Section 6

Proposal Evaluation and Conclusions

PREAMBLE

This section of the EIS concludes the document with:

- *an assessment of the alternatives considered and rejected during the planning stages of the Proposal;*
- *an evaluation of the Proposal, including an assessment of the residual environmental risk after the management and mitigation measures identified in Sections 4 and 5 are taken into account;*
- *an evaluation of the Proposal against the principles of Ecologically Sustainable Development; and*
- *a justification for the Proposal on the basis of the residual impacts, socio-economic benefits, consideration of planning requirements and the consequences of not proceeding.*

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6.1 ALTERNATIVES CONSIDERED

6.1.1 Introduction

The Dubbo Zirconia Project (the Proposal) has been in development for approximately 15 years and during that time, there have been several alternative designs, methods and layouts considered. This subsection outlines those alternatives considered most relevant to the management of environmental impacts and the reasons for proceeding with the preferred options.

The alternative of not developing the Proposal is considered in Section 6.3.5.

6.1.2 Processing Operations and Production Level

Investigations and development work on the DZP commenced in 1998 beginning with a three-phase feasibility study. This phased study identified a number of key milestones to be achieved, including the development of a commercially viable process flow sheet and establishment of products with genuine market appeal.

The Pre-feasibility Study was completed in September 2000 and the third phase of the programme, the Definitive Feasibility Study (DFS), commenced in 2001 and included two resource definition drilling programmes, extensive process development work and pilot plant testing as well as product market assessments. A key recommendation of the DFS was that a Demonstration Pilot Plant (DPP) should be established, with principal objectives of reducing process risk and providing market samples of sufficient quantity to reassure consumers that the different 'style' of products could be suitable for their various end-uses.

The DPP was set up at ANSTO in Lucas Heights, south of Sydney in 2007, and commenced operations in 2008. Several important process control mechanisms have been developed and subsequently demonstrated over numerous production 'runs'. Several tonnes of products have been made, and a range of zirconia products prepared to customer specific requirements.

Niobium product development has succeeded in manufacturing ferro-niobium suitable for the steel industry and speciality alloy industry. Both ferro-niobium and the precursor concentrate therefore have underpinned the marketing of this co-product.

During the operation of the DPP, selection and demonstration of recovering two streams of rare earth concentrates has been undertaken. Given the current and forecast markets for rare earths, these product streams are very significant to the Proposal. The Proposal now includes a full scale recovery processes in the capital and operating cost estimates.

Project Scale

Since the 2002 DFS, based on an annual throughput of 200 000tpa, the scale of production has been reviewed twice. In 2011, the feasibility study was conducted on a doubled throughput of 400 000tpa and in 2012 the DFS (completed in 2013) considered an annual throughput of 1 000 000tpa.

While production at the reduced scale would result in reduced overall annual emissions, the final impact footprint should the resource in its entirety be developed would be equivalent to that at increased production rate (albeit over a much longer timeframe). Consequently, the

Applicant proposes to develop the DZP based on the increased rate given the improved return on investment (largely as a result of economies of scale) whilst environmental impacts could be managed to achieve relevant criteria and reasonable community expectations.

Products

Since the 2002 DFS was completed, the process has been revised to include the recovery of rare earth elements. Given the significant price increases for these elements since 2002, this was a natural add-on to the Proposal and has made a significant contribution to the improved project economics.

Process Options

The creation of the process flow sheet has evolved over the many years the DZP has been in development. The following reviews several key design modifications based on consideration of alternate process options.

- Rare Earth Separation Circuit.

  Rare earth (RE) products will comprise a light rare earth (LRE) and heavy rare earth (HRE) concentrate to be sold for further onward separation and recovery into individual RE products. The possible inclusion of a final RE separation circuit was considered, however, this would have added significant complexity to the processing operations. Furthermore, the Applicant has identified potential off-take partners with existing separation technology and infrastructure, negating the necessity to undertake this component of the production circuit.

- Rare Earth Precipitation Options.

  As a result of lab-scale testing and subsequent demonstration pilot plant (DPP) runs the decision was taken to replace the original fluoride precipitation (of rare earths) process with a more environmentally benign carbonate precipitation process. This has resulted in increased RE recoveries and improved water recovery measures.

- Import of Sulphur vs Sulphuric Acid

  During the preparation of the 2011 DFS (400 000tpa), the following alternative to include a sulphuric acid plant (requiring the import of sulphur for the manufacture of the acid as opposed to the importation of sulphuric acid) was introduced.

  While the manufacture of sulphuric acid introduces additional emissions from the processing operations, inclusion has several operational and environmental benefits.

  – Sulphuric acid has a high specific gravity and would require the transport of approximately 300 000tpa to the DZP Site as opposed to 196 000tpa of sulphur. This would increase the total transport task with the related impacts on local traffic, roads and greenhouse gas emissions.

  – Furthermore, sulphuric acid is a dangerous good and would add an additional level of risk to the overall transport task for the Proposal.

  – A sulphuric acid plant on site also provides the benefit of generation of almost 70% of the power requirements for the Proposal as burning sulphur produces an exothermic reaction.

Given the potential environmental impacts of acid manufacture on the DZP Site can be appropriately mitigated the alternative to manufacture acid on the DZP Site was considered the preferable option both on environmental and operational grounds.

6.1.3 Water Use

Initial water requirement of the processing operations approximated 6 500ML which was reduced to 5 000ML by 2012. Water balance modelling based on this consumption rate indicated that the evaporative surface area of the LRSF required to accommodate the liquid residue generated would approximate 500ha. Initial designs based on this requirement were prepared by the Applicant providing for seven LRSF Areas. Whilst the locations of the seven LRSF Areas were identified as less environmentally sensitive than surrounding areas, it would have resulted in an increase to the impact footprint of approximately 200ha.

By introducing two water softening and reverse osmosis (RO) plants, which facilitate the re-use of large volumes of previously designated waste water, the volume of water required has been reduced by a further 20%. This has the environmental benefit of reducing the required evaporative surface of the LRSF. While the construction and operation of the reverse osmosis plant introduces additional costs (both capital and operational) and resolution of various technical issues related to water quality, the reduction in the impact footprint was considered the more environmentally sensitive and sustainable alternative and therefore chosen.

As noted above, the Applicant has identified land on the DZP Site for the construction of an expanded LRSF to manage the additional liquid residue which would be generated if the alternative (original) water use strategy was implemented. However, based on the reduction of environmental impacts associated with a reduction in the impact footprint of the LRSF, the Applicant has discounted this as an option.

6.1.4 Alternative Open Cut Design and Sequence

The Toongi ore body is a Jurassic aged trachyte flow or sill overlying a flat lying sequence of interbedded Triassic sandstone and siltstone (see Section 1.5.2). It is approximately vertically aligned and continues to a determined depth of approximately 115m.

Two principal alternatives have been considered with respect to the design and sequence of the open cut.

- Design for the continuation of the open cut at greater depth.

  This would increase the nominated life of the current Proposal and there are no geological, technical or operational impediments to doing this.

  By increasing the depth of the open cut, however, it is likely that the groundwater table would be intercepted introducing an additional environmental impact requiring assessment and mitigation. It was subsequently concluded that as a 20 year life for the DZP could be sustained by maintaining the open cut above the groundwater table, there was no necessity to introduce this additional environmental impact.

Subsequent applications to extend the DZP, should they be made, would assess this potential impact based on data collected over the life of the current Proposal.

- Develop the entire open cut footprint from commencement

  The initial open cut mining sequence provided for the clearing and excavation of the entire open cut footprint as a single bench.

  Following identification of the threatened Pink-tailed Worm-lizard within the open cut footprint, and in consultation with ecological experts (OzArk Environment and Heritage Management Pty Limited, Biosphere Environmental Consultants Pty Ltd and Kleinfelder Ecobiological), a decision was made to stage the open cut development into an eastern and western half. This would reduce the initial impact (for a period of 10 years) to the western half of the open cut, allowing for passive and active relocation of the Pink-tailed Worm-lizard during this time. Further detail on Pink-tailed Worm-lizard management is provided in Sections 2.3.4, 4.7.5 and the preliminary *Pink-tailed Worm-lizard Plan of Management* (Biosphere, 2013) included as *Appendix 13* of Part 6 of the *Specialist Consultant Studies Compendium* (OzArk, 2013a).

6.1.5 Disposal of Salt

Several options for the disposal of the salt were considered and ultimately discounted.

- Disposal within the open cut void.

  On the basis of the continuation of the ore body at depth and therefore continued extraction (subject to future development approval), this option was discounted

- Commercial sale of the salt.

  Enquiries to several commercial salt producers were made by the Applicant, however, at this time the final content and concentration of potential impurities preclude the sale of the salt for commercial production.

  The Applicant continues to assess potential opportunities.

- Disposal off-site to a licensed waste disposal facility or operator.

  Several commercial waste management companies were consulted to assess the likely practical and economic implications of this alternative. At this time the following makes the alternative unviable.

  – Disposal costs in the vicinity of $100 to $150 per tonne. The Proposal would likely generate 6.7Mt of salt over the proposed 20 year life incurring disposal costs of $670 million to $1 billion.

  – The off-site disposal would almost certainly require the development, approval and licensing of a new facility with the associated costs and environmental impacts.

6.1.6 Surface Infrastructure Locations and Design

Processing Plant

On the basis of the Dubbo-Molong Rail Line being upgraded to Toongi to allow for the transport of bulk reagents by rail to the DZP Site, the location of the processing plant would be required adjacent to or in close proximity to the rail line.

Several possible locations for the placement of the processing plant were considered. Initial site designs had the processing plant located further to the north, approximately where the Rail Laydown and Container Storage Area is currently located. Placing the processing operations between this location and the current location were also considered.

These locations were ultimately rejected on the basis of the following.

- The initial location adjoined the village of Toongi. While the Applicant holds contractual arrangements with the landowners within Toongi, by locating operations further from the village the option for these residents to stay on following commencement of the DZP would be more viable.
- The groundwater table is more elevated to the north (refer to Section 4.6.2.3 and **Figure 4.31**), increasing the potential for obstruction of lateral groundwater flow and dryland salinity issues.
- The occurrence of a 2nd order tributary of Wambangalang Creek that crosses the Rail Line to the south of Toongi, approximately where Toongi Road makes a right hand bend to the north (Watercourse C on **Figure 4.21**). Based on the noted flooding potential (see **Figure 4.21**), it was determined that the Processing Plant Area should be located either solely to the north or south of the watercourse.
- The geotechnical properties of the subsoil and subgrade were investigated and the land to the south was determined to be more suited to the heavy plant required for processing operations (refer to SSM, 2013).

The proposed location of the Processing Plant and DZP Site Administration Area was therefore considered the best alternative on the basis of access to the rail line, distance from Toongi, local drainage and geotechnical conditions of the ground.

Various alternative layouts for the Processing Plant and DZP Site Administration Area were considered during Proposal development. Ultimately, however, the alignment of Watercourse C constrained the area within which the processing operations could be arranged and that presented as part of this Proposal represents the most practical orientation in the space provided.

Liquid Residue Storage Facility Design

The alternative for an extension of the LRSF on the DZP Site to accommodate an increased water demand (for the alternative excluding an RO plant) has been discussed Section 6.1.3.

The entire DZP Site, excluding the open cut area, was initially considered as potential locations for the LRSF. Areas where significant stands of remnant native woodland are present were then excluded. Other criteria used in the identification of appropriate land for the LRSF were then applied as follows.

1. The land is more than 200m from the Wambangalang Creek and 50m from other drainage lines (unless the area extends to the watershed).
2. The slope does not exceed 5%.
3. There are no water discharge areas.
4. The minimum width of the land is 200m.
5. The land is more than 50m from known road reserves and does not include any known road reserves.

Seven areas correlating to the initial seven LRSF Areas were identified as suitable for the LRSF. Based on such factors as environmental sensitivity, distance from the processing operations and agricultural suitability of the land, Areas 1, 6 and 7 were subsequently excluded when the volume of water required for processing was reduced.

In designing the LRSF, an alternative approach to the construction of each salt crystallisation cell was considered. This approach minimised the earthworks required by constructing each cell with a sloping floor which approximated the slope of the existing topography (between 1% and 5%). By minimising the cut and fill required to create flat floors in each cell, the cost of construction would be significantly reduced along with total emissions associated with the earthworks.

However, by providing for a sloping floor, the evaporative surface area of the LRSF would not be maximised and water balance modelling predicted this design would be far less efficient in evaporating the liquid residue. This would have required the incorporation of Areas 1, 6 and/or 7 into the LRSF to provide for sufficient capacity for the 20 year life of the Proposal. It was ultimately decided that the additional cost and emissions associated with constructing the cells with flat floors would provide for a better environmental outcome than increasing the LRSF footprint to construct cells with sloping floors.

Solid Residue Storage Facility

Following assessment of soil and other constraints by SSM (2013), it was assessed that the areas identified as suitable for the LRSF would also be suitable for the SRSF. Notably, however, the general location where the SRSF is currently located was identified as suitable for the SRSF but not the LRSF. While locating the solid residue closer to the processing plant, e.g. where LRSF Area 3 is located, would be more practical for the operation of the DZP (as liquid residue can be sent greater distances far more easily and cheaply than solid residue), given the area required for management of liquid residue is a potentially limiting constraint for the Proposal, the current area was chosen.

An initial design for the SRSF proposed by DE Cooper & Associates Pty Ltd based on DZP Site topography had a modified impact footprint for Cell C. This design was subsequently modified to that presented in this EIS to avoid direct impact on an area of Pink-tailed Worm-lizard habitat (moderate quality).

Salt Encapsulation Cells

On the basis that the salt accumulated within the LRSF would require disposal on the DZP Site, it was considered appropriate to design salt encapsulation cells adjacent to the SRSF and WRE, i.e. within an area that would already be subject to disturbance.

Slight modifications to the original design to Cells C to E provided by DE Cooper & Associates Pty Ltd were made during the Proposal development stage to avoid direct impact on an area of high quality Pink-tailed Worm-lizard habitat.

6.1.7 Transport Operations

Various alternative combinations of rail and road transportation have been considered by the Applicant and Section 2.12.1 describes the three feasible options.

It remains the preference of the Applicant to develop the rail to Toongi option (Option A) and the 2013 DFS Study for the Proposal incorporates the capital and operational costs of the Toongi-Dubbo Rail Line upgrade and operation. It is noted that incorporating the rail line to Toongi would increase total capital cost and increase the complexity of the transport task of the DZP. The simplest and cheapest option would be to operate a road transport fleet only. However, the environmental and social benefits of reducing the number of heavy vehicles on the roads of Dubbo and NSW have been considered and influence the Applicant's preference for including the Toongi-Dubbo Rail Line upgrade into the Proposal.

6.2 EVALUATION OF THE PROPOSAL

6.2.1 Residual Environmental Risk and Impacts

An assessment of the unmitigated environmental risks associated with the Proposal has previously been presented in **Table 3.10**. Following consideration of the proposed management and mitigation measures described in Section 4, together with the commitments provided in Section 5, an assessment of the mitigated risks associated with the Proposal was completed for each potential environmental impact based on the likelihood of occurrence and potential environmental consequence. **Tables 6.1** reproduces **Table 3.8** and presents the risk matrix used during the mitigated risk analysis. **Table 6.2** reproduces the results of the analysis of (unmitigated) risk together with the residual (mitigated) risks associated with the Project. It is noted that in some cases no residual risk rating has been allocated as the assessment recorded in Section 4 has determined that the impact would not occur.

Table 6.1
Risk Rating Matrix

Likelihood		Consequences				
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
A	Almost Certain	M	H	H	VH	VH
B	Likely	M	M	H	H	VH
C	Possible	L	M	H	H	H
D	Unlikely	L	L	M	M	H
E	Rare	L	L	M	M	H

Source: Alkane Policy & Procedures Organisational Risk Management Framework June 2012 – Diagram 4

Table 6.2
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Radiation					
Low level radiation emitted by ore	Adverse health outcomes for mining workforce	L	E	2	L
	Adverse health outcomes for processing workforce	L	E	2	L
Low level radiation emitted by process residues and by-products	Adverse health outcomes for surrounding landowners / residents during the period of mine operation	L	-		-
	Long-term adverse health outcomes for surrounding landowners / residents following the completion of the Proposal	L	-		-
	Degradation of local vegetation and/or reduced survival rates of local fauna during the life of the Proposal	L	-		-
	Long-term degradation of local vegetation and/or reduced survival rates of local fauna following the completion of the Proposal	L	-		-
Low level radiation emitted by product	Adverse health outcomes for those exposed to the equipment or scrap	L	E	2	L
	Adverse health outcomes for the customer or end user	L	-		-
Groundwater					
Leachate from the SRSF	Reduction in groundwater quality	M	E	3	M
	Reduction in the beneficial uses of the water and therefore availability to existing groundwater users.	H	E	2	L
	Contamination of Dubbo City water supply	M	E	3	M
	Health related impacts (people) due to consumption of contaminated water	M	E	3	M
	Health related impacts (stock) due to consumption of contaminated water	H	E	2	L
	Degradation of groundwater dependent ecosystems	L	E	2	L
Leachate from LRSF	Reduction in groundwater quality	H	C/D	2/3	M/H
	Reduction in the beneficial uses of the water and therefore availability to existing groundwater users	H	D	2	L
	Contamination of Dubbo City water supply	M	E	3	M
	Degradation of groundwater dependent ecosystems	L	E	2	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Groundwater (Cont'd)					
Hydrocarbon spills	Reduction in groundwater quality	M	E	2	L
	Reduction in the beneficial uses of the water and therefore availability to existing groundwater users	M	E	2	L
	Contamination of Dubbo City water supply	M	E	2	L
	Health related impacts (people) due to consumption of contaminated water	M	E	2	L
	Health related impacts (stock) due to consumption of contaminated water	M	E	1	L
Process chemical / reagent spills	Reduction in groundwater quality	M	-		-
	Health related impacts (people) due to consumption of contaminated water (surrounding land user water bores)	M	-		-
	Health related impacts (stock) due to consumption of contaminated water (surrounding land user water bores)	H	-		-
	Contamination of Dubbo City water supply	M	-		-
	Health related impacts (people) due to consumption of contaminated water (Dubbo City Council water bores)	M	-		-
	Health related impacts (stock) due to consumption of contaminated water (Dubbo City Council water bores)	M	-		-
	Degradation of groundwater dependent ecosystems	L	-		-
Groundwater drawdown	Reduction in the volume of water contained within the affected groundwater aquifer	L	E	1	L
	Reduced yields of local groundwater bores	M	E	1	L
	Degradation of groundwater dependent ecosystems	L	E	1	L
Reduction in contribution to surface water flows	Reduced surface flows to Wambangalang and other creek catchments of the Macquarie River	L	D	1	L
	Degradation of riparian or aquatic vegetation / ecosystems	L	D	1	L
	Degradation of groundwater dependent ecosystems	L	D	1	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Surface Water / Flooding / Erosion and Sediment Control					
Reduction in environmental flows through on-site capture of water	Reduced flows to Wambangalang Creek and other tributaries of the Macquarie River	M	A	1	M
	Reduced availability of water to downstream users	M	D	2	L
	Stress and possible reduction in viability of native vegetation	L	D	2	L
	Degradation of aquatic habitats	L	D	2	L
Discharge of dirty, saline or contaminated water	Pollution of downstream waters	L	E	2	L
	Pollution of local waterways resulting in detrimental affects to flora and fauna	L	E	2	L
	Contamination of soil resources and indirect impacts on future land use	M	E	2	L
	Health related impacts (people) due to consumption of contaminated water	M	E	2	L
	Health related impacts (stock) due to consumption of contaminated water	H	E	2	L
Wall failure or overtopping of LRSF	Contamination of local surface water	M	-		-
	Contamination of local soil resources	M	-		-
	Contamination of drinking water supply	M	-		-
Changes to hydrology of creeks and drainage lines	Reduced surface flows within the affected waterway and the Macquarie River catchment more generally	M	A	1	L
	Increased erosion potential resultant from changed alignment of flow	L	D	2	L
	Reduction in the quality of aquatic habitat	L	D	2	L
Changes to the flood regimes of Wambangalang and Paddys Creek	Increased erosion potential within Wambangalang and Paddys Creek catchments	L	D	2	L
	Detrimental impacts on surrounding properties as a result of changes to flooding regime	L	E	2	L
	Changes to vegetation community structure and habitat values	L	E	2	L
Erosive actions of water	Soil erosion and loss of agriculturally productive capacity	M	E	2	L
	Decreased availability of soil for rehabilitation	H	E	2	L
Sedimentation of water on and discharged from the DZP Site	Increased sediment load in drains and/or waterways	M	D	2	L
	Increased siltation	M	E	2	L
Increase in dryland salinity	Occurrence of dryland salinity on the DZP Site	H	D	2	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Biodiversity (Flora and Fauna)					
Removal of native vegetation due to clearing activities	Loss of biodiversity and alteration to existing habitat	H	B	2	M*
	Direct adverse impact on threatened species, populations and communities	H	B	2	M*
	Local or regional reduction in distribution of threatened species, populations and endangered ecological communities	H	C	2	M
Detrimental affects of indirect Proposal impacts, e.g. noise, dust, lighting	Reduced biodiversity value of the site	M	C	1	L
	Reduced local distribution of threatened species, populations and endangered ecological communities	M	D	2	L
Pooling of contaminated (including hypersaline) water on the SRSF and LRSF	Detrimental health impacts on native fauna	H	C	1	L
	Injury or death of fauna	H	D	2	L
Aboriginal Heritage					
Unauthorised removal or destruction of known Aboriginal sites and/or artefacts	Destruction of identified site	M	E	3	M*
	Cumulative reduction of the in-situ archaeological record	M	E	3	M
Removal or destruction of currently unidentified Aboriginal sites and/or artefacts	Destruction of identified site	H	E	3	M*
	Cumulative reduction of the in-situ archaeological record	H	E	3	M
European Heritage					
Removal or destruction of sites of heritage significance due to Proposal activities	Loss or destruction of items of heritage significance	M	D	2	L
Noise					
Increased noise resultant from construction on the DZP Site (18 month to 24 months)	Noise levels associated with the Proposal causing annoyance and/or distractions	H	D	2	L
	Noise levels associated with the Proposal causing adverse affects on physical or mental health.	M	E	2	L
	Adverse effects on the local fauna assemblage	L	E	1	L
Increased noise levels resulting from mining and haulage	Noise levels associated with the Proposal causing annoyance and/or distractions.	H	E	2	L
	Noise levels associated with the Proposal causing adverse affects on physical or mental health.	H	E	2	L
	Adverse effects on the local fauna assemblage.	L	E	1	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Noise (Cont'd)					
Increased noise levels from processing plant	Noise levels associated with the Proposal causing annoyance and/or distractions	H	D	2	L
	Sleep disturbance as a result of maximum noise levels	M	D	2	L
	Noise levels associated with the Proposal causing adverse affects on physical or mental health	H	E	2	L
	Adverse effects on the local fauna assemblage	L	E	2	L
Noise associated with the construction of the rail line	Noise levels associated with the Proposal causing annoyance and/or distractions	H	E	2	L
Increased noise levels from rail loading	Noise levels associated with the Proposal causing annoyance and/or distractions	H	E	2	L
	Sleep disturbance as a result of maximum noise levels	H	C	2	M
	Noise levels associated with the Proposal causing adverse affects on physical or mental health	H	E	2	L
	Adverse effects on the local fauna assemblage.	L	E	2	L
Increased rail traffic noise levels	Noise levels associated with the Proposal causing annoyance and/or distractions	H	E	1	L
	Sleep disturbance as a result of maximum noise levels	H	E	1	L
Noise associated with road upgrades	Increased noise levels associated with DZP activities causing annoyance, distractions, i.e. amenity impacts	H	E	1	L
Increased road traffic noise levels	Noise levels associated with the Proposal causing annoyance and/or distractions	H	E	2	L
	Sleep disturbance as a result of maximum noise levels	H	-		-
Vibration					
Vibration from mine blasting	Structural damage to buildings and structures	L	-		-
	Reduced local amenity	L	-		-
	Reduced biodiversity value of the site.	L	-		-
	Reduced productivity	M	-		-
Vibration from rail traffic	Reduced local amenity	M	E		L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Air Pollution – Dust, Odour, other					
Dust generation resulting from blasting, vehicle movements on unsealed haul roads	Nuisance/amenity impacts from dust deposited on window sills, cars, surfaces etc.	M	D	2	L
	Adverse health impacts (if PM_{10} levels are excessive)	H	E	3	M
	Decreased productivity of pastures	L	E	2	L
Wind action on disturbed areas, waste rock emplacements, SRSF and other stockpiles	Nuisance/amenity impacts from dust deposited on window sills, cars, surfaces etc.	L	D	2	L
	Adverse health impacts (if PM_{10} levels are excessive)	M	E	3	M
Blasting fugitive emissions	Increase in the greenhouse gas effect	M	E	1	L
Crushing and grinding emissions	Nuisance/amenity impacts from dust deposited on window sills, cars, surfaces etc.	L	E	2	L
	Adverse health impacts (if PM_{10} levels are excessive)	M	E	3	M
	Health related impacts (stock) due to consumption of contaminated pasture	H	E	1	L
Material handling (train unloading bulk products limestone and sulphur)	Adverse health impacts (if PM_{10} levels are excessive)	H	-		
Processing plant stack emissions	Increase in the greenhouse gas effect	M	E	1	L
Emissions resultant from plant malfunction	Temporary reduction in local amenity due to odour and visible plume	M	E	2	L
	Acute health impacts associated NH_3, SO_2, SO_3 emissions	H	E	4	M
Vehicle emissions	Increased contribution to greenhouse effect.	M	E	1	L
Traffic and Transport					
Obley Road and Toongi Road upgrade and site access road construction	See "*air pollution*", "*flora and fauna protection*" and "*noise*" and "*Aboriginal heritage*" above.				
	Temporary inconvenience to commuters if stopped for road works	H	C	1	L
	Increased risks of accident	H	D	3	M
Re-establishment of railway Toongi-Dubbo	See "*air pollution*", "*flora and fauna protection*" and "*noise*" and "*Aboriginal heritage*" above				
	Temporary inconvenience to commuters if stopped for road works	H	C	1	M
	See "*air pollution*", "*noise*" and "*vibration*" above.				

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Traffic and Transport (Cont'd)					
Train derailment causing chemical spill	Broad dispersion of chemicals	M	E	3	M
	Hydrocarbon or other pollutant contamination of surface water	M	E	3	M
Road accident causing chemical spill	Broad dispersion of chemicals	H	E	3	M
	Hydrocarbon or other pollutant contamination of surface water	H	E	3	M
	See "*air pollution*" above				
	See "*Bush fire*" below				
Railway crossings	Temporary inconvenience to commuters and loss of productivity	M	B	1	M
	Loss of life/property damage through collision with train	H	E	4	M*
	Use of an existing easement/asset	Positive impact (no risk rating)			
	Lessen road freight task (increased transport safety)	Positive impact (no risk rating)			
Workforce commuter traffic	Increased traffic creating pressure on existing road and infrastructure function	H	C	1	L
	Accelerated road pavement deterioration	H	E	2	L
	Elevated risk of accident/incident on local roads	H	E	4	M*
Heavy vehicle movements for reagent delivery	Increased traffic creating pressure on existing road and infrastructure function	H	C	1	L
	Accelerated road pavement deterioration	VH	D	2	L
Visual Amenity					
Changes in visual characteristics of the site from agriculture to industrial	Decreased visual amenity	H	C	2	M
Night lighting	Reduced amenity of night sky	M	C	1	L
Rehabilitation and Final Landform					
Modifications to the landform of the site	Reduced amenity of the final landform resultant from altered topography	H	C	1	L
	Final landform and land use that is different from current activities/lifestyle of local community	H	D	1	L
Soil Resources					
Local soils	Rehabilitation outcomes not meeting objectives	H	E	2	L
	Reduced productivity on final landform	H	D	2	L
	Increased erosion on the final landform	H	E	2	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Waste Management					
Management of process waste	See "*surface water / flooding / erosion and sediment control*" above.				
	Reduced visual amenity	M	C	1	L
Management of waste rock from mining	Generation of acid from waste rock	No potential for AMD			
	Reduced water quality of downstream catchment	L	E	2	L
	Reduction in groundwater quality	M	E	2	L
	Reduction in the beneficial uses of the water and therefore availability to existing groundwater users	H	E	2	L
	Health related impacts (people) due to consumption of contaminated water	M	E	2	L
	Health related impacts (stock) due to consumption of contaminated water	H	E	1	L
Low level radionuclides contained in SRSF and LRSF	See "*surface water / flooding / erosion and sediment control*" above.				
Management of Effluent	Organic and nitrate contamination of groundwater	M	E	2	L
Disposal of Reagent packaging waste	Contaminate off-site landfill	H	E	2	L
Disposal of waste process consumables, e.g. filter cloths	Contaminate off-site landfill	H	E	2	L
Disposal of non-processing waste, e.g. engineering scrap, office waste, domestic waste	Reduced life of landfill	M	C	1	L
Bush fire					
Initiation of fire in the processing plant	Health and safety impacts to Proposal personnel	H	E	3	M
	Damage to DZP Site equipment	H	E	3	M
	Property damage and impacts on process	M	E	2	L
	Damage to adjoining properties and/or native vegetation	H	E	2	L
Bush fire in pasture, cropping and offset woodlands	See above				
Ignition of sulphur stockpile	Acute health impact from ingestion of SO_2	H	E	3	M
	Death of vegetation	M	E	2	L
Fire within Solvent Extraction Plant (large volumes of kerosene)	Air contamination	M	E	2	L

Table 6.2 (Cont'd)
Risk Sources and Potential Environmental Impacts

Risk Source (s)	Potential Environmental Impacts	Unmitigated Risk Rating	Likelihood of Occurrence if Mitigated	Consequence of Occurrence if Mitigated	Residual Risk Rating
Socio-Economic Impacts					
Alteration of social activities or employment	Strain/drain on local skilled workforce	H	C	2	M
	Reduced unemployment and increased local spending	Positive impact (no risk rating)			
	Additional population for schools and community services	Positive impact (no risk rating)			
	Strain on local (Dubbo) housing and other community infrastructure and services	H	C	2	M
Perceived or real impacts on local amenity of neighbouring properties	Reduced property values	M	D	2	L
	Reduced amenity value of landholdings.	M	C	2	M
Resuming railway land	Loss of associated income	H	D	1	L
	Loss of biodiversity	H	C	1	L

Through the implementation of the proposed management and mitigation measures identified in Section 4 and summarized in the Statement of Commitments in Section 5, the residual (mitigated) risk rating for the majority of potential environmental impacts has been reduced. The following provides further consideration of the potential impacts associated with those outcomes attributed a "high" risk or noted with a * (indicating justification supplied for reduced likelihood or consequence rating).

- Loss of biodiversity and alteration to existing habitat.

  The Proposal would result in the removal of approximately 485ha of remnant native vegetation communities. This impact has been attributed only minor consequence on the basis that:

  i) *All but 71ha has been classified as Derived Grassland (>50% weedy, rotationally cropped) and of limited biodiversity value; and*

  ii) *The Applicant has provided for a substantial offset (of 1 021ha) which meets a Tier 3 or better outcome (subject to the application of Variation Rules).*

  Therefore, while biodiversity values would be lost, these would be effectively limited to 71ha of currently isolated remnants which would be appropriately offset.

- Direct adverse impact on threatened species, populations and communities.

  The Proposal would impact directly on known occurrences and habitat of the Pink-tailed Worm-lizard, as well as vegetation classed as the White Box Yellow Box Blakely's Red Gum woodland EEC. This impact has been attributed only minor consequence on the basis that:

  i) *The proposed biodiversity offset area provides for the conservation and enhancement of 82.3ha of high quality habitat, 42ha of low quality habitat and 114.7ha of medium quality habitat for the Pink-tailed Worm-lizard;*

ii) *Specific management measures would be implemented to avoid and minimise impacts on the Pink-tailed Worm-lizard, e.g. staging of the open cut development; and*

iii) *Disturbance to the quality remnants of the EEC (43.7ha) would be offset by the conservation of 306.5ha within the proposed BOA. The Applicant has provided for a substantial offset (of 1 021ha) which meets a Tier 3 or better outcome (subject to the application of Variation Rules).*

Therefore, while biodiversity values would be lost, the consequence of this would be reduced by the proposed mitigation, management and offset measures.

Although considered unlikely, it is conceivable that the Proposal may result in the local loss of other threatened species. Again, reference is made to the proposed BOA described in Section 2.17.8 and assessed in Section 4.7.6.2 which would reduce the consequence of any local impact.

- Loss of life/property damage through collision with train / Elevated risk of accident/incident on local roads

  As indicated in Section 4.12.5, the Proposal would not result in increased traffic levels on roads surrounding the DZP Site that would be in excess of the capacity of those roads. Furthermore, the Applicant has committed to implementing a number of measures, including widening and upgrading of Obley Road and Toongi Road (and associated creek crossings), that would promote the safe use of surrounding roads. However, as the Applicant does not control motorists who use those roads, the potential for accidents cannot be eliminated. As a result, the risk rating associated with accident or incident on the roads surrounding the DZP Site remains elevated (due to the potential consequence).

  Similarly, while the rail level crossings would be designed and constructed to meet the appropriate safety standard, the actions of individual motorists cannot be controlled and as such, the risk rating associated with accident or incident remains elevated (due to the potential consequence).

- Unauthorised removal or destruction of known Aboriginal sites and/or artefacts / Removal or destruction of currently unidentified Aboriginal sites and/or artefacts

  While every precaution would be taken to ensure that the identified Aboriginal sites are managed in accordance with the wishes of the Aboriginal community, the possibility of accidental or malicious damage to a site cannot be completely excluded. The consequence of such an occurrence would be at least 'Moderate' and possibly 'Major' and therefore even though the likelihood is considered rare (E), the overall risk rating of E3 or E4 provides for a medium risk.

- Reduction in groundwater quality (as a result of leakage from the LRSF).

  The Applicant has committed to a comprehensive management protocol to eliminate the potential for human error to result in the liner of the LRSF being breached. This notwithstanding, and following from the assessment of EES (2013), a conservative approach has been taken to the assessment of risk. The following provides a summary of this analysis of risk

- *With the enforcement and implementation of the proposed management protocols (refer to Section 4.6.4.2.6) it is considered unlikely (D) that a major breach of the liner leading to a moderate consequence (3) would occur. The risk rating associated with this event is D3 (medium).*
- *It is more likely, i.e. possible (C), that much smaller, isolated breaches of the liner could occur. Based on the restricted area these would affect, however, the consequence would be at worst Minor (2). The risk rating associated with this event is C2, also medium.*

The above notwithstanding, it is assessed that the implementation of the proposed controls prior to, during and following construction, as well as those management controls, monitoring programs and contingency plans for the operation of the LRSF, that the risk level associated is acceptable.

The risks associated with the majority of potential environmental impacts are considered moderate or less and therefore, while these may result in impacts deemed unacceptable to some stakeholders, the development and operation of the Proposal, with the implementation of appropriate management and mitigation measures, are generally considered acceptable.

6.2.2 Ecologically Sustainable Development

6.2.2.1 Introduction

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. The principles of Ecologically Sustainable Development (ESD) that have been recognised for over a decade were based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives.

Throughout the design of the Proposal, the Applicant has endeavoured to address each of the sustainable development principles. The following subsections draw together the features of the project that reflect the four principles of sustainable development, namely:

- the precautionary principle;
- the principle of social equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing of environmental resources.

6.2.2.2 The Precautionary Principle

In order to satisfy this principle of ESD, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it. During the planning phase for the Proposal and throughout the preparation of the EIS, the Applicant engaged specialist consultants to examine the existing environment, predict possible impacts and recommend controls, safeguards and/or mitigation measures in order to ensure that the level of impact satisfies statutory requirements or reasonable community expectations.

Throughout the development of the Proposal, the Applicant and its consultants have adopted an anticipatory approach to impacts, particularly those impacts resulting in irreversible ecological damage, by undertaking an analysis of the risks posed by proposed activities, an appropriate level of research and baseline investigations and environmental evaluation. The controls, safeguards and/or mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by DZP-related activities.

The implementation of the environmental safeguards, controls and mitigation measures has been formalised by the Applicant as the draft Statement of Commitments presented as Section 5.

Examples of matters relating to the precautionary principle that were considered during the various stages of the Proposal are listed below.

Proposal Objectives

The principal objectives of the Proposal are the design and operation of the open cut, processing operations and ancillary waste management activities in a manner that minimises surface disturbance and impact on the environment and surrounding residents, as well as ensuring compliance with environmental criteria, reasonable community expectations and all relevant statutory requirements through appropriate design, management and mitigation measures.

DZP Design Components

A number of design features were incorporated during the initial design stage in recognition of the precautionary principle. In addition, subsequent modifications were made in response to issues identified during the specialist consultant investigations undertaken as part of the environmental assessment phase. These design features and modifications included the following.

- Wherever possible, the Applicant has located infrastructure and activities away from areas of remnant native vegetation. As a result, of the 807.7ha of disturbance, less than 71ha (<8%) occurs on vegetation considered remnant of the original community type1.
- The processing plant and infrastructure has been located and arranged to minimise impacts on natural surface flows to Wambangalang Creek.
- Significant time and effort have been placed on reducing the overall water requirement for the Proposal. Since the design of the initial flow sheet including REE processing, this requirement has been reduced by almost 40%, reducing the volume of liquid residue to be discharged and managed by a similar proportion which has ultimately resulted in a smaller impact footprint for the LRSF.
- The impact footprint of the LRSF was further reduced by modifying the internal design of the salt crystallisation cells. Initially, sloped floors were proposed given the undulating nature of the local topography. However, while requiring greater earthworks, and therefore increased costs, the LRSF has ultimately been designed as a series of flat bottomed terraces, maximising the evaporative potential of these.

[1] A further 414ha occurs on 'derived grasslands' which are >50% weedy and rotationally cropped by the landowners.

- All residue management facilities (LRSF, SRSF and SECs) have been designed with impermeable liners and leak detection systems or protocols to prevent contamination of groundwater, surface water or soil resources.
- Various structures of the DZP Site have been redesigned to minimise the impact on habitat for the Pink-tailed Worm-lizard. The SRSF, SECs, LRSF and open cut have either been modified or sequenced to minimise impacts.
- The final landform has been designed to provide for areas of native vegetation, agriculture and possibly other activities. The final landform also provides for the protection and extension of remnant areas of native vegetation (including EECs). The proposed approach to final landform creation and land use allows for the greatest flexibility in the use of the DZP Site following completion of the Project.

Management and Operational Safeguards

The framework for ongoing environmental management, operational performance and rehabilitation of the DZP Site would be provided through the project approval and be managed in accordance with the Mining, Rehabilitation and Environmental Management Process, both of which would involve the input from relevant State and local government agencies. The *Mining Operations Plan* (or *Rehabilitation Management Plan*) would contain a range of site specific environmental procedures to achieve consistency with specified outcomes and to control identified risks. This document would be updated periodically. In addition, the *Annual Environmental Management Report* would document the progress of the Proposal and provide an opportunity to review the effectiveness of the environmental management strategies adopted. Finally, the following management and operational safeguards would be implemented in accordance with the precepts of the precautionary principle.

- All on-site procedures would be regularly reviewed, particularly in light of monitoring results.
- Surface water, groundwater, noise, deposited dust, PM_{10}, radiation, Pink-tailed Worm-lizard, rehabilitation and other environmental parameters would be monitored at locations potentially most affected by the Proposal in order to ensure the continued compliance with the goals outlined in this document. Importantly, the Applicant has committed to real time monitoring of noise to the west of the DZP Site.
- The open cut would be developed in two stages to allow for time for passive and active relocation of the Pink-tailed Worm-lizards which occur within Habitat Area 1. Areas of currently low or moderate quality habitat for this species linking known habitat areas would be conserved, protected and enhanced to accelerate the relocation of individuals ahead of mining.
- Noise attenuation would be applied to the processing plant operations to minimise nose levels received at the closest receivers to the west of the DZP Site.
- Surface water management structures identified within Section 4.5.4 would be constructed and maintained to ensure that potentially sediment-laden water does not flow from the DZP Site.

- Water within the sediment basins would preferentially be used for mining-related purposes, minimising the water that would be required to be drawn from the water supply pipeline.
- A biodiversity offset area would be developed and implemented to provide for the protection and extension of remnant native vegetation (including EECs) and threatened fauna on the DZP Site. The areas of to be protected and enhanced would be fenced (unless impractical to do so) and access limited to minimise the potential for inadvertent disturbance.
- Wherever practicable, areas not required for mining-related activities would remain vegetated to assist in minimising erosion and reducing the suspended sediment load in surface water flowing through the DZP Site.
- Soil material would be stripped, stockpiled and re-spread on the basis of the quality of the soil (as indicated by the soil mapping unit), and planned final land use of different areas of the final landform.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the environment would be avoided through:

- creation of a safe, stable, vegetated, non-polluting final landform;
- progressive rehabilitation, including shaping of the final landform, spreading of soil and reseeding or replanting with endemic, locally sourced species as described in Section 2.17.6; and
- a final land use of agriculture, nature conservation and other land uses, possibly including light industry, to be determined in conjunction with the surrounding community and the relevant government agencies.

Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the Proposal. The approach adopted, i.e. risk analysis, initial assessment, consultation, specialist investigations and safeguard design, provides a high degree of certainty that the project would not result in any major unforeseen impacts.

6.2.2.3 Social Equity

Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes both inter-generational (between generations) and intra-generational (within generations) equity considerations.

Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community. Equity between generations requires that the non-material well-being or "quality of life" of existing and future residents of the local community would be maintained throughout and beyond the life of the Project.

Both elements of social equity are addressed through the design of the Project itself, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed. Examples of matters relating to social equity that are relevant to the various stages of the proposed development are listed below.

Identification of Proposal Objectives

As noted above, the principal objective of the Proposal is the design and operation of a small open cut mine and associated processing operations in a manner that minimises surface disturbance and impact on the environment and surrounding residents. The Proposal would also be developed with the objective of maximising the social and economic benefits to local communities (Toongi and Dubbo) and wider region (Dubbo LGA and Orana region) through:

- production of materials utilised in green technology applications;
- provision of employment, including a commitment to employee training (whilst not adversely affecting the ability of other employers within the region to maintain suitably qualified staff);
- support to community organisations, groups and events and, as appropriate, assist in and contribute to the planning and development of community based projects;
- assist the local Aboriginal community through the provision or contribution towards education and training initiatives that will increase the potential of local Aboriginal people to gain employment; and
- development of a purchasing policy specifying the local purchase of project-related consumables such as fuel, oil, cleaning products, etc. where practicable.

The Proposal has also been designed with the objective to ensure the continued viability of surrounding land uses throughout and beyond the life of the DZP.

Design of DZP Components

The Proposal has been designed to maintain inter-generational equity, i.e. in recognition that the mining and processing of the rare metal and REE resource is a temporary land use, and to ensure components of the existing biological, social and economic environment available to existing generations would also be available to future generations.

- The final landform and land use of the DZP Site has been designed conceptually to provide for both the protection and enhancement of native vegetation / fauna habitat, and the continued commercial use of the affected properties (for agriculture).
- A Biodiversity Offset Area (BOA) would be established to compensate for any disturbance to native vegetation, threatened fauna and fauna habitat, to safeguard the populations of threatened flora and fauna species and EECs, and ultimately provide a higher level of protection and management to these threatened species.
- Surface water management on the DZP Site has been designed to have minimal impact on environmental flows and maintain or improve the water quality available to downstream users.

- Water required for the Proposal would be obtained under appropriate licences, obtained on the open market under the rules of the relevant water sharing plans. That is, this water would be drawn from the current allocation to industrial users of water within the relevant water sharing plans.
- Access to groundwater would not be affected.

Integration of Safeguards and Procedures

The Applicant recognises that all members of the community should benefit appropriately from the DZP, either directly or indirectly. In order to ensure a realistic distribution of benefits, the Applicant would continue to consult with the community and maintain a pro-active approach to issues of interest. This dialogue would also include a system to record, manage and respond to any complaints relating to the operation.

Several issues, some Proposal-related and others of a more general nature, have possible inter-generational effects. The following describes these issues and the approach to be taken by the Applicant to ensure potential for adverse inter-generation impacts are minimised.

- Solid Residue Management. The SRSF has been designed to ensure it remains structurally sound, retains all residues, i.e. no leachate, and can be rehabilitated to provide for future nature conservation. Ongoing monitoring would be undertaken to confirm no leakage of leachate into local groundwater or surface water drainage, with this monitoring undertaken for the life of the DZP and for as long as required by the responsible government agency. These measures will ensure that the proposed residue management does not adversely impact on the environment and land users of future generations.
- Liquid Residue Management. The LRSF has been designed to maximise evaporative efficiency and thereby minimise the area required. It has been designed to ensure it remains structurally sound, retains all residue, i.e. no leachate, and can be rehabilitated for a return to the pre-disturbance landform and provide for future agricultural land use.
- Accumulated Salt Residue Management. The SEC's have been identified as the most suitable alternative disposal method (refer to Section 6.1.6). The SEC's have been designed to ensure they remain structurally sound, retain all residue, i.e. no leachate, and can be rehabilitated to provide for future nature conservation. Ongoing monitoring would be undertaken to confirm no leakage of leachate into local groundwater or surface water drainage, with this monitoring undertaken for the life of the DZP and for as long as required by the responsible government agency. These measures will ensure that the proposed salt residue management does not adversely impact on the environment and land users of future generations.
- Water Use, Access and Allocation. Local agriculture and other industry rely on access to water. Regulatory safeguards are in place through *Water Sharing Plans* issued under the *Water Management Act 2000* to manage the allocation of this water. The Applicant has acknowledged this and as described in Section 2.8.2

commenced purchasing and leasing available allocation. Importantly, the average volume of water traded each year within the *Water Sharing Plan* for the Macquarie and Cudgegong Regulated Rivers Water Source (12 200ML) is well in excess of that which the Applicant would require to obtain each year. Furthermore, a report by Hennessy Water (**Appendix 7**) confirms that water is currently available within the two targeted groundwater sources and a report by EES (**Appendix 8**) confirms that extraction of groundwater from below the DZP Site is viable.

An assessment as to the possible impact of the purchase of 4.05GL of water on agriculture in the region has been undertaken as part of an Agricultural Impact Statement (AIS) (**Appendix 9**). The AIS concludes that the volume of water required could be obtained each year without adversely affecting current and future agricultural enterprises and/or production.

- Weed Management. The spread of weeds is recognised as an issue that could impact on surrounding landowners over the life of the Proposal and beyond. While this issue is a more general one for the local area, the Applicant recognises that poor land management on the DZP Site could exacerbate the problem. Conversely, the proposed implementation of appropriate weed control on Applicant owned land would assist in overall weed management of the local area. The Applicant proposes to implement appropriate weed management programs. Any such works would be undertaken in consultation with the local Weeds Officer of Dubbo City Council or the DPI.
- Land Use. The proposed rehabilitation objectives and measures described in Section 2.17.2 have been designed to ensure that the DZP Site lands are available for future use for agricultural or nature conservation purposes and do not restrict the ongoing agricultural activities on surrounding lands. An AIS prepared for the DZP and included as **Appendix 9** confirms that the impact on local agricultural industry and production would be minor and largely temporary.
- Cultural Heritage. An *Aboriginal Cultural Heritage Management Plan* is to be developed in conjunction with the Aboriginal community to provide for the protection and, where unavoidable, salvage of those Aboriginal sites that would or could otherwise be disturbed by the Proposal.

Rehabilitation and Subsequent Land Use

The final landform would be constructed and rehabilitated in a manner that would retain land for the maintenance and improvement of local biodiversity values with the majority to be retained for future agricultural use. Some sections of the DZP Site final landform would also be ideally suited to some form of light industry with some interest received by the Applicant from the renewable energy sector for the installation and distribution of power generated by solar power generation. This would provide a basis for continuing economic activity in the local community. The areas rehabilitated for biodiversity protection and enhancement may provide areas for recreational activities for the local community.

Conclusion

The principle of social equity has been addressed through the consideration of how the Proposal could benefit the local and regional communities, the design of particular elements of the Proposal and the integration of operational safeguards and management measures that would maximise community involvement in reviews of operations, as well as ensure that gains made in the short-term do not result in adverse impacts on the environment or the local community post-completion of the DZP. Notably, the Proposal would contribute significantly to the economic activity of the local and regional community through the generation of employment, increased demand for local goods and services, direct community contributions and flow-on effects. These benefits of the Proposal, which are reviewed in more detail in Section 6.3.3, would be distributed throughout the local community. The DZP has also been designed such that elements of the existing environment available to this generation, including water and local biodiversity would continue to be available to future generations. Furthermore, the Applicant would adopt a pro-active approach in identifying and addressing any concerns identified by the local community.

6.2.2.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems is a central goal of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term. Details of how the DZP has been designed to achieve compliance with these principles are set out below.

Identification of Proposal Objectives

The Applicant has nominated specific objectives with respect to the rehabilitation of the DZP Site and development of final landform / land use (see Section 2.17.2). Importantly, these rehabilitation objectives provide for the establishment of:

- a low maintenance, geotechnically stable and safe, non-polluting landform which blends with surrounding landforms and provides land suitable for the final land use of nature conservation, agriculture, tourism or light industry; and
- native vegetation with the species diversity commensurate to each relevant ecological community.

In addition, and following the identification of one threatened fauna species (Pink-tailed Worm-lizard) and three EEC's on the DZP Site and along the alignment of Obley Road, the Applicant developed an additional objective with respect to biodiversity management.

- To maintain or improve the biodiversity values of the DZP Site and surrounds with respect to the biota that would be impacted by the Proposal and meet the recommended standards of the relevant NSW and Commonwealth authorities.

Design of Proposal Components

The Applicant is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not significantly adversely affect biological diversity or ecological integrity.

The Applicant, on advice from the specialist consultancies commissioned to assist with the design and to assess the impact of the DZP, has provided for the conservation of biological diversity and ecological integrity through the following design elements. As far as practical, the Applicant has followed Step 4 of the guideline document "*Draft Guidelines for Threatened Species Assessment"* (DEC/DPI, 2005), i.e. "*avoid, mitigate and then offset*".

Impact Avoidance

- Impacts on threatened flora and fauna have been further avoided through the strategic location of surface disturbance away from remnant native vegetation and use of previously cleared land for the construction of surface infrastructure.
- The area required for the LRSF was reduced following successful efforts of the Applicant to maximise water re-use within the processing plant and therefore minimise the volume discharged as liquid residue.
- Areas originally nominated for residue management were subsequently modified on identification of the EEC's and habitat for the Pink-tailed Worm-lizard.

Impact Mitigation

- The open cut mining schedule was reviewed and revised to allow for development in two separate stages, effectively splitting the open cut into a western half (to be developed on commencement of the DZP) and an eastern half to remain undisturbed for approximately 10 years. This would allow additional time for the passive and active relocation of Pink-tail Worm-lizards from this impact footprint and the establishment of additional habitat areas linking this sub-population to sub-populations to the north and northeast.
- Water management structures have been designed and would be constructed to ensure that only water of appropriate quality leaves the DZP Site and minimise changes to surface flows to the Paddys Creek, Wambangalang Creek, Cockabroo Creek and Macquarie River catchments.
- Construction of the Wambangalang Creek rail crossing would be undertaken in a manner which minimises impact on the identified population of the threatened Eel-tailed catfish population identified near the current rail crossing of the creek.
- Soil would be stripped and managed in stockpiles for eventual respreading over the final landform.
- The construction of internal roads and access routes would minimise disturbance to native vegetation.
- Progressive rehabilitation of the DZP Site would provide for the re-establishment of native and pasture vegetation. The area to be rehabilitated for management of biodiversity back to nature conservation would be greater that what is currently available for nature conservation within the DZP Site, as the majority of the land has been previously been cleared of trees for agricultural purposes.
- Effective weed control would be undertaken to reduce the spread of weeds over the DZP Site and surrounding land.

Impact Offsetting

- The limited areas of disturbance to native vegetation and fauna habitats associated with the Proposal would be compensated by the establishment of a Biodiversity Offset Area (BOA). The BOA would provide for the protection and enhancement of remnant native vegetation on and surrounding the DZP Site. The BOA would also provide for the protection and enhancement of habitat of the Pink-tailed Worm-lizard.

Integration of Safeguards and Procedures

The following safeguards and procedures would be integrated into the Proposal with the objective of maintaining biological diversity and ecological integrity.

- Clearing of vegetation would be undertaken on a campaign basis to ensure that clearing is undertaken during periods when local fauna is unlikely to be nesting, roosting or over-wintering within the trees and shrubs to be cleared.
- Given the potential occurrence of threatened native fauna on the DZP Site and within trees to be cleared, a *Vegetation Clearing Protocol* would be developed and implemented prior to each clearing campaign to identify if any threatened fauna species are present in trees nominated for clearing. In the event a threatened fauna species is present, clearing would be suspended until it moves away from the subject area or is relocated by a suitably qualified person.
- Remnant native vegetation enhancement would involve seeding and tree planting activities as deemed appropriate to improve the coverage and species diversity of each remnant to be conserved.
- Areas linking known habitat for the Pink-tailed Worm-lizard would be enhanced in accordance with the *Pink-tailed Worm-lizard Plan of Management* to be finalised for the DZP.
- Rehabilitation of the DZP Site would include the establishment of endemic vegetation, including grassland species.
- Weed eradication programs would be implemented, as required.

Rehabilitation and Subsequent Land Use

The final landform has been designed to provide for future use of the DZP Site lands for biodiversity conservation, agricultural activity and possibly some other light industry to be determined in consultation with the local community and local government.

Conclusion

The Proposal addresses the principle of conservation of biological diversity and ecological integrity through the minimisation of disturbance to areas of native vegetation, and conservation of greater areas of native vegetation than are disturbed. Threatened species identified within those areas of the DZP Site to be disturbed would be relocated or managed appropriately in consultation with OEH or a suitably qualified professional. Weed eradication programs would continue to be implemented as appropriate and would further assist in addressing the conservation of biological diversity and ecological integrity principle of sustainable development.

6.2.2.5 Improved Valuation and Pricing of Environmental resources

The issues that form the basis of this principle relate to the acceptance that:

- the polluter pays;
- when all resources are appropriately valued, cost-effective environmental stewardship is adopted; and
- the adoption of user-pays principle based upon the full life cycle of the costs.

A reflection of these issues on the DZP is set out below.

Identification of Proposal Objectives

The Applicant's principal objectives (see Sections 6.2.2.2 to 6.2.2.4) demonstrate that an appropriate value has been placed on elements of the existing environment.

Design of Proposal Components and Integration of Safeguards and Procedures

The extent of research, planning and design of environmental safeguards, mitigation measures and offset strategies to prevent irreversible damage to environmental resources, other than the rare metals and REEs to be mined, is evidence of the value placed by the Applicant on these resources.

Rehabilitation and Subsequent Land Use

The design of the final landform to integrate ongoing agricultural activities, light industry and biodiversity conservation illustrates the value placed by the Applicant on both the commercial and ecological elements of the DZP Site.

Conclusion

The value placed by the Applicant on environmental resources is evident in the identification of Proposal objectives, extent of site-specific research, planning and environmental safeguards and measures to be implemented to prevent irreversible damage to the environment on and surrounding the DZP Site and other components of the Proposal. It is planned that the income received from the sale of the rare metal and REE products would be sufficient to enable the Applicant to achieve an acceptable profit level whilst undertaking all environmentally-related tasks and meeting all commitments in all approvals, licences and permits and those made to the local community.

6.2.2.6 Conclusion

The approach taken in planning the DZP has been multi-disciplinary, involved consultation with community representative groups, potentially affected local residents and various government agencies and emphasis on the application of safeguards to minimise potential environmental, social and economic impacts. The design of the Proposal has addressed each of the sustainable development principles, and on balance, it is concluded that the proposed Dubbo Zirconia Project achieves a sustainable outcome for the local and wider environment.

6.3 JUSTIFICATION OF THE PROPOSAL

6.3.1 Introduction

In assessing whether the development and operation of the Proposal are justified, consideration has been given both to the predicted residual impacts on the local and wider environment and the potential benefits the Proposal would have for the Applicant, surrounding landowners and residents, Toongi and Dubbo communities, the Dubbo LGA more generally, NSW and Australia. When considering the predicted residual impacts, a review of the proposed controls, safeguards and mitigation measures prepared by the Applicant was also undertaken to determine the emphasis placed on impact minimisation and the incorporation of the principles of ESD.

This section also considers the consequences of the Proposal not proceeding.

6.3.2 Biophysical Considerations

6.3.2.1 Introduction

Table 6.2 presents the range of mitigated residual impacts on the biophysical environment predicted should the Project proceed based on the assessments summarised in Section 4. The residual impacts considered being of greatest significance and the proposed management of these are summarised in the following subsections.

6.3.2.2 Noise

Noise modelling completed as part of the noise assessment for the Project (EMM, 2013), predicts the Proposal would generate noise levels greater than those currently experienced in the vicinity of the DZP Site. Initial noise modelling indicated that without the implementation of noise mitigation measures, the increase in noise levels received at residences surrounding the DZP Site would exceed the nominated intrusiveness criteria, i.e. background noise + 5dB(A). However, following the implementation of the mitigation measures described in Section 4.2.6 the predicted noise levels received at residential and other sensitive receivers have been reduced to compliant levels with the criteria.

It is noted that should rail loading or unloading be undertaken at night, it is possible that maximum noises levels received at four non-Proposal related residences to the west of the DZP Site could be as high as 53dB(A) or 54dB(A). The Applicant has committed to restricting night time loading and unloading of trains to only when an overnight changeover of a train is necessary to meet the allocated rail path. Furthermore, the Applicant has also committed to enforcing operator behaviour to minimise and ultimately eliminate the L_{max} noise levels associated with wagons being carelessly placed onto wagons. These management controls notwithstanding, it is noted that although these L_{max} noise levels are above the sleep disturbance criteria of 45dB(A), they remain below levels that are likely to wake sleeping occupants indoors based on international research as published in the EPA's RNP.

Rail and road noise predictions indicated compliance with the relevant noise criteria.

6.3.2.3 Air Quality and Radiation

The air quality assessment for the Proposal (PEL, 2013), predicted that emissions of TSP, PM_{10}, $PM_{2.5}$, dust deposition, SO_2, NO_x, HCl and odour would all comply with annual average criteria at all non-Proposal related receivers. A number of the residences surrounding the DZP Site are predicted to be subject to exceedance of the cumulative PM_{10} 24-hour criterion on 2 days. However, given the background data set already contains two exceedances of the EPA 24-hour criterion, the Proposal is not anticipated to contribute to any *additional* exceedances. On this basis, the Proposal is anticipated to satisfy the EPA criterion (PEL, 2013).

The radiation assessment of the Proposal completed by JRHC (2013) shows that the impacts would be manageable and well below the recognised limits. A summary of the radiological impacts of the Proposal can be seen in **Table 6.3**.

Table 6.3
Summary of Radiation Impacts for the Proposal

Dose Groups	Expected Dose/Impact (mSv/y)	Dose Limit/Standard (mSv/y)
Workers	2 to 9mSv/y*	20mSv/y
Member of Public	<0.1mSv/y	1mSv/y
Non-Human Biota	No impact	-
Note * depending on the work area		

Monitoring of emissions to air (including radiation) would be undertaken to ensure that the conservative predictions summarised above are correct. Should concentrations be noted to be approaching trigger criteria, relevant and contributing operations would be identified and activity appropriately reduced until such time as the monitoring information provided confidence that concentrations had been reduced.

6.3.2.4 Surface Water Resources

The conclusion of the surface water assessment (SEEC, 2013) is that there would be limited residual impacts to surface water as a result of the Proposal (refer to Section 4.5.5).

Of notable significance, water balance modelling completed for LRSF by SEEC (2013) illustrates that in all but the wettest 20 year cycle, the volume of liquid residue generated by the DZP over the 20 year life of the Proposal could be maintained within the nominated structures. Furthermore, comprehensive design, construction, installation and monitoring protocols would ensure that the potential for contamination of surface water resources as a consequence of leakage or spillage from the LRSF is reduced as far as reasonably and feasibly possible.

This notwithstanding, the Applicant would implement appropriate mitigation measures if it was determined that impacts to surface water resources have occurred as a result of the Project.

6.3.2.5 Groundwater Resources

Given the open cut would be developed above the groundwater table, no dewatering would be required and there would be no drawdown of groundwater levels associated with the Proposal.

Impacts on local groundwater conditions could occur as a result of changes to recharge rates and flows resultant from the construction of various features of the DZP Site. The following outlines the potential impacts associated with the main features of the DZP Site.

- Open Cut. On completion of the mining, enhanced recharge could be expected to be more significant resulting in an increase in groundwater levels in the vicinity of the open cut. This impact is not predicted to extend to the alluvial sediments associated with the flats of Wambangalang Creek.
- SRSF and SECs. The rate of recharge over the footprint of the SRSF and SECs would be reduced, leading to a possible moderate reduction in the level of the water table (in the order of 1m to 3m) beneath and in the vicinity of these structures. Based on the controls to be implemented, no adverse impacts on groundwater quality are expected.
- LRSF. The rate of recharge over the footprint of the LRSF would be reduced during operations, leading to a reduction in the level of the water table beneath and in the vicinity of these structures. This impact would be limited to the life of the Proposal given the proposed rehabilitation of the LRSF back to agricultural use.

  With the installation of an impermeable liner, and implementation of comprehensive and detailed protocols for design, construction, installation and testing of the cell foundations and cells, no impact on groundwater quality is expected.

  With the use of a single liner, there remains potential for a breach of this liner to result in the leakage of saline material from the LRSF which could contaminate the aquifer below. Based on the comprehensive controls to be implemented during design, cell construction and liner installation, the likelihood of a breach of the liner leading to a leak is considered to be low. In the unlikely event of such a breach, this would be limited in size, diluted by base flows and identified by the proposed monitoring system. A comprehensive monitoring system would be installed, using both monitoring bores and review of cell water balances, and a *Leak Detection Response Strategy* developed such that in the event of any leakage, this would be quickly identified, contained and remediated to limit the area of impact.

  Groundwater users more than approximately 100m to the west of Wambangalang Creek are assessed as unlikely to be affected by the DZP Site as they are outside the local flow system.

  Assuming no leakage from the LRSF, or effective leak identification, response and remediation, no groundwater dependent ecosystems would be adversely affected.

6.3.2.6 Biodiversity

Based on the conclusions of the Terrestrial Ecology and Aquatic Ecology Assessments for the Proposal (OzArk, 2013a and AHA, 2013), the following residual impacts relating to biodiversity would result.

The Proposal would result in the disturbance to less than 71ha (<8% of all disturbance) of vegetation considered remnant of the original community type[2]. However, this minor impact is assessed as being appropriately offset by the proposed establishment and management of a BOA focussed on the conservation of the remnant vegetation of Dowds Hill and linkage of this regionally significant remnant, incorporating areas of remnant vegetation communities, to other significant vegetation or habitat remnants including.

- The remnant vegetation of Wambangalang Creek which itself provides a corridor to the Macquarie River.
- The remnant vegetation within the road easement of Benolong Road to the north. Identified remnants of two endangered ecological communities have also been included within this proposed corridor.
- Important but potentially isolated habitat for the NSW and Commonwealth listed threatened species, Pink-tailed Worm-lizard, to the west, northwest and north of Dowds Hill.

The combined total BOA of 1 021ha, comprises 653.1ha (64%) native vegetation communities, 306.8ha (30%) associated derived grassland communities and 61.1ha (6%) currently cleared land (without derived native grassland) or white cypress pine monoculture (see **Figure 2.23**).

When considered using the BioBanking Assessment Methodology (DECCW, 2008), the BOA variously achieves Tier 1, Tier 2 and Tier 3 (with application of Variation Rules) for each of the vegetation communities and threatened species impacted by the Proposal. The proposed BOA also satisfies each of OEH's nominated principles for biodiversity offsets (DECC, 2008e) (see Section 4.7.6.2.2) and the offsetting requirements of the EPBC Offset Policy (see Section 4.7.6.2.3).

The Aquatic Ecology Assessment of AHA (2013) confirms that with the adoption of the proposed management and mitigation measures, and implementation of specific controls when constructing the Wambangalang Creek rail crossing (where a population of the Eel-tailed catfish has been identified), the impact on aquatic biota and habitats would be reduced to acceptable levels.

On the basis of the above, it is assessed that the Proposal would not result in the loss of biodiversity values locally and would potentially lead to an improvement through the widening and connection of protected wildlife / habitat corridors.

[2] A further 414ha occurs on 'derived grasslands' which are >50% weedy and rotationally cropped by the landowners.

6.3.2.7 Cultural Heritage

The combined field surveys undertaken by OzArk and RAPs resulted in 52 sites being identified within the DZP Site, Toongi-Dubbo Rail Line and Obley Road Realignment Study Areas. These sites include 19 sites previously recorded on the AHIMS database. Of the 52 sites:

- 26 occur well away from areas of proposed disturbance and would not be impacted; and
- 12 are located in close proximity to the impact footprint but would remain undisturbed with the implementation of appropriate management.

Impact to 14 sites would be unavoidable.

Specific management measures for each site to be affected have been proposed and presented to the Registered Aboriginal Parties (RAPs) for the DZP. Correspondence received from the RAPs indicates satisfaction with the proposed management subject to the preparation and implementation of a Care Agreement between the Applicant and RAPs (to define the collection, transfer and management of artefacts salvaged).

6.3.2.8 Transport

With or without the incorporation of the rail component of the Proposal, it has been assessed that impacts on local roads and road users would be appropriately mitigated and managed.

6.3.3 Socio-Economic Considerations

While the impacts summarised in Section 6.3.2 have been assessed to comply with nominated criteria or to meet accepted environmental standards, the cumulative effect of these minor impacts may have some adverse effect on the amenity of the local setting.

Based on a mining rate of 1Mtpa and annual production of 75 000tpa of products, the Proposal would generate a total revenue stream of over $500 million/year. Earnings before Interest, Taxes, Depreciation, and Amortization (EBITDA) generated have been estimated at around $5.4 billion over the life of the Proposal[3].

Importantly, the DZP would provide several economic benefits to the local and regional socio-economic setting, including the following.

- Direct employment for up to 400 positions during the site establishment and up to 250 full-time equivalent positions during the operational phase of the DZP.
- Employees would preferably be sourced locally with a target for the start-up workforce to comprise 80% drawn from Dubbo and surrounding towns. The remaining specialist and technical positions would be drawn from further afield, however, would move to the region, i.e. no FIFO workforce is proposed.

[3] It is noted that the rare metal and rare earth resource significantly exceeds that which could be mined and processed within 20 years. Subject to a future development application, there is potential for the operation of the DZP to continue well beyond 20 years with a commensurate increase in the EBITDA generated by the DZP.

Increased employment opportunities associated with the Project would have additional flow-on benefits including:

- the provision of new employment would provide an impetus to other local businesses;
- contribution of $50 million per year to the local and regional economy through wages and purchases of local goods and services;
- commitment to upgrading Obley and Toongi Roads, which will benefit all users of these roads, at a cost likely to exceed $15 million;
- commitment to enter into an agreement, possibly in the form of a *Voluntary Planning Agreement* (VPA), with Dubbo City Council, to assess any net costs to Council and to establish a fund to meet community needs identified as arising from the DZP; and
- support of local community services and projects.

The operation of the DZP would also make significant contributions to the public sector via a range of payments made to the national, State, and local governments under existing legislative arrangements.

- Corporate tax payments (at an assumed rate of 30%) be in the order of $70 million.
- Royalties to the NSW State Government of approximately $9.5 million.
- Annual payroll costs to the NSW State Government of around $34 million.
- Relevant income tax payments generated by the higher wages paid by the mining sector.

The Proposal would also provide for the continued diversification of development / industry in the region and provide for one of the 10 key steps to Dubbo's economic success of the *Dubbo City Economic Development Strategy* (DCC, 2012), i.e. to encourage and develop a mining and mining services sector.

It is acknowledged that while impacts on the biophysical environment have been assessed as complying with nominated criteria or meeting accepted environmental standards, the cumulative effect of these minor impacts may have some adverse effect on the socio-economic setting. This is often expressed as a reduction in the amenity of the local area.

An objective assessment of this impact on local amenity is difficult as what one person may consider as acceptable, may not be to another person (and vice versa). However, where all biophysical impacts are assessed as complying with nominated criteria or standards, it is considered unlikely for impacts on local amenity to be unacceptable to a reasonable person.

It is further noted that the Applicant remains accountable for managing the DZP in a manner that complies with the nominated environmental criteria and meets reasonable community expectations. A comprehensive monitoring program would be established to demonstrate compliance with environmental criteria, and liaison with both official and unofficial community representation would continue to address community concerns as they arise.

6.3.4 Planning Considerations

6.3.4.1 Introduction

This subsection reviews the compliance of the Proposal with local and State planning instruments. It is noted that whilst the relevance of these instruments may change in the future, the following represents the application of these in their current form to the DZP as described in Section 2.

6.3.4.2 Permissibility

As noted in Section 3.3.4.1, mining is permissible with consent within the DZP Site by virtue of its location within Zone RU1 of the *Dubbo Local Environmental Plan* (LEP) *2011*.

Development within the SP2 Zone for the purpose of the rail line upgrade and natural gas pipeline are permissible on the basis that:

- The SP2 Zone of the Dubbo LEP map is identified for the purpose of Railway; and
- Dubbo City Council confirmed the placement of the natural gas pipeline within this zone would be permitted with consent in a letter received 9 January 2013.

Development within the W2 Zone for the purpose of water reticulation systems is permissible with consent.

6.3.4.3 State Environmental Planning Policy (State and Regional Development) 2011

As the proposed capital cost would be in excess of the identified threshold of $30 million, the Proposal is identified under Schedule 1 of the SEPP as a State Significant Development to which Part 4 Division 4.1 of the EP&A Act 1979 applies. This EIS addresses the requirements of this SEPP.

6.3.4.4 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. **Table 3.5** presents a summary of each element requiring consideration and a reference to the section in the EIS where this is addressed.

6.3.4.5 State Environmental Planning Policy (Infrastructure) 2007

A range of infrastructure has been identified which would be required or affected by the Proposal including electricity, road, railway, pipeline and telecommunications infrastructure. Section 3.3.2.3 considers the relevant clauses of the SEPP and the Applicant has consulted with the relevant stakeholders and considered their requirements in the preparation of the EIS.

6.3.4.6 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)

A risk screening and Preliminary Hazard Analysis (PHA) has been undertaken for the Proposal in accordance with SEPP 33 with the results presented in full as **Appendix 4** (Sherpa, 2013) and summarised in Section 4.14.2. The results of the PHA indicate that the Proposal is not 'hazardous industry' and can proceed subject to the issue of development consent.

6.3.4.7 State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)

Dubbo City (LGA) is not identified in Schedule 1 of SEPP 44 as an LGA that could provide habitat for Koalas. While not strictly required under SEPP 44, a review of previous recordings of Koala occurrence and local vegetation completed as part of the Terrestrial Ecology Assessment (OzArk, 2013a) has confirmed that the DZP Site represents potential Koala habitat for dispersing or transient individuals. Section 4.7.4.2.1 reviews the classification and potential impacts in greater detail.

No *Koala Management Plan* is required and with the implementation of the management and mitigation measures proposed, SEPP 44 does not constrain the development of the Proposal.

6.3.4.8 State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) requires that consent for any development cannot be granted unless the consent authority has considered whether the land is contaminated.

Only land adjoining the DZP Site was identified as being potentially contaminated and an investigation of this completed by Ground Doctor (2012) (and reproduced as **Appendix 10**) confirmed the land is considered suitable for ongoing commercial and/or industrial use (see Section 4.14.5.3).

6.3.5 Consequences of not Proceeding with the Proposal

The consequences of not proceeding with the Proposal include the following.

- The recoverable rare metal and REE resource, globally important as critical to the ongoing development of 'green technology', would not be mined. Such an outcome would be contrary to the objective of the DRE of DTIRIS and the Applicant to maximise resource utilisation.
- The opportunity to create up to 400 construction and 250 operational full-time jobs would be foregone.
- The contribution of an anticipated $50 million per year to the local and regional economy through wages and purchases of local goods and services would be foregone.

- The contribution of at least $114.5 million each year to the public sector, in the form of taxes and royalties, along with the additional income tax and rates generated, would be foregone.
- The opportunity to provide for one of the 10 key steps to Dubbo's economic success of the *Dubbo City Economic Development Strategy* (DCC, 2012), i.e. to encourage and develop a mining and mining services sector, would be foregone.
- The subsequent opportunity for the training opportunities that would be provided would be foregone. These opportunities for training and employment would assist in the retention of school leavers and younger people who are often lost from regional communities to pursue opportunities elsewhere.
- The minor impacts on the local biophysical environment would not eventuate.

It is considered that the benefits of proceeding with the Proposal therefore far outweigh the minor impacts on the environment that would result.

6.4 CONCLUSION

The proposed Dubbo Zirconia Project has been designed, as far as practicable, to address the issues of concern to the community and all levels of government. The Proposal provides for the recovery of valuable rare earth and REE resources which contribute significantly to the economies of NSW and Australia. The subsequent landform would be constructed to sustain agricultural operations, light industry and biodiversity conservation.

This document and the range of specialist consultant studies undertaken have identified that the DZP should proceed because it would:

- satisfy sustainable development principles;
- operate with risks to the local environment minimised to the greatest extent practicable through Proposal design and implementation of a range of environmental controls and safeguards;
- have a minimal and manageable adverse impact on the biophysical environment;
- have a substantial positive impact on the local and wider regional and NSW socio-economic environment;
- contribute to the continued economic activity of the Dubbo and surrounding LGAs; and
- provide a site suitable for future agricultural activities, regionally significant biodiversity conservation and possibly light industry.

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