters and groundwater are minimized” under clause 58.

The EES included an assessment of surface water movements and water supply for the project as contained in Appendix A. The report contained:
- A review of existing water users in the area;
- Mine water balances;
- Numerical groundwater modelling to determine potential surface water impacts; and
- Mitigation and management measures.

There are no permanent water bodies in the Project area. The nearest water body is the Murray River located approximately 25kms to the north of the Kulwin deposit. The Project area is well outside the floodplain of the Murray River.

“There are several salt lakes, or salinas, in the vicinity of the proposed mines sites.” (EES p7-5). None of the salinas are registered as wetlands under the Ramsar convention, which are protected through the EPBC Act. The Project area is within the catchments of the Kerang Lakes and Lake Albacutya Ramsar sites. The Hattah-Kulkyne Lakes are located approximately 35 kms to the north from the Kulwin deposit.

Low rainfall, high evaporation rates, sandy soils and undulating terrain are features of the Project area. There is minimal runoff and most drainage lines are temporary and terminate in the salinas. Flooding during a 1 in 100 year event would be restricted to local depressions rather than causing widespread inundation (EES p7-7).

The Northern Mallee pipeline delivers water for stock and domestic supplies within the Project area. Two small dams are also located in the north of the Woornack and Rownack deposits.

The project will require approximately 170m$^3$ of water per hour for mineral processing, which will be sourced from the pit dewatering operations. Up to 60m$^3$ of freshwater water per hour will also be required for mining operations, which will be sourced from two onsite reverse osmosis plants. Supplementary freshwater may be sourced from the Northern Mallee pipeline depending on water restrictions. Bottled water will be provided for drinking and saline water will be used for dust suppression.

The EES concluded that due to no permanent natural surface waterbodies in the region that the project will have little or no impact on ephemeral runoff. Runoff will be contained within the mine sites. The modelling also indicated that there would be no measurable impact on Ramsar wetlands.

The EES indicates that the water supply from the Northern Mallee pipeline will be disrupted for a short period of time where the deposits intersect the pipeline in four locations. The pipeline will be temporarily diverted in these locations.

Five submissions addressed surface water and water supply issues. DSE confirmed its earlier advice that before salinas are used as groundwater disposal contingencies that hydrogeological and flora and fauna assessments should be undertaken.

Mr Hopkins stated that the project must ensure protection of the environment from spillage or leakage of saline water from water pipelines at the mine sites. He also expressed concern about the impact of extreme rainfall events particularly in light of climate change and that there was a need for proper rehabilitation.

GWM Water commented that access to supplementary water supplies from the Northern Mallee Pipeline would be dependent on restriction levels in the supply system and that it would work with the proponent to ensure maintenance of supply to GWM Water customers connected to the pipeline.

DPI indicated that an assessment of water quality monitoring of suspended solids in the infiltration basins will be required and details of the planned routes, infrastructure and approach for managing discharge to salinas.

The EPA concluded that provided adequate excess freeboard is provided in the infiltration basins, little risk is posed to surface waters. However, the EPA expressed some concern in relation to contingency planning, to address the infiltration to groundwater through the infiltration basins failing to keep pace with dewatering and disposal requirements.

The EPA also expressed concern that discharges to the salinas may result in significant impact on beneficial uses. The EPA recommended that the salinas not be used for brine and dewatering disposal and, that if required, additional information on how the salinas could be used without significantly impacting on the beneficial uses would be required.
The Inquiry concluded that the surface water management was satisfactory and that the proposed mitigation measures will limit the impact on the surface water environment to an acceptable level. The Inquiry found that surface water impacts will have no effect on Ramsar sites.

The Inquiry agreed that concerns about the pumping of saline waters were valid but that such risks could be adequately addressed in the detail design and subsequent approval. It also agreed that the proposed supply of freshwater by a combination of saline water from the mine sites and water via the Northern Mallee pipeline was sound.

Issues relating to infiltration basins and the salinas are further addressed under the groundwater section.

Having considered the EES and Inquiry’s analysis, it is my assessment that:

- The overall risk to surface water from the Project will be low due to the absence of permanent waterbodies and the proposed mitigation measures; and
- The project will cause minimal disruption to the water supply system in the Project area and that the project will be largely self-sufficient as a result of the proposed treatment of saline water via the two reverse osmosis plants.

Further, it is also my assessment that sediment should be controlled via control mechanisms outlined in the EPA Publication 480, *Environmental Guidelines for Major Construction Sites*.

### 4.7.2 Groundwater

The SEPP (Groundwater) provides a framework to protect groundwater in Victoria. It aims “to maintain, and where necessary, improve groundwater quality sufficient to protect existing and potential beneficial uses of groundwater throughout Victoria.”

The policy segregates the groundwater environment into five segments classified on the basis of the background level of total dissolved solids (TDS). The project falls into segment D as the TDS range is greater than 13,000mg/L is segment D.

The policy defines the beneficial uses to be protected. Protected beneficial uses for segment D include:

- Maintenance of ecosystem;
- Industrial water use; and
- Building and structures.

The EES included an assessment of groundwater impacts (Appendix A), which reviewed existing conditions, mine water balances, modelling of dewatering and disposal requirements and mitigation measures. Appendix B also included an assessment of the options for the management of groundwater and potential impacts on groundwater chemistry were also assessed in Appendix B and in a letter contained in Appendix C.

The Parilla Sands Aquifer System occurs within the Parilla Sand, which consist of fine to coarse grained, well sorted quartz sand, sandstone, minor clay and silt. The aquifer occurs across the Project area and varies in depth from 40-44m AHD and thickness from 80 to 60m. The ore body is located within the Parilla Sand with sections above and below the watertable.

The Bookpurnong Beds consisting of a layer of poorly consolidated calcareous clay, silt and sand are located immediately below the Parilla Sand and separate the Parilla Sands Aquifer from the Upper Renmark Group Aquifer. The Blanchetown Clay layer, consisting of sandy and silty clays with a thickness of 5 to 10m lies immediately above the Parilla Sand. The Wooringen Formation, which consists of unconsolidated, wind blown units lies immediately above the Blanchetown Clay layer.

The groundwater within the Project area is highly saline, acidic and has elevated sulphate, iron and aluminum concentrations. There are no registered groundwater users within 50kms of the centre of the deposits.
The EES outlines that groundwater impacts will principally be caused by the mine dewatering requirements. The volume of dewatering flow will vary as the mine progresses and will be largely dependent on the depth of the ore below the water table (EES p7-19).

The proposal involves lowering the groundwater levels to within 2.5m of the ore over an area of 750m in length, which may create a cone of depression some distance from the mine. The EES concluded that it was unlikely to cause a negative impact.

The EES anticipated that groundwater levels may increase in the area surrounding the infiltration basins used for disposal of excess groundwater. Groundwater modelling predicted that mounding to within 2m of the ground surface would not occur for the anticipated disposal volumes.

Groundwater will return to the Parilla Sand Aquifer via seepage, either from the mining by-products placed in the mine void or from the infiltration basins. The modelling indicated negligible effects on groundwater quality over time and no impact on beneficial uses.

Partial oxidation of excess groundwater discharged to the infiltration basins was also expected to occur as a result of exposure to the atmosphere. The EES predicted that significant changes to groundwater as a result of excess groundwater disposal were not likely to occur.

The EES did not anticipate any environmental issues associated with using saline groundwater for dust suppression on materials that were from below the watertable. Extracted mine materials were also not expected to be a source of acid rock drainage.

The risk of contamination of the perched aquifer systems near the mines was considered low as there was a low probability that these systems existed in the vicinity of the mines. The EES also concluded that increased land salinisation from ruptured pipelines was a risk but the likelihood would be minimal due to the design of the project and proposed mitigation measures.

Groundwater modelling predicted negligible impacts on the Murray River and no measurable impacts on the Lake Albacutya, the Kerang Lakes or the Hattah-Kulkyne Lakes Ramsar wetlands.

The proposal will redistribute both groundwater and salts around the mine area. It is expected that evaporation from the TSF and infiltration basins will cause a marginal increase in the concentration of salt in the water present in these facilities, but no net import of salt into the environment.

In the likelihood that the capacity of the infiltration basins were exceeded, the EES outlined a number of contingency measures that included disposal of water to nearby salinas. Following the exhibition of the EES, the proponent advised that the estimated water balances had been revised. As a result, the predicted volume of water to be disposed was substantially reduced and that only a single infiltration basin would be required for the Kulwin deposit and that disposal to the salinas would not be required under any circumstances.

Four submissions discussed groundwater impacts associated with the project. A key issue outlined in the EPA submission was the potential for agricultural land to be impacted by groundwater salinisation driven by increased elevations of the groundwater in infiltration basins and the tailings. Whilst the EPA supported the overall assessment in the EES, concern was expressed in relation to the management trigger values for the infiltration basins and the chemical reactions changing groundwater chemistry and aquifer properties and thus reducing seepage rates.

The EPA noted that the management trigger value was set at 2m below groundwater level in the EES and commented that:

“The intention should be to ensure that the groundwater level due to the operation of the mine does not come any closer to the surface than 2 metres. This would imply that the trigger for action should be set at some depth deeper than 2 metres to allow for management activities to prevent groundwater becoming any shallower than 2 metres.”

The EPA recommended the trigger level be set below 2m below ground level and be based on the capacity for the management action to respond.

The EPA was also concerned about the potential for chemical reactions to result following changes in groundwater chemistry and aquifer properties, which may result in a reduction in seepage rates and the...
effectiveness of the infiltration basins. The EPA recommended that the management of groundwater consider mechanisms to assess seepage rates, and to make an assessment of and change in impacts.

The EPA also expressed concern about the potential for accidental spills of highly saline groundwater to agricultural land. It was recommended that the environmental management plan include provisions for ensuring that pipe infrastructure was not impacted by the operation of the mines and that management measures were in place. The EPA also highlighted that the EES did not include the proposed rehabilitation of the infiltration basins post active mining and recommended that the mine close plan include an assessment of the impact of rehabilitation of the infiltration basins on groundwater levels.

DPI commented that a commitment to develop performance targets for the infiltration basins prior to operating them would be required in the work plan. An assessment of whether water quality monitoring of suspended solids in the infiltration basins would also be required along with details of the planned routes, infrastructure and approach for managing discharge to the salinas. If discharge was approved then an assessment of the need for monitoring ecological impacts would also be required.

DSE advised that the groundwater had been adequately addressed in the EES and that the monitoring and reporting of groundwater impacts was supported.

Mid Murray Field Naturalists expressed concern that further clearing of native vegetation would accelerate the effects of salinity in the region.

The Inquiry found that no adverse impacts were expected from the lowering of the watertable by dewatering and mining. In relation to groundwater quality, the Inquiry concluded that the impacts would be minimal and it would be unlikely that the project would adversely impact on beneficial uses protected under the SEPP (Groundwater).

The Inquiry accepted the prediction of no impact on Ramsar sites. It was also satisfied that the water balance estimates and the predicted performance of the infiltration basins were sound. In relation to the concerns raised by the EPA, the Inquiry noted that there was universal agreement that the groundwater level below the infiltration basins should be monitored and that the trigger levels for action should be set so that action can be taken to prevent groundwater entering the root zone rather than at the bottom of that zone.

Lastly, the Inquiry found that the impacts on groundwater flow caused by changes in the aquifer properties within the mining voids will be negligible.

Having considered the EES and the Inquiry’s report, it is my assessment that:

- The Project will have minimal impacts on groundwater and its beneficial uses.
- A monitoring program be developed that includes:
  - An assessment of the performance of the infiltration basins, which will enable any rise in the watertable below the basins to be detected; and
  - The establishment and definition of action trigger levels and a description of actions to be taken in the event of trigger levels being reached.
- The management of groundwater consider mechanisms to assess seepage rates, and to make an assessment of and change in impacts should there be a need to increase capacity or operating levels of the infiltration basins prior to the operational change being made.
- The environmental management plan include provisions for ensuring that pipe infrastructure is not impacted on during the operation of the mines and that management measures are in place to prevent saline groundwater from directly impacting agricultural soils.
- The mine closure plan includes an assessment of the impact of rehabilitation of the infiltration basins on groundwater levels.
4.8 Greenhouse Gas Emissions

**Objective 8.** To minimise to the extent practicable, including avoidance, the generation of greenhouse gases.

**Context**

The *Victorian Greenhouse Strategy* was released in June 2002 and implemented a three year program of action to reduce greenhouse gas emissions in Victoria. The strategy recognises that industry and commerce are major users of energy and therefore major contributors to greenhouse gas emissions. A key issue is to improve the greenhouse performance of businesses.

The *Protocol for Environmental Management (Greenhouse Gas Emission and Energy Efficiency in Industry), 2002* (PEM) also provides guidance for businesses on the SEPP (AQM) and its requirements for managing greenhouse gas emissions.

Since January 2008, all larger consumers of energy and water in Victoria are now required to prepare an environment and resource efficiency plan. This project will need to register with the EPA and to prepare a plan to reduce energy and water consumption, implement the plan and report on their performance.

The project has the potential to generate greenhouse gas emissions through the use of electricity and diesel-powered equipment.

**Discussion**

The EES estimated that the electricity and fuel consumption for the project was expected to be 3.47MW of electricity used on a continuous basis; 16,788,500-23,418,500 L/yr of onsite diesel and 5,442,800 L/yr of offsite diesel transporting the HMC from the site to Mineral Separation Plant at Hamilton (p4-16).

The EES concluded that the project would generate annual greenhouse gas emissions of 111,287 tonnes of carbon dioxide equivalent per year for the Kulwin deposit and 131,177 tonnes of carbon dioxide equivalent per year for the WRRP deposits. An additional 17,542 tonnes of carbon dioxide equivalent per year will be generated at the Kulwin deposit by the use of diesel generators for a six month period whilst the power line along the Mallee Highway is upgraded.

Two submissions addressed greenhouse gas emissions. The EPA submission agreed that the estimated emissions appeared to be sufficiently accurate. However, it also recommended that the proponent acknowledge the PEM requirement to identify and implement best practice for energy efficiency and greenhouse gas emissions with respect to the project and requested that further information be provided to demonstrate how the project comprised best practice for energy efficiency and greenhouse gas emissions. The EPA also highlighted as of 1 January 2008, the proponent was required to prepare an environment and resource efficiency plan.

Mr Hopkin’s submission highlighted that the project made no provision for its own supply of energy and that the project provided an opportunity to develop alternative energy supplies in the context of sustainability.

The Inquiry concluded that large scale mining is invariably associated with a great deal of energy usage and that there are few opportunities to avoid the use of diesel-fuelled earthmoving equipment and the consumption of electricity. The Inquiry noted that the proponent had committed to the completion of an environmental and resource efficiency plan in the EES and that further work is needed to occur in relation to demonstrating best practice for energy efficiency and greenhouse gas emissions.

In relation to the transport of HMC by rail, the Inquiry noted that the EES did not include a calculation however indicated that it would expect that such a calculation would show significantly lower emissions when compared to road transport. The Inquiry accepted that there was no realistic alternative to the transport of HMC to Hamilton until an upgrade of infrastructure was undertaken. I note also that the Inquiry considered that Mr Hopkin’s concerns about alternative energy supplies were legitimate but highlighted that the Assessment Guidelines did not require the proponent to address the matter.
Having considered the EES and the Inquiry’s Report, it is my assessment that:

- The Project will produce a significant amount of greenhouse gas emissions; and
- The proponent will need to provide further information to demonstrate best practice and satisfy the requirements of the Protocol for Environmental Management - Greenhouse Gas Emissions and Energy Efficiency.

### 4.9 Ecologically Sustainable Development

**Objective 9.** To ensure that mining can be implemented in accordance with a robust and transparent framework for environmental management.

**Objective 10.** To enable ecologically sustainable development over the short- and longer-term, having regard to the likely overall economic, social and environmental implications of the proposal.

**Context**

This section focuses on the acceptability of the environmental effects of the Project, in the context of its objectives and principles of ESD and applicable legislation and policy, and the proposed environmental management measures to address residual effects. The Ministerial Guidelines made under section 10 of the EE Act specify that the assessment of a proposal and its effects is to address the implications with respect to the objectives and principles of ESD.

Schedule 13 of the Mineral Resources Development Regulations 2002 requires an EMP to be prepared as part of the Work Plan to be approved by DPI.

Further, the Environment Protection Act 1970 provides a “legislative framework for the protection of the environment in Victoria having regard to the principles of environment protection” (s.1). Principles of environment protection that are relevant to the framework for environmental management of the present Project include:

- Principle of integration of economic, social and environmental considerations;
- The precautionary principle;
- Principle of improved valuation, pricing and incentive mechanisms;
- Principle of wastes hierarchy;
- Principle of integrated environmental management; and
- Principle of enforcement.

These principles point to the need for an approach to environmental management that is integrated, cost-effective, proactive and precautionary as well as enabling effective risk management, addresses waste issues in accordance with the waste hierarchy, and provides effective accountability.

**Key Issues**

- The overall environmental effects of the proposal need to be acceptable in terms of their consistency with applicable environmental policy and legislation.
- Need to consider the Project (and its environmental and related economic and social effects) in terms of its consistency with ESD.
- As discussed in previous sections, the Project could have a number of environmental effects that require careful management.

**Discussion on ESD**

This Project would bring significant economic benefits to the State as a whole and north-western Victoria in particular, through capital investment, employment and demand for goods and services. It would, however, entail significant impacts on remnant native vegetation, almost all of which is of high or very high conservation significance, in large measure because of its value as habitat for the Mallefowl and Regent
Parrot. These potential impacts are a key focus in this Assessment, having regard to the core ESD principle of “conservation of biological diversity and ecological integrity”.

Because of the risk that the Project may cause some impact on the regional Regent Parrot population at least in the short-term due to the reduction of available feeding and dispersal habitat, this Assessment recommends stringent measures to offset this risk. It does so by calling for the establishment or restoration of habitat links (or alternate habitat enhancement) that will be able to be utilised by the Regent Parrot in the medium- to longer-term. Similarly, because of the risk that the Project may cause a significant impact on a local population of the Malleefowl, a substantial financial offset to enable implementation of actions under the Malleefowl National Recovery Plan to strengthen the regional population is proposed. These responses are to some extent precautionary, because it is uncertain what the potential extent of impacts on the Regent Parrot and Malleefowl might be in the absence of specific conservation measures. Equally, there are avoidable uncertainties involved in the establishment or restoration of habitat or other conservation measures which justify a requirement for monitoring and accountability, as well as a ‘net gain’ margin for error.

The proposed requirements in relation to the Regent Parrot and Malleefowl adopt the approaches put forward by the proponent but provide a more certain framework for their implementation. They are intended to be compatible with ensuring the effective implementation and operation of the Project.

I note that the ability to effectively integrate economic, social and environmental considerations in decision-making on development proposals depends on the availability of information on these three dimensions, to the extent that they are relevant in particular instances. While the preparation of the EES, followed by public submissions and the Inquiry process has facilitated an integrated approach here, this has been constrained to some degree by the limited information available on the implications of project alternatives.

It is my assessment that the Project, if implemented in accordance with the recommendations of this Assessment, would be consistent with the relevant goals, objectives, principles and other provisions of:

- the MRSD Act;
- the EP Act;
- the P&E Act and State Planning Policy Framework
- the FG Act, Victoria’s Biodiversity – Directions for Management and the NVMF; and
- the EPBC Act

Environmental Management

Section 8 of the EES outlined an Environmental Management Framework for the Project. In this context, it proposes that the EMP would include 16 specific environmental procedures, for management of: air quality, fire, greenhouse gas emissions, land access, noise, non-indigenous cultural heritage, pest animals and plants, soils and landforms, threatened species, vegetation clearance, waste, water and wildlife, as well as compliance reporting. The EMP is to include a monitoring program to ensure that the environmental procedures are properly implemented and effective, as well as to validate environmental modeling for the EES and assess whether environmental mitigation and management measures need to be modified.

Iluka tabled a draft EMP during the Inquiry hearing, which included the proponent’s environmental commitments with respect to managing the environmental effects associated with the Project.

As noted in section 4.5, a CHMP has already been prepared and approved under the Aboriginal Heritage Act 2006.

As part of the Environmental Management Framework in the EES, the need for following additional plans was also identified:

- An Environment, Health and Safety Management Plan;
- A Traffic Management Plan;
- A Radiation and Radioactive Waste Management Plan; and
- A Rehabilitation Plan.
The Environment, Health and Safety Management Plan is to involve environmental risk assessments to evaluate and manage project risks, and ensure that mining activities and/or associated works do not adversely impact the environment in the immediate future as well as the longer term.

DPI considered the Environmental Management Framework to be comprehensive and indicated that DPI would work closely with other agencies in relation to the approval of the EMP.

In addition to the plans outlined above, the Inquiry indicated that the Work Plan should not be approved unless it included:

- A Native Vegetation Management Plan including:
  - Native Vegetation Offset Plan; and
  - Native Vegetation Clearance Plan;
- Weed Management Plan;
- Pest Management Plan; and

The Inquiry also noted the need for a monitoring program in the EMP that:

- Includes monitoring of groundwater in order to assess the performance of infiltration basins; and
- Satisfies the requirements of the *Protocol for Environmental Management – Mining and Extractive Industries*, made under the SEPP (AQM).

The Inquiry recommended the establishment of an Environmental Review Committee (ERC) to monitor the environmental impacts. In addition, this Assessment has recommended that a consultative arrangement be established to monitor community well-being and service capacity issues in Ouyen.

Having regard to the EES, submissions and Inquiry Report, it is my assessment that:

- The EMP to be included as part of the Work Plan incorporate appropriate performance objectives to provide a clear framework for implementation and evaluation of outcomes;
- DPI establish and convene an ERC with broad terms of reference inter alia (i) to monitor the implementation of the EMP and the environmental performance of the Project during its construction, operational and decommissioning phases, and (ii) to provide a channel for communication between the mine operator and key stakeholder interests, including in relation to issues of concern and community engagement by the mine operator;
- To provide transparency, a report on the environmental performance of the Project be prepared annually by the mine operator and made publicly available on a suitable internet site following its review by the ERC.
5 Response to Inquiry Recommendations

The Inquiry's recommendations are reproduced in italics with the response by the Minister for Planning in normal type font below.

Overall Recommendation

1. That the Minister for Planning should approve the proposed Murray Basin Stage 2 sand mine project subject to the additional mitigation and management measures recommended below.

2. That the Minister for Planning should recommend approval of Works Approval Application WA63046 Murray Basin Stage 2 Project – Kulwin Deposit.

Minister’s Response:

Accepted in principle. It is my assessment that the Project be approved subject to stringent management and measures being applied, as detailed previously in this Assessment. I note that this Assessment does not constitute an ‘approval’ as such.

Environment Review Committee

3. The DPI establish an Environmental Review Committee (ERC) to monitor the environmental impacts, and should be set up, function and operate having regard to the recommendations of the DPI discussion paper on ERC’s.

Minister’s Response:

Accepted. It is my assessment that an ERC be established in accordance with DPI requirements and consistent with this Assessment.

Water

4. That the following be included in the conditions attached to the approval of any Work Plan:
   - Sediment management will be conducted in conformance with EPA Publication 480 ‘Environmental Guidelines for Major Construction Sites’.

Minister’s Response:

Accepted. It is my assessment that this recommendation be supported.

Groundwater

5. That the Work Plan not be approved unless the EMP contains:
   - A monitoring program that will enable assessment of infiltration basin performance in such a way that any rise in the watertable below the basins can be detected; and
   - The establishment and definition of action trigger levels plus descriptions of actions to be taken in the event of trigger levels being reached.

Minister’s Response:

Accepted. It is my assessment that these aspects be incorporated in the EMP forming part of the Work Plan that will need to be approved by DPI.

Biodiversity and Habitat

6. That the Work Plan not be approved unless the EMP contains the following:
   - A Native Vegetation Management Plan including:
     - A Native Vegetation Offset Plan; and
     - A Native Vegetation Clearance Plan;
   - A Weed Management Plan;
   - A Pest Management Plan; and
Minister’s Response:
Accepted. It is my assessment that the above plans be incorporated into the Work Plan to be approved by DPI. It is also my assessment that the Work Plan to be approved incorporates all the relevant aspects of this Assessment’s recommendations (refer to section 4.6), including in relation to any required monitoring, management, mitigation and offsets for potential impacts on native vegetation and listed threatened species (e.g. Regent Parrot and Malleeefowl).

Air Quality
7. That the Work Plan not be approved unless it includes:
   - Adequate information in the EMP to satisfy the requirements of the ‘Protocol for Environmental Management – Mining and Extractive Industries’ to identify and evaluate “best practice” controls for all relevant indicators specified in the State Environment Protection Policy (Air Quality Management) and “maximum extent achievable” controls for indicators specified as Class 3 indicators;
   - A dust emission management strategy that includes actions that are considered “best practice” for all relevant indicators specified in the State Environment Protection Policy (Air Quality Management) and “maximum extent achievable” controls for indicators specified as Class 3 indicators; and
   - A monitoring program in the EMP that satisfies the requirements of the ‘Protocol for Environmental Management – Mining and Extractive Industries’.

Minister’s Response:
Accepted. It is my assessment that the above be incorporated into the Work Plan to be approved by DPI.

Greenhouse Gas Emissions
8. That the Work Plan not be approved unless it includes:
   - Plans to meet the requirements of both the Victorian Environment and Resource Efficiency Plans and the Commonwealth’s Energy Efficiency Opportunities programs when relevant thresholds for energy use are reached;
   - A Transport Management Plan that includes actions to be taken to investigate the option of transporting HMC to Hamilton by rail; and
   - An Environmental Management Plan that includes actions to be taken to give consideration to the use of renewable and alternative energy supplies.

Minister’s Response:
Accepted in principle. It is my assessment that these be incorporated into the Work Plan to be approved by DPI, with the exception of the proposed EMP requirement regarding renewable and alternative energy supplies.

Noise
9. The Work Plan not be approved unless it details a noise management strategy that:
   - Is aimed at compliance with prescribed noise limits, or better;
   - Includes identification of potential non-compliance with prescribed noise limits and the development of detailed plans to prevent predicted non compliance with prescribed noise limits;
   - Lists potential noise mitigation measures that may be applied to reduce noise emissions and the circumstances under which they will be applied;
   - Lists potential noise mitigation measures that may be applied at affected residences and the circumstances under which they will be applied;
   - Describes a process for keeping residents of potentially affected residences informed of actions taken on site and enabling negotiations on actions that could be taken at the residences; and
   - Includes noise monitoring that enables compliance testing and performance measurement.
10. That the following be included in the conditions attached to the approval of any Work Plan:

- The licensee must ensure that noise levels at any sensitive receptor not exceed the noise limits specified in the Interim Guidelines for Control of Noise from Industry in Country Victoria N3/89 except if the licensee provides the District Manager with a proposal for the substitution of a limit on the maximum noise level for the Night limit at a particular residence. Such proposal will include each of the following:
  - Be for a limit on the maximum noise level outside the residence of no more than 62 dB(A);
  - Include evidence of the consent of the owner and/or occupier of the residence to the application of the proposed noise limit;
  - If the proposed noise limit is greater than 57 dB(A), include evidence that noise at the proposed limit will not result in a noise level in a habitable room of greater that 47 dB(A); and
  - Include details of a monitoring program that will enable demonstration of compliance, or otherwise.

- If the proposal is for a limit on the maximum noise level of 57dB(A) or less, the District Manager will approve the proposal providing he/she is satisfied with:
  - The evidence of the consent of the owner and/or occupier; and
  - The adequacy of the proposed monitoring program, assessed in consultation with the EPA.

- If the proposal is for a limit on the maximum noise level of greater than 57dB(A), the District Manager will approve the proposal providing that he/she is satisfied with:
  - The evidence of the consent of the owner and/or occupier;
  - The adequacy, assessed in consultation with the EPA, of the proposed monitoring program; and
  - The evidence, assessed in consultation with the EPA, that noise at the proposed limit will not result in a noise level in a habitable room of greater than 47 dB(A).

- Once the proposal is approved the licensee must:
  - Ensure maximum noise levels at the residence during the Night do not exceed the approved limit; and
  - Implement the proposed monitoring program to the satisfaction of the District Manager.

11. Management of noise emissions during construction activities, with such activities being defined by the District Manager in consultation with the EPA, will be in accordance with the guidance provided in Section 12 of Noise Control Guidelines TG302/92 and resultant noise levels at sensitive receptors must comply with the limits described in the Schedule in that Section of the guidelines.

**Minister’s Response:**

Accepted in principle. It is my assessment that this general approach be adopted in the Work Plan to be approved by DPI, such that it is consistent with my earlier findings and recommendations on noise within this Assessment (see section 4.4.2).

A Noise Management Strategy or Plan should be prepared as outlined above (i.e. as a condition of the Work Plan). It should incorporate the specific measures that will be adopted to meet the N3/89 noise limits (or better), including noise reduction and treatment at the source(s) wherever possible, as well as the specific agreed mitigation to be adopted for each residence.

Management of noise emissions during construction activities will now need to be in accordance with the new guidelines, EPA Publication 1254 ‘Noise Control Guidelines’, which replaced TG302/92 in October 2008.
Roads, Traffic and Transport

12. The Work Plan not be approved unless it contains a Transport Management Plan that:
   - Is developed by a working group comprising Iluka, VicRoads, Mildura Rural City Council and relevant emergency service organisations; and
   - Includes actions to be taken to investigate the option of transporting HMC to Hamilton by rail.

Minister’s Response:
Accepted. It is my assessment that these aspects be incorporated into the DPI approved Work Plan.

Rehabilitation

13. That the Work Plan not be approved unless it contains an adequate rehabilitation plan for agricultural land and native vegetation land based on the information and guidance provided in the report Northern Murray Basin Project – Rehabilitation Assessment and Plan for the Ouyen Deposits.

Minister’s Response:
Accepted in principle. It is my assessment that the rehabilitation plan required under the MRSD Act address the report cited above, as well as the specific relevant aspects of this Assessment (see section 4.3.2.

JUSTIN MADDEN MLC
Minister for Planning