



Report and recommendations of the Environmental Protection Authority



Barrambie Vanadium Project, Shires of Meekatharra and Sandstone

Reed Resources Ltd

Report 1446

August 2012

Public Environmental Review Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
13/2/2008	Level of assessment set	
18/3/2009	Final ESD approved	53
28/6/2010	Environmental Review Document (ERD) released for public review	63
26/7/2010	Public review period for ERD closed	4
14/3/2012	Final Proponent response to ERD issues raised	85
13/8/2012	Publication of EPA report	21
27/8/12	Close of appeals period	

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

In this case, the Environmental Protection Authority did not meet its timeline objective in the completion of the assessment and provision of a report to the Minister. The proponent provided additional information regarding groundwater drawdown and further consultation was required to confirm the predictions and identify recommended conditions.



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Chairman
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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal to develop and operate an open-cut vanadium mine and process plant by Reed Resources Ltd.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) Vegetation and flora
- (b) Fauna;
- (c) Surface and groundwater; and
- (d) Rehabilitation and closure.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

- (a) the Precautionary Principle;
- (b) the Principle of Intergenerational Equity; and
- (c) the Principal of Biological Diversity and Ecological Integrity.

Conclusion

The EPA has considered the proposal by Reed Resources Ltd to develop and operate an open-cut vanadium mine and process plant 75 kilometres (km) north-west of Sandstone townsite and 116 km south-east of Meekatharra.

Plant communities affected by the proposal are not considered to be regionally significant and are characteristic of the region. No Declared Rare Flora (DRF) or Priority flora species were identified, nor are any Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) expected to be impacted. Clearing will be restricted to the areas identified by the proponent.

Trenching for the water pipeline linking the minesite to the borefield poses risks for animal entrapment. The EPA has recommended a condition to ensure acceptable management practices to minimise impacts to fauna that might otherwise be unable to escape from the open trench.

The Cogla Downs calcrete aquifer site for the proposed borefield is inhabited by a stygofaunal assemblage listed by the Department of Environment and Conservation (DEC) as a Priority 1 PEC. The assemblage of stygofauna in the calcrete aquifer contains six potentially new species collected only from bores in the impact zone. The EPA notes the apparent connectivity of habitat across and within the profile of the aquifer. In view of the above, the EPA has recommended a condition to ensure that the saturated thickness of the aquifer is maintained at 75% for the first five years of operation of the borefield, and shall not fall below 50% over the life of the project in order to retain stygofauna habitat. Groundwater abstraction is also licenced under the provisions of the *Rights in Water and Irrigation Act 1914* and will be managed by the DoW to ensure abstraction occurs consistent with a sustainable yield.

The proposal is also subject to the requirements of the *Mining Act 1978* and the Department of Mines and Petroleum (DMP) has statutory requirements relating to mine closure and rehabilitation. The EPA considers the issues of rehabilitation and closure can be adequately addressed by the DMP and meet the EPA's objectives.

The EPA has therefore concluded that it is likely that the EPA's objectives would be achieved provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

That the Minister for Environment:

1. Notes that the proposal being assessed is for an open-cut vanadium mine and process plant;
2. Considers the report on the key environmental factors as set out in Section 3;

3. Notes the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4;
4. Imposes the conditions and procedures recommended in Appendix 4 of this report; and
5. Notes the EPA's other advice presented in section 5 in relation to offsets and the main Sandstone to Meekatharra road.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Reed Resources Ltd to develop an open-cut vanadium mine and process plant at Barrambie is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) management of open trenches to protect fauna; and
- (b) manage groundwater abstraction to ensure that stygofauna habitat is retained in the aquifer.

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4. Recommended environmental conditions and nominated decision-making authorities
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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Reed Resources Ltd to develop an open-cut vanadium mine and process plant at Barrambie.

The proponent referred the proposal in January 2008 to the EPA. A formal level of assessment was considered appropriate because of the potential for significant impacts to flora, fauna and groundwater supplies. The level of assessment was set as Public Environmental Review (PER) with a four week public review period in February 2008. A final version of the environmental scoping document was approved by the EPA in February 2009. The PER was released for public review on 28 June 2010. Submissions received during the public review period raised concerns about the likelihood of identifying an adequate water supply. The proponent provided additional information about the water supply and its final response to submissions on 15 March 2012.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides other advice by the EPA.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

The deposit, proposed mine and process plant are sited approximately 75 kilometres (km) north-west of Sandstone and 116 km south-east of Meekatharra, as shown in Figure 1. The mine requires a borefield to supply water and the borefield is located approximately 35 km from the mine. The location of the borefield relative to the mine is shown in Figure 2.

The main characteristics of the proposal are summarised in Table 1 below and in Figure 3. A detailed description of the proposal is provided in Section 2 of the PER.

Table 1 Summary of Key Proposal Characteristics

Proposal title	Barrambie Vanadium Project
Proponent name	Reed Resources Ltd
Short description	To develop and operate an open-cut vanadium mine and process plant 75 km north-west of Sandstone townsite and 116 km south-east of Meekatharra. It includes waste dumps, a tailings storage facility, and mine infrastructure (offices, workshop, accommodation, water pipeline, roads, airstrip)

Physical Elements

Element	Location	Extent Authorised
1. Mine	Figure 3	Clearing of up to 290 hectares
2. Associated infrastructure	Figure 3	Clearing of up to 646 hectares
3. Waste rock landform	Figure 3	Clearing of up to 516 hectares
4. Tailings storage facility	Figure 3	Clearing of up to 231 hectares
5. Water pipeline corridor	Figure 2	Clearing of up to 7 hectares
6. Haul roads	Figure 2	Clearing of up to 84 hectares

Operational Elements

Element	Location	Extent Authorised
1. Discharge of waste	Tailings storage facility, Figure 2	19,000,000 cubic metres
3. Pit dewatering	Figure 2	Up to 2400 kilolitres per day
4. Borefield water demand	Figure 2	2.5 gegalitres per annum

Table 1 incorporates modifications to the proposal made by the proponent following release of the PER. This includes a change to the size of the overall footprint of the proposal to 1774 hectares (ha) from the 1522 ha reported in the PER and changes to the sizes of the listed physical elements.

The potential impacts of the proposal initially predicted by the proponent in the PER document (*Barrambie Vanadium Project. Reed Resources Ltd, 2010*) and their proposed management are summarised in Table ES-2 (Executive Summary) of the proponent's document.

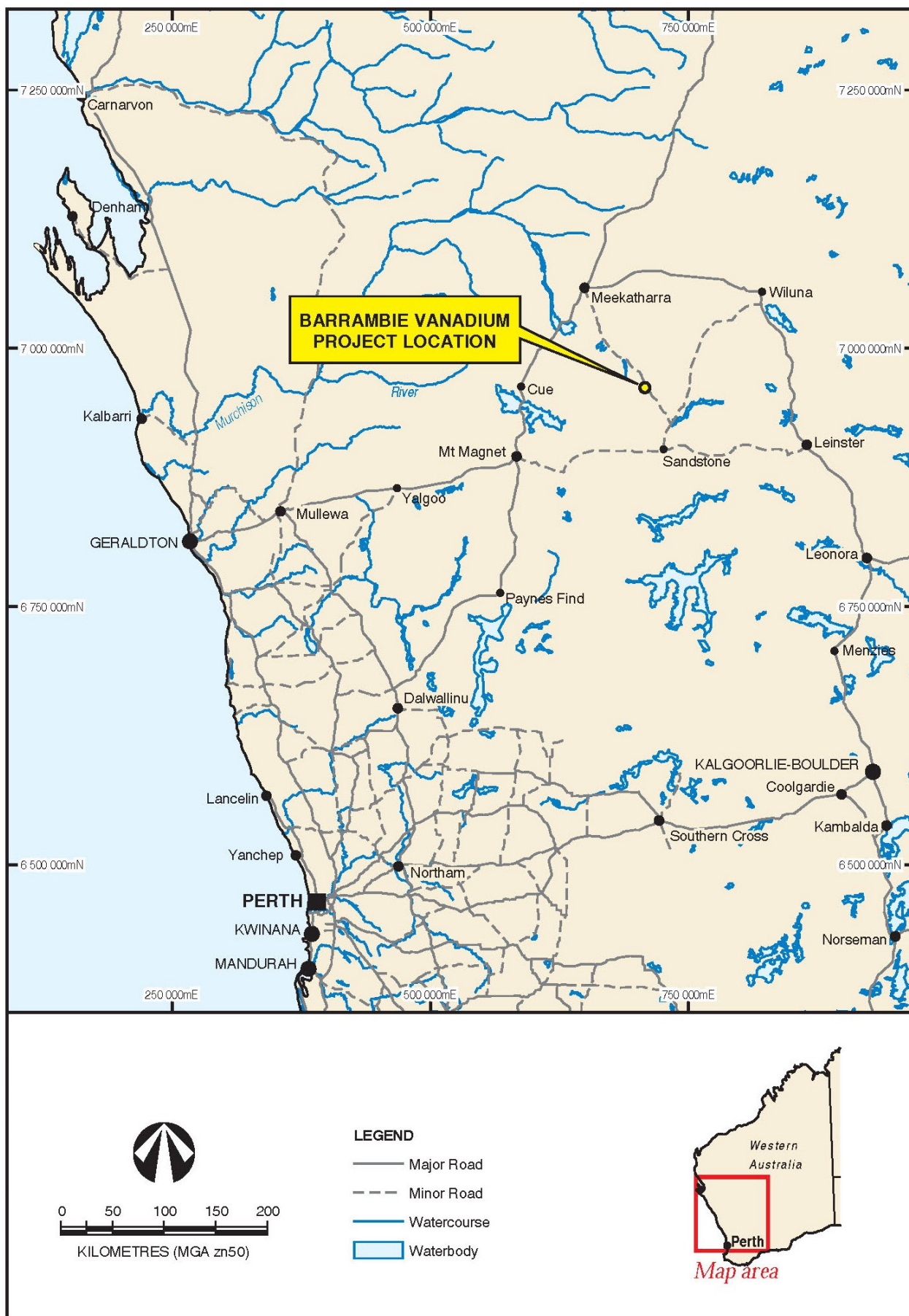


Figure 1. Regional location of the Barrambie Vanadium Project

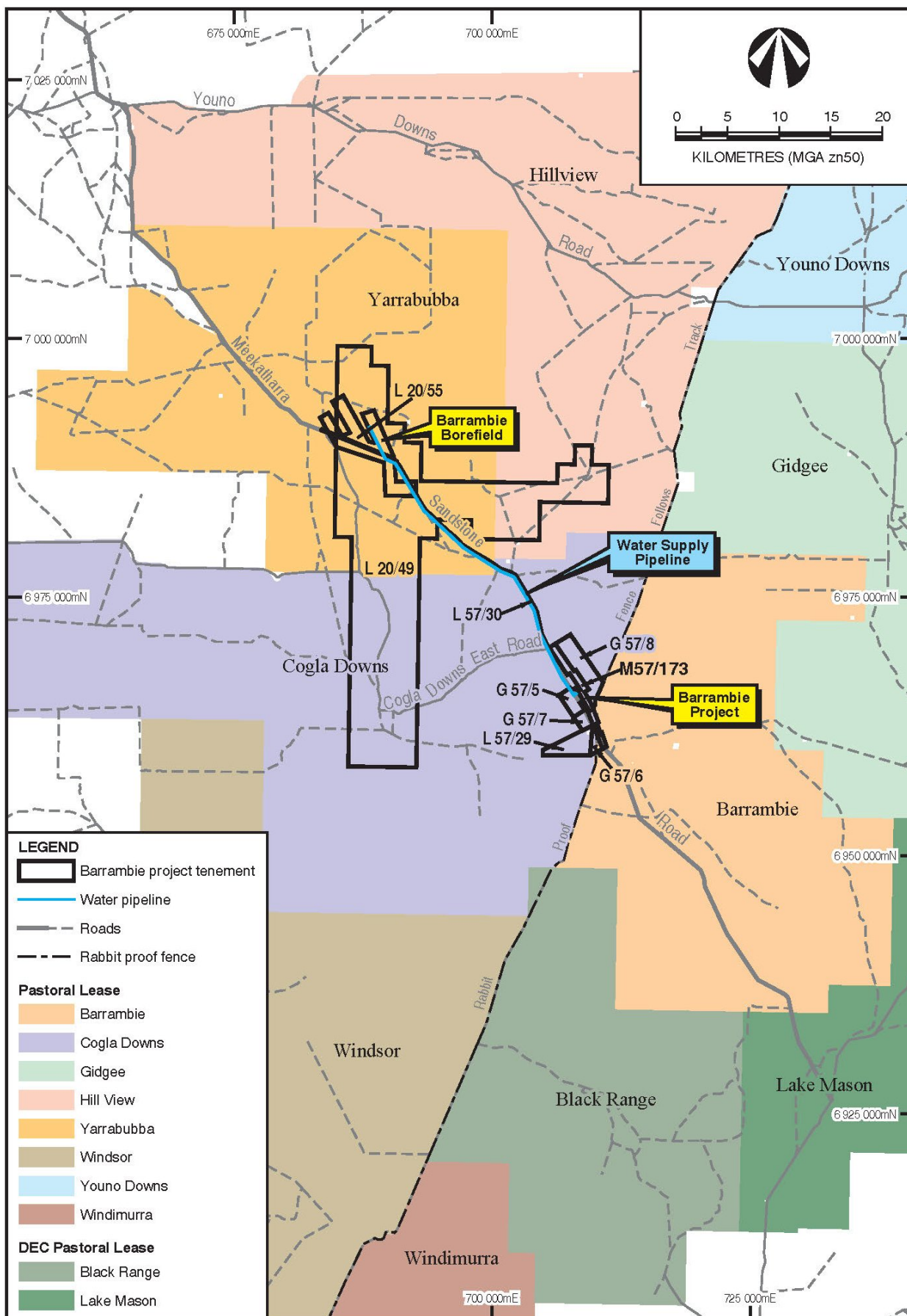


Figure 2. Barrambie mining tenements and pastoral leases

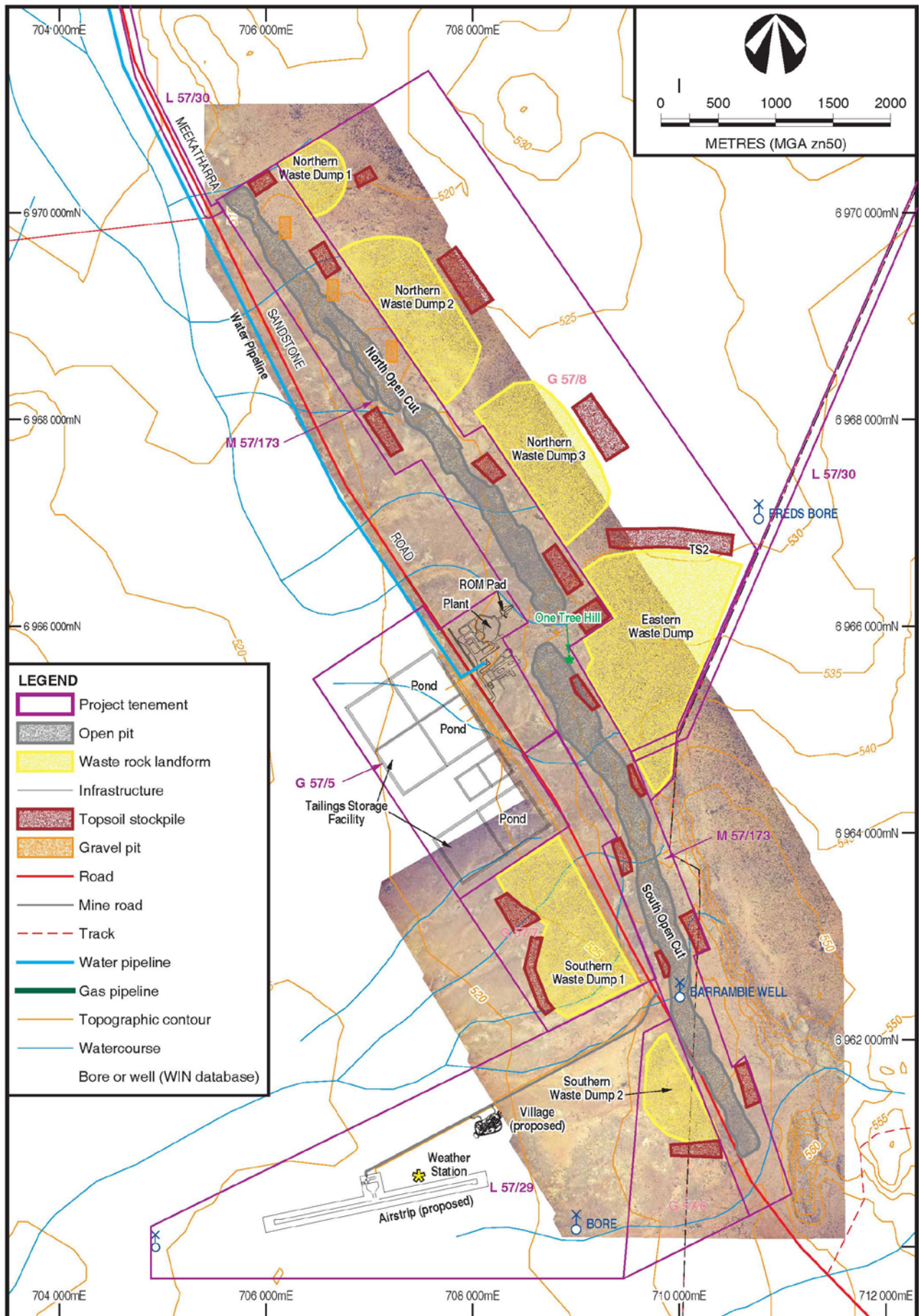


Figure 3. Barrambie project layout

3. Key environmental factors and principles

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as groundwater contamination, atmospheric emissions, noise, dust and road transport, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

- (a) Vegetation and flora;
- (b) Fauna;
- (c) Surface and groundwater; and
- (d) Rehabilitation and closure.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics set out in Table 1.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.4. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal, taking into consideration environmental impact management by the proponent. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) the Precautionary Principle;
- (b) the Principle of Intergenerational Equity; and
- (c) the Principal of Biological Diversity and Ecological Integrity.

3.1 Vegetation and flora

Description

The proposal will result in the clearing of 1774 ha of vegetation. Vegetation and flora surveys have been carried out at the minesite, along the proposed water pipeline route, and at the borefield. The proposal requires 1774 ha of native vegetation to be cleared. The nearby Ballanhoe Peaks area, which is considered to be more environmentally significant, is outside and up-slope of the proposed footprint of the project.

Twenty-four plant communities were defined within the survey areas. Eight of these communities are *Acacia aneura* (Mulga) woodlands–shrublands which are characteristic of the region. No Declared Rare Flora (DRF) or Priority flora species were identified, nor any Threatened Ecological or Priority Ecological Communities (TECs and PECs). Mulga woodlands comprise the predominant cover around the minesite, while the borefield is predominantly defined by *Hakea* and *Eremophila* open shrublands.

The survey work (PER section 3.6.6) combined with groundwater drawdown modelling indicated that seven vegetation communities would be within the modelled drawdown footprint of the borefield. These communities contain some tree and tall shrub species on the waterways and floodplains, including *Eucalyptus victrix*, that may be dependent on groundwater. This aspect is dealt with more fully in section 3.3 of this report.

Submissions

A submission questioned the adequacy of botanical surveys.

Assessment

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge.

In relation to the adequacy of flora surveys, the proponent has advised that the surveys identified in the submission were precursors to the four subsequent field surveys included in the appendices of the PER.

The EPA considers that the surveys conducted for this project comply with the requirements of EPA Guidance Statement No. 51 (*Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*).

The EPA notes that the plant communities affected by the proposal are not considered to be regionally significant and are characteristic of the region. No DRF or Priority flora species were identified, nor are any TECs or PECs expected to be impacted.

Clearing will be restricted to the areas identified by the proponent in the Key Characteristics of the Proposal and described in figures attached to the recommended Ministerial Statement.

Summary

The EPA considers that vegetation and flora have been adequately addressed.

Having particular regard to:

- a) the relatively common vegetation and flora over the project site that are typical of the broader region;
- b) no DRF, Priority species, TECs or PECs being identified in flora surveys; and
- c) the surveys that were carried out in accordance with EPA guidelines,

it is the EPA's opinion that it is likely that the EPA's environmental objective for this factor can be achieved.

3.2 Fauna

Description

Vegetation clearing for the proposal spans several different environments, none of which is regarded as being particularly important to the survival of endangered fauna. There are no habitats favoured by short range endemics within the project area. Ballanhoe Peaks, with rocky micro-habitats generally favoured by some short range endemic species, lies a few kilometres south-east of the project area and would not be disturbed by the proposal.

Two field surveys for fauna were carried out. The PER (section 3.7) lists the fauna species recorded in the bioregion which may be found in the proposal area. The only species of conservation significance was the (Priority 4) Australian Bustard. Its range is extensive and its preferred habitat of lightly wooded grasslands and drainage areas is widely represented in inland Australia.

The Spotted Mulga Snake is considered to be endemic to the bioregion and likely to be found in the area, but was not recorded during the survey. It is not listed as a Priority fauna species.

Core drilling around the minesite has shown that the rock type has very limited fracturing and cavities and is therefore broadly unsuitable habitat for troglofauna. At the proposed borefield, the shallow water table (around five metres below ground and sometimes flooded after rain events) does not provide favoured habitat for troglofauna.

The Coglea Downs calcrete aquifer site of the proposed borefield is, however, inhabited by a stygofaunal assemblage listed by the DEC as a Priority 1 PEC. The assemblage in the calcrete aquifer contains six potentially new species collected only from bores in the impact zone.

Four surveys for stygofauna were carried out from January 2008 to October 2009. Bores and pastoral wells were sampled at 15 sites and 41 samples were collected. Relevant points arising from the surveys were:

- the groundwater quality, as measured over the four sampling surveys and between sampled bores was similar, implying a degree of connectivity through the aquifer;
- the distribution pattern of several stygofaunal groups, as indicated by the sampling, also supports a high level of connectivity in the calcrete aquifer. This may enable stygofauna populations to move within the calcrete body away from areas where the expected drawdown from operating bores would expose their habitat to a drier regime;
- the proposed borefield would create an area of drawdown occupying about 15% of the total area of the wider calcrete aquifer (as shown by Figure 3.19 of the PER); and
- movement of stygofauna may also occur between the calcrete unit and the surrounding alluvial sediments.

Submissions

Terrestrial fauna

The DEC advised that specific fauna management protocols for trenching activities should be developed and implemented in consultation with the DEC.

Subterranean fauna

The Western Australian Museum considered that abstracting water from the calcrete aquifer rich in subterranean fauna may affect the communities in the region and, in the longer term, regions downstream such as near Lake Aneen.

The DEC requested that appropriate outcome-based conditions be placed on the proposal incorporating the commitments made by the proponent relating to saturated thickness across the aquifer in order to retain the potential habitat of stygofauna.

Assessment

The EPA's environmental objective for this factor is to maintain the abundance, species diversity, geographic distribution and productivity of fauna at species and ecosystem levels through improvements in knowledge and the avoidance or management of adverse impacts.

The EPA considers that surveys undertaken by the proponent for fauna are sufficient and comply with its Guidance 56 (*Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*) and EPA Guidance 54a (*Sampling methods and survey considerations for subterranean fauna in Western Australia*).

Trenching for the water pipeline poses risks for animal entrapment. The EPA has recommended a condition to ensure acceptable management practices which would minimise impacts to fauna that might otherwise be unable to escape from the open trench.

The EPA considers that the risk to stygofauna as a result of drawdown at the proposed borefield is a key factor and requested a peer review of the proposed borefield and water supply to address uncertainties regarding the extent to which the aquifer would be impacted by abstraction. In summary, it was concluded that the estimates of the potential extent of impacts to the aquifer were conservative. This is discussed in more detail in section 3.3 below.

In response to the WA Museum's view that abstraction could have wider regional impacts the proponent advised that the proposed borefield drawdown would occupy only a small area of the wider calcrete aquifer. The company has proposed a management plan incorporating:

- a network of monitoring bores for groundwater levels and stygofauna;
- trigger levels for appropriate early warning to permit cut off of water supply bores, as agreed with the DEC;
- a strategy for a maximum of 25% of the saturated thickness of the aquifer to be drawn down for the first five years of operation, increasing to a total of 50% drawdown of the saturated thickness across the aquifer over the whole life of the project; and
- alternative water supplies to be brought into use if water extraction were found to be depleting water levels beyond agreed trigger points.

The EPA notes that groundwater abstraction is licenced under the provisions of the *Rights in Water and Irrigation Act 1914* (RIWI Act) and will be managed by the Department of Water (DoW) to ensure abstraction occurs consistent with a sustainable yield. The EPA also notes the apparent connectivity of habitat across and within the profile of the aquifer. In view of the above, the EPA has recommended a condition to ensure that the saturated thickness of the aquifer is maintained at 75% for the first five years of operation of the borefield, and that this shall not fall below 50% over the life of the project, in order to retain stygofauna habitat.

Summary

The EPA considers the key environmental factor of fauna has been adequately addressed and the EPA's objective for this factor can be achieved provided that conditions are imposed requiring the proponent to:

- carry out the proposed trenching for construction of the water pipeline using accepted practices developed and implemented in consultation with the DEC; and
- manage groundwater abstraction to ensure that stygofauna habitat is retained in the aquifer.

3.3 Surface and groundwater

Description

Whilst there are no significant drainage systems in the immediate vicinity, natural surface water flows around the mine pits, waste dumps, tailings ponds and plant site would be disrupted.

The primary tailings ponds, consisting of waste material from the crushed host rocks and clays, would be unlined. The only additive to this stream is a flocculent. Water used for deposition of these tails would be pumped back to the plant for re-use and /or for dust suppression.

A separate, lined storage pond would be built for the calcine tails which contain traces of ammonium and sodium salts, plus vanadium, ferric and titanium compounds. A lined evaporation pond would also be required for the barren solution comprising low concentrations of sodium and ammonium sulfates and chlorides. It is proposed to encapsulate these evaporites with clay to prevent ongoing leaching post-closure.

The pits are expected to extend 25-30 m below the water table and dewatering would be required. Water recovered from the pits would be used in the process plant. The basement rocks in the vicinity of the proposed mine are relatively impermeable clays. Although aquifers in fractured and altered bedrock occur at the base of weathering, drilling results indicate that significant yields of water are not expected from this feature.

Surveys for the project's supply of water have focussed on an unconfined calcrete aquifer on Yarrabubba Station, known as the Cogla Downs drainage system. It lies some 35 km north-west of the proposed minesite and is part of an extensive palaeodrainage system with arms trending north-west, eastwards and southwards. Water quality is brackish and weakly alkaline, with salinity increasing northwards.

The proponent expects that the supply of 2.5 GL of water a year can be obtained from 10-12 bores. The number would depend on the yield of each bore, whilst the degree of drawdown experienced at any given site depends on the bore spacing and the amounts of water delivered from each. Some

built-in redundancy is planned so that bores could be turned off from time to time, both for maintenance and to tailor drawdown to minimise impacts.

Appendix E (section 5.3) of the PER states that four groundwater-dependent (phreatophytic) vegetation communities on waterways and floodplains within the borefield drawdown area are not well replicated within the survey area and may be considered locally significant. These communities contain species such as *Acacia aneura*, *Melaleuca stereophloia*, *Melaleuca xerophila* and *Eucalyptus victrix*. These areas could be impacted by water drawdown.

Water levels in pastoralists' bores near the borefield could potentially be depressed by the drawdown. Modelling has indicated that Nickyloo Bore in the centre of the proposed borefield could be the most affected, with the groundwater level being depressed by more than five metres (PER Fig 5.3).

By adding extra bores to build in a degree of redundancy, the proponent expects that individual water outputs could be varied to minimise adverse effects from drawdown to bores. However, if the total Cogla Downs borefield output needs to be reduced to prevent excessive groundwater drawdown, the proponent has outlined two potential alternative groundwater sources: (1) extensions of the Cogla Downs borefield system to the east and the south, (which have been secured by its mining tenements); and (2) the partially flooded Gidgee Mine pit, approximately 32 km north-east of the minesite, which intercepts groundwater. The Gidgee mine is currently under care and maintenance. A decision about which of these alternatives may be used would depend on circumstances prevailing at the time.

Submissions

The DoW advised that information provided in the PER on the groundwater supply was inadequate to allow confidence in the predictions that the Cogla Downs calcrete system would be able to sustain the required supply of water over the nominal 12 year period of the project. The proposal has the potential to impact existing pastoral lease stock bores.

Assessment

Ephemeral drainage lines trend west and south-west off the gentle slopes of the minesite and are intersected by the Sandstone-Meekatharra road. No significant impacts to drainage systems are expected.

Leaching tests for metals and metalloids on prepared samples equivalent to the process plant tails indicated that very low amounts (significantly below guideline levels) would be mobilised (PER Table 5.8). Monitoring and interception bores would be installed to (respectively) detect and remove any seepage and leakage.

The process plant would need a DEC works approval to construct the facilities and a licence to operate issued under Part V of the EP Act. Similarly, the

tailings ponds would be subject to Part V requirements. The DEC will address the construction and ongoing monitoring and management of these facilities.

The rock formations surrounding the pit have low transmissivities and, hence, the drawdown cone surrounding the pits is modeled to be steep. Barrambie Bore, south-west of the minesite (and others in the borefield) may potentially be affected by the dewatering. The proponent has agreed to provide an alternative water supply to the pastoralist if this were to eventuate, using the borefield or an alternative supply.

In response to the DoW's concerns about the confidence in predictions about the potential impacts of the proposed borefield on the aquifer, the EPA requested the proponent to undertake a peer review.

The peer review on the project groundwater supply found that previous survey work had been conservative because it had not taken into account:

- recharge from rainfall;
- the input to the overall volume of available water from the eastern arm of the Cogla Downs drainage system; and
- inflows from the surrounding alluvial sediments.

The effect of this interpretation was to overestimate water drawdown levels.

The EPA considers the proponent's strategy to spread abstraction over an additional number of bores to be appropriate. This would improve flexibility by allowing for bore down-time to fine-tune water drawdown levels. Groundwater abstraction is licenced under the provisions of the RIWI Act and will be managed by the DoW to ensure abstraction occurs consistent with a sustainable yield.

However, as noted above, the EPA has recommended conditions to ensure that the saturated thickness of the aquifer is managed to retain stygofauna habitat.

Summary

The EPA considers the key environmental factors of surface and groundwater have been adequately addressed and the EPA's objectives for this factor can be achieved noting that groundwater abstraction will be managed subject to licence requirements of the DoW under the RIWI Act.

3.4 Rehabilitation and closure

Description

The Barrambie pits would be mined in sequence down to 60-80 m below ground level. Rehabilitation of the waste rock dumps would be progressive. The dumps would be designed to maximise infiltration of water, with an undulating profile and deep ripping of the top and slopes. Mining is proposed

to take place down to 25-30 m below the current water table (which varies from 35-50 m below ground level).

After the mine closes and dewatering ends, the pits would act as groundwater sinks and water levels are expected to stabilise around 15 m below the current groundwater table. This means that pit water depths would vary around 10-15 m and that the water would become stratified, with increasingly saline waters at the base.

Preliminary results indicate that the proposal will not give rise to acid or neutral mine drainage. The proponent has indicated that acid mine drainage is not expected to pose a problem at the site because ore is to be mined only from the oxidised zone.

Submissions

The DEC recommended that, to be consistent with best practice standards, mine pits should be backfilled to above the current water table level. This would prevent deterioration of the groundwater quality and also reduce impacts to fauna that would otherwise be attracted to an increasingly saline water source.

Assessment

The EPA's environmental objective for mine closure is to ensure that a planning process is in place so that the mine can be closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed post-mining outcomes and land-uses, and without unacceptable liability to the State. This objective is reflected in the jointly prepared DMP / EPA *Guidelines for Preparing Mine Closure Plans (June 2011)* and Guidance Statement 6: *Rehabilitation of Terrestrial Ecosystems (June 2006)*.

Recent amendments to the *Mining Act 1978* now require the preparation of mine closure plans at the early stages of mine planning. In view of the statutory requirements of the *Mining Act 1978*, the EPA is satisfied that rehabilitation and mine closure and decommissioning can be managed by the DMP, consistent with the DMP/EPA *Guidelines for Preparing Mine Closure Plans*.

Key matters to be considered by the DMP in approving the plan include:

- designing waste dumps and tailings storage so that they are non-polluting, stable and able to support native vegetation comparable with natural analogue landforms;
- progressive rehabilitation of disturbed areas with local provenance vegetation and with percentage cover and species diversity comparable to undisturbed natural analogue sites; and

- confirmation of rehabilitation completion criteria to apply to disturbed areas.

The EPA is aware that the proponent intends to leave the pits open at the end of mining because of the costs involved in backfilling and so as not to sterilise the residual vanadium resource in the unweathered host rocks below the pit floor. Closure and rehabilitation therefore needs to address the potential problems associated with a pit lake, which include:

- potential for worsening water quality over time (either from salinity and/or potentially acid and metalliferous mine drainage);
- harm to wildlife, birds or stock that may come in contact with pit lake water; and
- available water giving rise to more animals, leading to over-grazing of surrounding vegetation or attracting increased numbers of predators which may impact native wildlife in the area.

Management measures should include:

- monitoring of pit lake water chemistry;
- the development of trigger levels; and
- ensuring that the pit lakes do not adversely affect fauna or regional groundwater.

Summary

Noting the proposal is subject to the requirements of the *Mining Act 1978* which has statutory requirements relating to rehabilitation and mine closure, the EPA considers the issues of rehabilitation and mine closure can be adequately addressed by the DMP and meet the EPA's objectives.

3.5 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in section 4A of the EP Act. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions

Section 44 of the *EP Act* requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Reed Resources Ltd to develop an open-cut vanadium mine and process plant at Barrambie is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- a) management of open trenches to protect fauna; and
- b) manage groundwater abstraction to ensure that stygofauna habitat is retained in the aquifer.

Other regulatory mechanisms relevant to the proposal are:

- rehabilitation mine closure and decommissioning would be managed under the mining Act 1978 by the DMP consistent with the *DMP/EPA Guidelines for Preparing Mine Closure Plans* (May 2011);
- atmospheric emissions and discharges (from the process plant and power station) would be regulated under a works approval and licence issued under Part V of the EP Act;
- groundwater abstraction will be managed by the DoW consistent with the requirements of the RIWI Act.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent, the DEC, the DMP and the DoW in respect of matters of fact and matters of technical or implementation significance.

5. Other advice

Main road-Sandstone to Meekatharra

Figure 3 shows that the main Sandstone-Meekatharra (shire) road runs through the proposed minesite. The EPA notes that the DMP is responsible for mine safety. The EPA is advised that the proponent has discussed this issue with both the DMP and the Shires of Meekatharra and Sandstone. The EPA understands the parties have agreed that the road, with only minor modifications to its current route, is acceptable and is a preferred option to a major diversion. The road handles low levels of traffic, which would be stopped from approaching the pits if blasting was imminent.

If the main road were to be diverted to outside of the current proposal footprint the proponent would need to ensure that appropriate approvals are in place before proceeding and noting that any decision to move the road should have regard to existing environmental information.

Appendix 1

List of submitters

Organisations

Department of Water

Department of Mines and Petroleum, Resources Safety, Health management

Department of Mines and Petroleum, Mineral Environment Branch

Western Australian Museum

Department of Environment and Conservation:-Environmental Management Branch; Air Quality Management Branch

Department of Indigenous Affairs

Department of Health

Midwest Development Commission

Individuals

Yarrabubba Station Owners

Barrambie Station Owners

Appendix 2

References

Reed Resources Ltd. *Barrambie Vanadium Project. Public Environmental Review.* (June 2010).

EPA Guidance Statement No. 51. *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.* (June 2004).

EPA Guidance 54a. *Sampling methods and survey considerations for subterranean fauna in Western Australia.* (July 2007).

EPA Guidance 56. *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia.* (June 2004).

DMP / EPA *Guidelines for Preparing Mine Closure Plans.* (June 2011).

EPA Guidance Statement 6. *Rehabilitation of Terrestrial Ecosystems.* (June 2006).

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Vegetation and flora	1522 ha of native vegetation would be cleared. 24 plant communities identified but no significant conservation values. No DRF or priority species, TEC or PEC	Pastoral lease-holder concerned that surveys were inadequate, but this was rectified with field surveys that were subsequently carried out.	Considered to be a relevant environment factor. Addressed in section 3.1
Terrestrial fauna	Project spans several habitat environments; none is crucial to the survival of endangered fauna. No endangered fauna were identified by field surveys.	Potential for fauna to be trapped in open trench for water pipeline while under construction. Pastoral leaseholder concerned about potential for increased road kills and disruption to grazing stock near proposed airstrip. Need to manage mosquitoes and the use of pesticides.	Considered to be a relevant environmental factor, addressed in section 3.2
Subterranean fauna	Stygofauna assemblages potentially at risk from drawdown at proposed borefield	Proposed stygofauna management regarded as inadequate. Needs a targeted programme to properly investigate the impacts of water abstraction. Need to set appropriate risk-based conditions to ensure adequate management of the aquifer so that its saturated thickness does not fall below specified limits	Considered to be a relevant environmental factor, addressed in section 3.2
Groundwater drawdown	The project needs 2.5GL annually for ore processing, dust control and domestic needs	Insufficient work done for PER on groundwater modeling for the borefield. Subsequently a peer review was carried out-this confirmed the conclusions reached in the original consultant report. Pastoralists seek commitment that groundwater drawdown would not affect outputs from stock bores, need contingency plan	Considered to be a relevant environmental factor, addressed in section 3.3

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
Rehabilitation and closure	There are planned to be three pits which will partly re-fill with water on closure	To be consistent with best practice standards the pits should be backfilled to above groundwater level. Initial concerns about a gravel and topsoil shortage and	Considered to be a relevant environmental factor, addressed in section 3.3
POLLUTION			
Groundwater contamination	Process plant to produce vanadium pentoxide, with optional production of ferovanadium	Possible leaching of metals or hazardous materials from the tailings storage facility, which is proposed to be unlined. Leaching tests indicated that very low amounts (significantly below guideline levels) would be mobilised.	Not considered to be a relevant environmental factor
Atmospheric emissions: from rotary kiln and from the de-ammoniation kiln. Key pollutants are NH ₃ , SO ₂ , NO _x , particulates (as PM ₁₀) and V ₂ O ₅ , or a water-soluble form of vanadium.	The accommodation village is would be sited 5km south of the processing plant. Nearest homesteads are Barrambie (12km SE) and Cogla Downs (18km W). The nearest significant development is the Windimurra Vanadium Mine, 100km SW, therefore emissions from Barrambie can be considered in isolation.	Impacts from all listed pollutants except SO ₂ on the village and homesteads not expected to be significant. SO ₂ concentrations at accommodation village could exceed acceptable human criteria, with a modeled 100 hours in excess of the NEPM standard over a period of 5 years. A management strategy comprising predictive weather forecasts and sulphate reduction by using a carbonate-sulphate reagent mix should pre-empt almost all predicted fumigation events at the village. The pastoral homesteads are not expected to be affected.	Not considered to be a relevant environmental factor. Can be managed via Pt V licence conditions under the EP Act

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
SOCIAL SURROUNDINGS			
Noise, dust, road transport of supplies and products	Transport of supplies to and from the minesite will result in increased levels of traffic on major roads to Perth and Kalgoorlie	Minesite is remote from towns and homesteads. Extra road traffic will require an upgrade to the unsealed road from Sandstone to the minesite	Not considered to be a relevant environmental factor

PRINCIPLES	Relevant	If yes, Consideration
<p>1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. Decisions should be guided by:</i> <i>(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> <i>(b) an assessment of the risk-weighted consequences of various options.</i></p>	yes	<p>In considering this principle the EPA notes that:</p> <ul style="list-style-type: none"> • vegetation, flora, fauna and groundwater values would be to some degree impacted by the proposal; • an assessment of the adequacy of these investigations and proposed management frameworks is provided in sections 3.1 to 3.3; • groundwater modeling studies for borefield drawdown are noted to be conservative.
<p>2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	yes	<p>In considering this principle the EPA notes that:</p> <ul style="list-style-type: none"> • 1055ha of the total of 1522ha to be cleared would be rehabilitated progressively; • a condition requiring progressive rehabilitation would be required by the DMP.
<p>3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	Yes	<p>In considering this principle the EPA notes that:</p> <ul style="list-style-type: none"> • the ecological values of the minesite and proposed borefield are considered to be relevant and discussed in the body of this report; • the minesite footprint is not expected to impact any areas of vegetation, flora or fauna habitat which are considered to have significant values; • the proposed borefield would impact stygofauna communities and species still to be fully described.

PRINCIPLES	Relevant	If yes, Consideration
4. Principles relating to improved valuation, pricing and incentive mechanisms	no	
5. The principle of waste minimisation <i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i>	yes	In considering this principle the EPA notes that: <ul style="list-style-type: none"> • hazardous substances will be used, with the potential to contaminate groundwater and soils and affect fauna; • storage of all such substances would be in accordance with accepted Australian standards; • wastes will be managed to comply with DEC (Part V) Operating Licence conditions; and • waste minimisation strategies would be employed.

Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of the EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

Decision-making Authority	Approval
1. Minister for Water	<i>Rights in Water and Irrigation Act 1914 - Licence to abstract water</i>
2. Minister for Indigenous Affairs	<i>Aboriginal Heritage Act 1972</i>
3. Minister for Lands	<i>Land Administration Act 1997</i>
4. Director General Department of Environment and Conservation	<i>Environmental Protection Act 1986 Part V works approval and licence.</i>
5. Director General Department of Mines and Petroleum	<i>Mining Act 1978 and Mines Safety Regulations</i>
6. Shire of Meekatharra	<i>Local Government Act 1995 - Planning approval</i>
7. Shire of Sandstone	<i>Local Government Act 1995 - Planning approval</i>

Note: In this instance, agreement is only required with DMAs 1, 2, and 3 since these DMAs are Ministers

RECOMMENDED ENVIRONMENTAL CONDITIONS

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)**

BARRAMBIE VANADIUM PROJECT
SHIRES OF MEEKATHARRA AND SANDSTONE

Proposal: To develop an open-cut vanadium mine and process plant at Barrambie, 75 kilometres north-west of the Sandstone townsite and 116 kilometres south-east of Meekatharra.

Proponent: Reed Resources Ltd
Australian Company Number 099 116 631

Proponent Address: 97 Outram Street,
WEST PERTH WA 6005

Assessment Number: 1724

Report of the Environmental Protection Authority: Report 1446

This Statement authorises the implementation of the Proposal described and documented in Columns 1 and 2 of Table 2 of Schedule 1. The implementation of the Proposal is subject to the following implementation conditions and procedures and Schedule 2 details definitions of terms and phrases used in the implementation conditions and procedures.

1 Proposal Implementation

- 1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Column 3 of Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the Proposal has been approved under the EP Act.

2 Contact Details

- 2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within 28 days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit of Proposal Implementation

- 3-1 The proponent shall not commence implementation of the proposal after the expiration of 5 years from the date of this statement, and any commencement, within this 5 year period, must be substantial.
- 3-2 Any commencement of implementation of the proposal, within 5 years from the date of this statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of 5 years from the date of this statement.

4 Compliance Reporting

- 4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO.
- 4-2 The proponent shall submit to the CEO the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

- 1 the frequency of compliance reporting;
 - 2 the approach and timing of compliance assessments;
 - 3 the retention of compliance assessments;
 - 4 the method of reporting of potential non-compliances and corrective actions taken;
 - 5 the table of contents of compliance assessment reports; and
 - 6 public availability of compliance assessment reports.
- 4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

- 4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the CEO.
- 4-5 The proponent shall advise the CEO of any potential non-compliance within seven days of that non-compliance being known.
- 4-6 The proponent shall submit to the CEO the first compliance assessment report fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report.

The compliance assessment report shall:

- 1 be endorsed by the proponent's Managing Director or a person delegated to sign on the Managing Director's behalf;
- 2 include a statement as to whether the proponent has complied with the conditions;
- 3 identify all potential non-compliances and describe corrective and preventative actions taken;
- 4 be made publicly available in accordance with the approved compliance assessment plan; and
- 5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Public Availability of Data

- 5-1 subject to condition 5-2, within three months of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps) relevant to the assessment of this proposal and implementation of this Statement.
- 5-2 If any data referred to in condition 5-1 contains particulars of:
- i. a secret formula or process; or
 - ii. confidential commercially sensitive information,

the proponent may submit a request for approval from the CEO to not make this data publically available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publically available.

6 Fauna

- 6-1 The proponent shall ensure that open trenches associated with construction of the water supply pipelines are cleared of trapped fauna by fauna-rescue personnel at least twice daily. Details of all fauna recovered shall be recorded, consistent with condition 6-5. The first daily clearing shall be completed no later than three hours after sunrise and shall be repeated between the hours of 3:00pm and 6:00pm.

The open trenches shall also be cleared, and fauna details recorded, by fauna-rescue personnel no more than one hour prior to backfilling of trenches.

Note: “fauna-rescue personnel” means employees of the proponent whose responsibility it is to walk the open trench to recover and record fauna found within the trench.

- 6-2 The fauna-rescue personnel shall obtain the appropriate licences required for fauna rescue under the *Wildlife Conservation Act 1950* and be trained in the following:

1. fauna identification, capture and handling (including specially protected fauna and venomous snakes likely to occur in the area);
2. identification of tracks, scats, burrows and nests of conservation-significant species;
3. fauna vouchering (of deceased animals);
4. assessing injured fauna for suitability for release, rehabilitation or euthanasia;
5. familiarity with the ecology of the species which may be encountered in order to be able to appropriately translocate fauna encountered; and
6. performing euthanasia.

- 6-3 Open trench lengths shall not exceed a length capable of being inspected and cleared by the fauna-clearing personnel within the required times as set out in condition 6-1.

- 6-4 Ramps providing egress points and/or fauna refuges providing suitable shelter from the sun and predators for trapped fauna are to be placed in the trench at intervals not exceeding 50 metres.

- 6-5 The proponent shall produce a report on fauna management within the open trenches associated with construction of the water supply pipeline at the completion of pipeline construction. The report shall include the following:

1. details of all fauna inspections;

2. the number and type of fauna cleared from trenches;
3. fauna mortalities; and
4. all actions taken.

The report shall be provided to the CEO and the Department of Environment and Conservation no later than 21 days after the completion of pipeline construction, and shall be made publicly available in a manner approved by the CEO.

7 Groundwater drawdown-Cogla Downs Calcrete Aquifer and management of stygofauna

- 7-1 The proponent shall ensure that at least 75% of the thickness of the Cogla Downs calcrete aquifer remains saturated at the points of water abstraction for the first five years of operation of the borefield and that over the life of the project the saturated thickness of the aquifer across the area of investigations, as determined by 7-3, does not fall below 50%.
- 7-2 Prior to groundwater abstraction from the Cogla Downs calcrete aquifer for mining purposes the proponent shall determine and agree the dimensions of the Cogla Downs calcrete aquifer to be used for calculating the 75% and 50% saturation levels of the aquifer in consultation with the Department of Water.
- 7-3 Prior to groundwater abstraction, unless otherwise approved by the CEO, the proponent shall prepare a Groundwater Drawdown Monitoring and Management Plan to limit potential impacts on stygofauna through the design and implementation of a suitable monitoring and trigger level system for the borefield area. The Groundwater Drawdown Monitoring and Management Plan shall include:
 1. a system of monitoring bores to measure groundwater levels;
 2. monitoring frequency;
 3. trigger levels to ensure that the requirements of Condition 7-1 are met; and
 4. management responses should trigger levels be exceeded.
- 7-4 Prior to groundwater abstraction the proponent shall implement the approved Groundwater Drawdown Monitoring and Management Plan of condition 7-3, until otherwise advised by the CEO.
- 7-5 Should the results of monitoring from the implementation of the approved Groundwater Drawdown Monitoring and Management Plan show that trigger levels identified in condition 7-3(3) have been reached or exceeded, the

proponent shall provide a report to the CEO within 21 days of the trigger levels being reached or exceeded which:

1. describes the event resulting in the trigger levels being reached or exceeded;
2. provides information which allows determination of the likely root cause of the trigger levels being reached or exceeded; and
3. if considered likely to be the result of activities undertaken in implementing the proposal, proposes the management responses and associated timelines to remediate the exceedance.

7-6 The proponent shall, implement the management responses identified pursuant Condition 7-5 (3) until the CEO determines that the remedial actions may cease.

The Proposal (Assessment No. 1724)

Table 1 Summary of the Proposal

Proposal title	Barrambie Vanadium Project
Short description	<p>To develop and operate an open-cut vanadium mine and process plant 75 kilometres northwest of Sandstone townsite and 116 kilometres southeast of Meekatharra. It includes waste dumps, a tailings storage facility, and mine infrastructure (offices, workshop, accommodation, water pipeline, roads, airstrip).</p> <p>The location of the various project components is shown in Figure 1.</p> <p>The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the project referral document, <i>Barrambie Vanadium Project</i>, prepared by Reed Resources Ltd, Perth, Western Australia (June 2010).</p>

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	Location	Authorised Extent
1. Mine	Figure 1	Clearing of up to 290 hectares
2. Associated infrastructure	Figure 1	Clearing of up to 646 hectares
3. Waste rock landform	Figure 1	Clearing up to 516 hectares
4. Tailings storage facility	Figure 1	Clearing up to 231 hectares
5. Water pipeline corridor	Figure 1	Clearing up to 7 hectares
6. Haul roads	Figure 1	Clearing up to 84 hectares
7. Discharge of waste	Tailings storage facility, Figure 1	19,000,000 cubic metres
8. Pit dewatering	Figure 1	Up to 2400 kilolitres per day
9. Borefield water demand	Figure 1	2.5 gegalitres per annum

Figure (attached)

Figure 1 Indicative project layout.

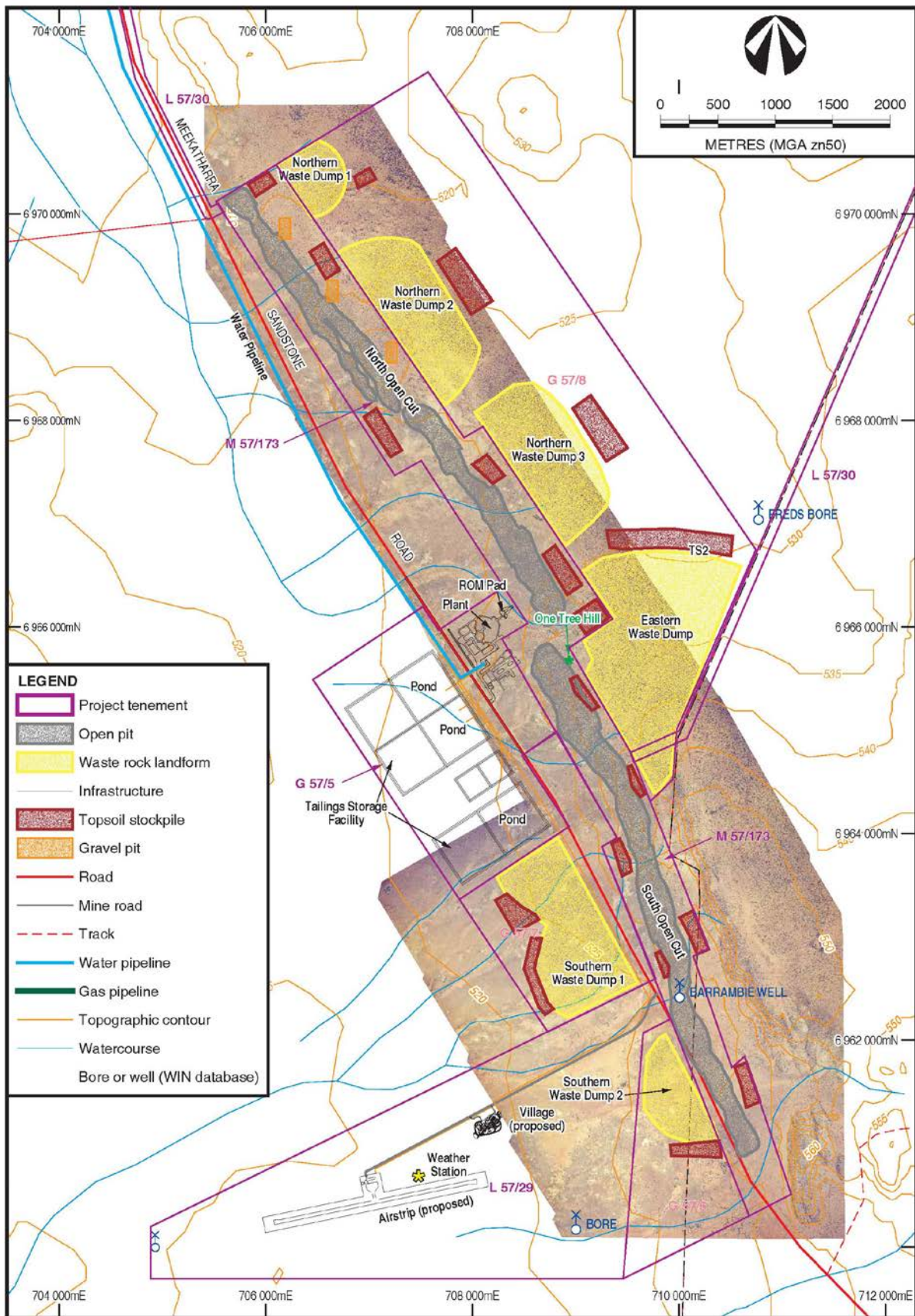


Figure 1 Indicative project layout

Term or Phrase	Definition
Approved Groundwater Drawdown Monitoring and Management Plan	The Groundwater Drawdown Monitoring and Management Plan for which the proponent has received written notification from the CEO that it meets the requirements of Condition 7-3.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate.
EP Act	<i>Environmental Protection Act 1986</i>

Appendix 5

Summary of Submissions and Proponent's Response to Submissions

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

Response to WA Health, Public Health Division Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of WA Health - Public Health Division and in particular Reed addresses the issues raised by WA Health as follows;

WA Health Comment 1

One remaining issue that needs to be addressed is the requirement for environmental approvals to be sought prior to undertaking any chemical treatment for the purpose of adult or larval mosquito control. This requirement should be incorporated in the final mosquito management plan.

Reed Response

Reed will put in place a mosquito management plan prior to the employment and accommodation of its workforce at Barrambie. A key feature of the management plan will be chemical treatment for the purpose of adult or larval mosquito control. Relevant environmental approvals will be sought prior to any the application of any chemical control.

WA Health Comment 2

Any treatment and application of pesticides must be applied in accordance with the Health (Pesticides) Regulations 1956.

- *A pest management plan should be adopted to ensure that the use of pesticides are minimised in the control of pests. Pests include insects. Weeds, and where appropriate feral animals.*
- *Where pesticides are applied by a contractor then those person(s) must hold a current pesticide operators licence with the correct endorsements and also hold a current pest management firm registration.*

Reed Response

Reed will adopt a pest management plan in accordance with the *Health (Pesticides) Regulations 1956* with the aim of ensuring that the use of pesticides are minimised in the control of pests. Pests include insects, weeds, and feral animals.

Where pesticides are applied by a contractor then that person must hold current pesticides operators licence with the correct endorsements and also hold current pest management firm registration.

WA Health Comment 3

The proponent will need to address the following:

- *Comply with the Australian Drinking Water Guideline 2004.*
- *Establish drinking water quality reporting procedures with WA Health.*
- *Establish a Drinking Water Quality Management Plan, including the extraction points, water supply pipeline, the water process and storage facilities.*

Reed Response

Reed intends to comply with the Australian Drinking Water Guideline 2004 and will establish drinking water quality reporting procedures with WA Health.

A Drinking Water Quality Management Plan including the identification of extraction points, water supply pipeline, the water treatment process and storage facilities.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

WA Health Comment 4

- *Where multiple wastewater treatment plans (WWTP) are to be used (it is likely the accommodation village and mine site have separate facilities), each installation requires approval under the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations.*
- *Due to the size of the accommodation village and the multiple systems on site, the WWTP installations require approval from WA Health (not the Shire of Sandstone , as referred to in the PER). Applications should still be lodged via the Shire of Sandstone.*
- *Proposals for the recycling of effluent, including for the maintenance of grounds, require separate approval. Submissions are to be made to the WA Health Water Unit, with Recycled Water Quality Management Plan, in accordance with the (draft) Guidelines for the Use of Recycled Water in Western Australia, April 2009.*
- *It should be noted that waste water recycling proposals are subject to ongoing water sampling and quality requirements.*

Reed Response

Reed intends to install multiple waste water treatment plants (WWTP) one at the accommodation village and the other at the mine site, and intends to seek approval for those facilities in accordance with the *WA Health (Treatment of Sewerage and Disposal of Effluent and Liquid Waste) Regulations*.

These WWTP installations will require approval from WA Health. Reed was intending to recycle the effluent for the maintenance of the grounds and has been made aware that it will have to put in place a Recycled Water Quality Management Plan in accordance with the (draft) Guidelines for the Use of Recycled Water in Western Australia, April 2009.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

Response to the Department of Mines and Petroleum – Minerals and Environment Branch Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of The Department of Mines and Petroleum – Minerals and Environment Branch (DMP MEB) and in particular Reed addresses the issues raised by DMP MEB as follows;

DMP MEB Comment 1

Tailings Storage Facilities (TSF) - It is proposed that the primary TSF will be unlined. RR will need to ensure that appropriate geotechnical design of the integrated Primary and Calcine TSF cells will be able to maintain embankment integrity to avoid cross contamination and potential movement/leaching of metals or hazardous materials through the Primary TSF. RR will need to ensure that the design and construction of the TSFs is managed by appropriately qualified geotechnical professionals”.

Reed Response

Reed and its design Engineers Sinclair Knight Merz (SKM) are aware of the requirement to ensure an appropriate geotechnical design of the integrated Primary and Calcine TSF cells in order to maintain embankment integrity and to avoid cross contamination and potential movement / leaching of metals or hazardous materials through the unlined Primary TSF.

Reed agrees that it will need to ensure that the design and construction of the TSFs is managed by appropriately qualified geotechnical professionals, and that geotechnical designs for these facilities will be subject to a Geotechnical Review by the DMP, Resources Safety Division.

Reed wishes to advise that the calcine tails dam will be lined with a 1.5mm HDPE sealed liner to contain the calcine tailings and prevent any seepage out of the calcine dam.

The Primary Tail “as mined rock and clays” has been subjected to leaching tests based on AS 4439.3:1997 (which is similar to USGS and USEPA Method 1311(TCLP) and showed very low levels of mobilised major metals and metalloids within the leach liquors the levels being significantly below the guideline levels.

DMP MEB Comment 2

Surface Water Management - RR will need to consider options for placement of waste facilities over historic and recent drill holes that may provide pathways for preferential seepage if such drill holes are not sealed and/or rehabilitated correctly.

All permanent infrastructure should be outside the area flooded by a 1 in 100 year 72 hour (recurrence interval) rainfall event, and armoured to withstand a potential maximum flood event (based on geotechnical assessment of the design) to ensure stability at closure”.

Reed Response

Reed Resources has drilled over 800 reverse circulation and diamond drill holes to define the Barrambie ore bodies and most of these holes are confined to the main mining lease M57/173 and generally speaking these holes will be exposed within the pit as the mining progresses. Infrastructure, waste landforms and the tailings dams have been situated on General Purpose leases external to the main mining lease have not been subject to the same level of drilling. Reed will not be placing waste facilities over historic drill holes.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

All permanent infrastructure will be either placed outside of the 1 in 100 year 72 hour average recurrence interval flood area or diversions designed to divert the 1 in 100 year flood will be constructed to ensure stability of that permanent infrastructure at closure.

DMP MEB Comment 3

Project Layout - It is difficult to determine if mining infrastructure is located outside the zone of pit instability. Mining Infrastructure must be located outside of the zone of pit instability around the pit(s). The process plant and the Northern borrow pits would be examples in part.

RR should be aware that pits cannot be directly adjacent to tenement boundaries as safety and abandonment bunding must be placed around the pits on the appropriate Mining Act 1978 tenure. Abandonment bunds must be placed outside the zone of pit instability, which generally results in them being some distance from the pit edge. The northern and southern open pits appear to be located on the tenement boundaries.

Reed Response

Barrambie infrastructure such as dumps, dams and process plant have been placed on General Purpose leases (G57/5, G57/6, G57/7 and G57/8) outside the zone of instability created by the pits and well clear of the Barrambie Mining Lease M57/173.

The position of the process plant has been checked and found to be outside the zone of instability. All dumps are well outside the zone of instability.

Due to the narrow nature of M57/173 it will be necessary in places for the abandonment bunds to be placed outside the mining lease and on the General Purpose leases in order to ensure the bunds are outside the zone of instability.

Mining Lease M57/173 is rather narrow (probably due to the historic amalgamation of a number of Mineral Claims) and cannot accommodate the open pit and the infrastructure. The open pit design engineers Snowden have confined the current open pit design within M57/173 however the pit perimeter does come within 10 metres of the mining lease boundary in a number of places.

Reed acknowledges the DMP requirement for mining infrastructure and abandonment bunds to be placed outside the zone of instability and will ensure its designs comply with these requirements.

DMP MEB Comment 4

Tenure - Much of the tenure for proposed mining infrastructure is located on several General Purpose Leases. There is an endorsement for this tenement that states: "The grant of the lease being confined to the natural surface of the land and there under to a depth of 15 metres". Figure 2.1 the "Barrambie Project Layout" illustrates a topsoil stockpile (south east) that is off Mining Act Tenure".

Reed Response

Reed acknowledges that the General Purpose Leases have the following endorsement "The grant of the lease being confined to the natural surface of the land and there under to a depth of 15 metres". Reed intends to comply fully with this requirement.

Reed will ensure that all topsoil stockpiles are located either on the mining lease M57/173 or are on one of the granted GP leases.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE
VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

DMP MEB Comment 5

Road Transport and Transport Corridors - The proponent needs to demonstrate that there is enough borrow material for on going construction. This area of 90Ha for haul roads needs to be clarified”.

Reed Response

Reed geologists have identified large quantities of lateritic gravels (greater than 3Mt) on the north east of M57/173 and believe there is sufficient gravel for construction and ongoing road maintenance operations. Reed notes that the Shire of Sandstone is currently obtaining gravel from the northern section of the mining lease.

It is assumed that there will be a maximum of 30km x 30m wide haul road totalling up to 90ha.

DMP MEB Comment 6

Closure, Decommissioning and Rehabilitation - A preliminary Closure Plan will need to be provided as part of the DMP Mining Proposal. A breakdown of volumes of materials required for construction / rehabilitation should be provided (eg TSF embankment, ROM pad, ponds, erosion resistant material for waste dump armouring), indicating the likely lithology they will be sourced from to establish that sufficient suitable material will be available for rehabilitation”.

Reed Response

Reed Resources advises that a preliminary closure plan has been provided in the Mining Proposal that was submitted to DMP on 30 July 2010.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

Response to the Department of Mines and Petroleum, Health Management, Resources Safety Division Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of The Department of Mines and Petroleum – Health Management, Resources Safety Division (DMP RSD) and in particular Reed addresses the issues raised by DMP RSD as follows;

DMP RSD Comment 1

The Project Description provided in the draft PER is of a higher standard than normal.

Reed Response

Reed thanks the Departments for the Comment that “*The Project Description provided in the draft PER is of a higher standard than normal and gives sufficient detail to adequately review the project at this stage of the process*”, and agrees that the mining and processing of the vanadiferous titanite magnetite is very similar to that of the Windimurra Vanadium Project.

DMP RSD Comment 2

Resource Safety Division (RSD) will hold meetings with the proponent prior to plant construction to review the design and operation of the mine and process plant.

Reed Response

Reed Resources is happy to meet with the Resources Safety Division prior to plant construction to review the design and operation of the mine and processing plant. Reed agrees with RSD that such a meeting could ensure that regulatory requirements for chemical storage and emissions management are incorporated into the plant design and this will have a significant impact on ensuring chemical spills are minimised and that air emissions are controlled.

Reed understands that while these requirements primarily focus on occupational health, safety and dangerous goods issues, they also assist in substantially reducing potential environmental impacts such as key air emissions as described in section 5.6.2 of the PER. Reed are pleased to note that the RSD believes that dust control is addressed within section 5.6.4 and that at this stage control techniques appear adequate.

DMP RSD Comment 3

The adequacy of plant design, operational management and dust/ emission control techniques will be assessed during operations under the Mines Safety and Inspection Regulations.

Reed Response

Reed acknowledges that the adequacy of plant design, operational management and dust/ emission control techniques will be assessed during operations under the *Mines Safety and Inspection Regulations* (MSIR) and that any observed deficiencies would be dealt with under MSIR.

DMP RSD Comment 4

One area that the PER is deficient is with reference to old repealed dangerous goods regulations.

Reed Response

Reed acknowledges that it inadvertently referenced the old repealed dangerous goods regulations. The PER should have instead referenced the more recent *Dangerous Goods Safety (Storage and*

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Handling of Non-explosive Regulations) 2007 and the Dangerous Goods Safety (Road and Rail Transport of Non-Explosives) Regulations 2007. Reed also acknowledges that the requirement for dangerous goods site licences at mine and port should also have been included in the PER.

Reed welcomes early meetings with the RSD prior to the construction phase including both the Mines Safety and Dangerous Goods Safety regulators so that Reed may be made aware of the requirements under the relevant dangerous goods safety legislation for explosives storage, general dangerous goods storage and the public safety requirements during transport and storage of final product.

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Response to the Department of Environment and Conservation – Environmental Management Branch Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of the Department of Environment and Conservation – Environmental Management Branch (DEC EMB) and in particular Reed addresses the issues raised by DEC EMB as follows;

DEC EMB Comment 1

That a condition be applied to require:

- *specific fauna management protocols for trenching activities to be developed and implemented in consultation with DEC; and*
- *that the protocols be consistent with the approved Dampier to Bunbury Natural Gas Pipeline (DBNGP) stage 5 fauna management protocol.*

Reed Response

Reed is supportive of a condition being applied to require specific fauna management protocols for trenching activities be developed and implemented in consultation with the DEC and that the protocols be consistent with the approved Dampier to Bunbury Natural Gas Pipeline (DBNGP) Stage 5 fauna management protocols detailed in the DBNGP Construction Environmental Management Plan 2006. Reed Resources has also reviewed Ministerial Statement 735 for the DBNGP Stage 5 Expansion and agrees that the fauna management protocols and requirements, and clearing personnel qualifications should be consistent with Condition 9.

The PER notes that Reed was aware of the potential for fauna to be come entrapped in the trenches associated with the water supply pipeline and had included some measures for managing impacts to fauna during trenching activities in management plans for the Project.

Reed is happy to develop the fauna management protocols in consultation with the DEC.

DEC EMB Comment 2

That an appropriate outcomes based condition/s be placed on the proposal incorporating the commitments made by the proponent that “during the first 5 years of operation of the Barrambie Borefield that 75% of the saturated thickness across the aquifer be retained and that the “saturated thickness of the calcrete aquifer across the area of investigations does not fall below 50% during the life of the project.

Reed Response

Reed Resources committed to trigger levels in the PER to retain 75% of the saturated thickness averaged across the area of drawdown within a section of the aquifer for the first five (5) years and not falling below 50% over the life of the Project. Reed has also committed to undertaking measures for monitoring and management of stygofauna and groundwater dependent vegetation to be agreed by DEC.

Reed consider that the commitments for trigger levels, monitoring and management of potential impacts on groundwater dependent ecosystems can be adequately enforced through both Ministerial Conditions under the *Environmental Protection Act* and the Groundwater Operating Strategy which will be required for a Licence to Take Water under Section 5 C of the *Rights in Water and Irrigation Act*.

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DEC EMB Comment 3

The DEC have recommended that mine pit voids be backfilled to at least two metres above the level of the pre-mining water table, if possible.

Reed Response

Reed resources does not agree with the concept of backfilling the mine pit voids in the context of the Barrambie Project because, in Reed's opinion it would sterilise or add additional costs to any future generation that may choose to mine the vanadiferous titanomagnetite seams that dip vertically below the existing pits (to unknown depths). Vanadium is a relatively rare element and its value has varied greatly (from \$3.00 per Kg to \$50 per Kg) during the 20th century and it is conceivable that a future generation may be compelled to mine the vanadium below the existing pits.

As long-term pit water levels will remain below pre-mining and regional water levels, the Barrambie pits will act as a groundwater sink, with groundwater flow toward the pit, and evaporative losses greater than inflows and incident rainfall. Although the groundwater within the pit lake will gradually become more saline in the long-term through evapo-concentration, the saline water is not expected to migrate from the pit due to the groundwater sink influence.

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Response to the Mid West Development Commission Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of the Mid West Development Commission (MWDC) and in particular Reed addresses the issues raised by MWDC as follows;

MWDC Comment 1

It is not clear where Reed Resources intends to source this labour from and what skills are required.

Reed Response

Reed Resources met with a representative of the Mid West Development Corporation on Thursday 19th August and advised the following:

As a general rule Reed will seek to employ local labour before fly in fly out labour but past experience was that the local supply of labour will not be sufficient to provide all the Barrambie projects labour needs.

Reed verbally advised the Mid West Development Commission of the following skills and numbers of people required for its permanent work force;

Administration and Technical	22
Process Plant Staff and Operators	47
Maintenance Tradesmen	20
Village, catering, paramedics and security	24
Open Cut Mining Personnel	102
Shut Down Personnel	29
Visitors	6
Total	250

MWDC Comment 2

The development of a buy and employ local policy would be beneficial in clarifying Reed Resources' aims and objectives in this regard.

Reed Response

Reed Resources is prepared to buy the goods and services it needs in the local mid west region provided they are competitive and employ local labour provided the skills are available.

MWDC Comment 3

The executive summary goes on to state that “substantial infrastructure will also be developed in the region with the construction of a sealed all-weather airstrip, a natural gas pipeline, and a contribution towards up grading and maintaining local roads. There may be opportunities here for Reed Resources to work collaboratively with others to provide appositve lasting legacy for Sandstone people through this investment in infrastructure.

Reed Response

Reed believes it is a responsible and compassionate member of the community in which it operates and is happy to investigate mutually beneficial infrastructure development and make its

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infrastructure available to the local community both during operations and in the future provided its needs are met.

MWDC Comment 4

Finally, the PER documents (page 8-3, row 1) the preference of local people for mine workers to be resident within the town of Sandstone. The Commission would like the opportunity to meet and partner with the proponents of this project to capture lasting benefits for regional communities. In particular the Mid West Development commission can assist in employing and training local people (through our connection with the Durack Institute of Technology), buying local (through the Mid West Procurement Officer), collaborative infrastructure requirements and locating a percentage of work in nearby communities.

Reed Response

Reed met with the Mid West Development Commission in Geraldton on Thursday 19th August 2010, and advised the Commission that Reed Resources was prepared to employ local people as appropriate, but it was unlikely that shift workers would be resident within the town of Sandstone because of safety concerns. The journey between Sandstone and Barrambie takes about 1 hour 15 minutes on a gravel road and when added to the 12 hour shifts at the mine it would mean the workers are doing 14.5 hour days with the resultant fatigue likely to cause an increase in accidents either at work or on the road.

Non-shift workers such as tradesmen, day workers and support staff who work less than 12 hours per day could be residents of Sandstone.

Reed are happy to investigate recruiting shift workers on a fly in fly out basis from Geraldton and buying local supplies such as diesel, bread, fruit and vegies etc in Geraldton. It is also likely that soda ash which is a bulk reagent (60,000 tonnes per annum) and some other bulk reagents can come in through Geraldton as well.

Infrastructure such as the gas pipeline and sealed airstrip could be a benefit to the whole district and Reed is happy to collaborate with the local communities to investigate how all stakeholders may benefit from the installation of such capital items.

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Response to Submission from Joy-Marie Valle on Behalf of the Valle Family Pastoral Lease Holders of Barrambie Station

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) from Joy-Marie Valle on behalf of the Valle Family Pastoral Lease Holders of Barrambie Station and in particular addresses the issues raised as follows;

Valle Family Pastoral Lease Holders Comment 1

As primary stakeholders (Barrambie Pastoral Lease Holders) I am disappointed that we have had no contact at all.

Reed Response

During the major drilling programs undertaken in 2006, 2007 and 2008 on the Barrambie deposit Reed Resources Ltd leased the Barrambie homestead from Mrs Anne Valle acting on behalf of the Valle family. During that time Reed was in touch with Mrs Valle on a number of occasions.

It was Reeds understanding that Mr John Bennett of Sandstone was the Manager of Barrambie during that time and not Ms Joy-Marie Valle and subsequently a copy of the PER document was forwarded to Mr John Bennett along with the other stake holders on 22nd June 2010.

Valle Family Pastoral Lease Holders Comment 2

I have not seen them uphold their environmental and ethical obligations within the initial stages on a smaller scale, so it does make me concerned what will happen on a broader scale. There has already been several level 1. Environmental incidences (GPS Co-ordinates can be provided, photos of incidences are included in this report at the end).

Reed Response

The GPS Coordinates provided by Ms Joy Valle have been checked and plotted and all lie outside Reed's Mining Lease M57/173 and were not drilled by Reed but were presumably drilled by other parties.

Furthermore Ms Joy Valle has identified a conservation area by a number of points some of which encroach on to Mining Lease M57/173 which is unacceptable to Reed.

Valle Family Pastoral Lease Holders Comment 3

Reeds States they are committed to maintaining a transparent process of communication with relevant stakeholders. The two most relevant stakeholders, The pastoral lease holders of Barrambie and the Managers of Cogla Downs Station had no idea they were even at the stage of EPA submissions let alone notified of how we could obtain a Review.

Reed Response

It was Reeds understanding that Mr John Bennett of Sandstone was the Manager of Barrambie during that time and not Ms Joy-Marie Valle and subsequently a copy of the PER document was forwarded to Mr John Bennett along with the other stakeholders on 22nd June 2010.

At that time Mr David Bruce the Manager of Cogla Downs was also forwarded a copy of the PER document. The PER document was initially returned as undelivered to Mr David Bruce and then later re-routed through Mr Ron Bradfield of Yulella Aboriginal Corporation to Mr David Bruce on 12 July 2010.

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Mr Ross Howden and Mrs Patrine Howden of Yarrabubba Station were also sent and received a copy of the PER document on the 22nd June 2010.

Valle Family Pastoral Lease Holders Comment 4

1. Water Supply - On page ES-16 of the review, it states “possible short to medium term, localised impact on pastoral bores” and “supplement local pastoral water supplies if adverse impacts are measured at pastoral bores”. I would like to know how you propose to do that.

Reed Response

The process water and camp water for the Barrambie Mining operation will be drawn from the a section of the Cogla Downs calcrete aquifer system on Yarrabubba Station situated about 30kms north of the Barrambie Project and piped to the Project and hence will have no impact on Barrambie Station water.

The dewatering of the mining pits is not expected to produce large draw down cones as the composition of the pit material and surrounding rock is predominantly clays with very low transmissivities.

If pit dewatering operations do impact negatively on Barrambie or Cogla Downs station bores then Reed will make water available to the pastoralists from its water piped in from the borefield on Yarrabubba Station.

As water is such a critical part of the proposed Barrambie operation Reed will monitor all bores including the Pastoral bores on a weekly basis.

Valle Family Pastoral Lease Holders Comment 5

2. Heavy Vehicle Movements

2.a) Dust and Noise Issues - For the Homestead (which is less than 16km from operation zone, approx 1km from road).

Reed Response

Reed will be employing industry best practice to keep the dust allayed at the mining operation and will be providing funding for the Shire of Sandstone to maintain the road.

Valle Family Pastoral Lease Holders Comment 6

Whilst David, Chris and Brian Smith all had my phone number since moving into the homestead around 2006, no-one contacted me so I assumed nothing was happening.

Reed Response

The Company rented the Barrambie Homestead from Mrs Anne Valle from 2006, 2007 to 2008 and was in constant contact with Mrs Valle during that period, the company was unaware (nor did Mrs Anne Valle make it aware that it should keep Ms Joy Valle informed of its activities).

Valle Family Pastoral Lease Holders Comment 7

“as they (R.R) have not correctly identified the real environmental matters and expectations, .It is also evident that other Government Departments have initiated remediation on some of the Environmental Incidences some time ago and as my photo’s illustrate, it has not been done yet”.

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Reed Response

Since receiving the submission to the PER the Company has met with Ms Valle who was advised the company intended to have a full time environmental officer and environmental management system as part of its regulations affecting its business.

As per Response 2, The Environmental Incidences noted by Ms Valle are outside Reeds Mining Lease and were presumably done by other company's.

Valle Family Pastoral Lease Holders Comment 8

It would be reasonable to ask that Reed Resources can demonstrate their capabilities to fulfil their obligation before this environmental review gives them the go ahead.

Reed Response

Reed's exploration clean up was audited by the Environmental Branch of the Mines Department on 5th August 2010 and the Company was advised "rehabilitation in general meets the standards required by the DMP. No further action is required".

Valle Family Pastoral Lease Holders Comment 9

Ms Joy Valle has advised Reed verbally that she intends to identify a conservation area on Barrambie around the Ballanhoe Peaks and undertake community training. With this in mind, it is fair to say that we will experience a fair amount of disruption and the area of great community significance which is the basis for our training as a sustainable community based program is under serious threat.

Reed Response

Reed's operations do not impact on the Ballanhoe Peaks and Reed has no need to go into the Ballanhoe Peaks and will make them out of bounds for all employees. However, Ms Valle has indicated a proposed conservation area that is to the East of Reed mining lease M57/173 and in places her boundary encroaches on to Mining Lease M57/173 which is unacceptable to Reed.

Reed has proposed a change to the western boundary of the proposed conservation area that separates it from Reeds Mining Lease M57/173.

Valle Family Pastoral Lease Holders Comment 10

2. Heavy Vehicle Movements

2. b) Impact on native fauna and livestock - no single person in the family was notified of their departure for three months. The bores were both left not working.

Reed Response

The Eternity Bore pump was not operational when Reed commenced occupancy of the homestead. The submersible bore pump had been made inoperable by the caretaker employed by the Valle family prior to the Reed occupancy.

The water supply for the homestead had to be carted by Reed from Freds Bore approximately 25km from the homestead. Freds bore was operational at the time of termination of the occupancy of the homestead and was repaired by Reed with the replacement of pump buckets prior to Reed ceasing to lease the property.

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Valle Family Pastoral Lease Holders Comment 11

2. Heavy Vehicle Movements

2. b) Impact on native fauna and livestock - I am concerned to be having 35 trucks a week going up and down and the many hundreds of delivery trucks over each year, also light vehicles.

Reed Response

Reed will attempt to consolidate the freight loads to keep truck movements to a minimum but it will be necessary for vehicular traffic to use the Sandstone Meekatharra road.

Valle Family Pastoral Lease Holders Comment 12

Appendices E and F to do with Botanical and Fauna Surveys in the area are unavailable for me to view as I only found out about the review by chance a short time ago, it was stated that some of the flora and fauna surveys were desk top surveys (ie Mattiskes, where desktop reviews.). I find it hard to understand how this can be completely relevant when a lot of the literature used was from some time ago and not in that particular area.

Reed Response

Appendices E and F were made available by Reed and handed to Ms Joy Valle at a face to face meeting with Ms Valle on 26th August 2010. The desktop surveys noted by Ms Valle were undertaken as a precursor to commencing field work and were surveys of relevant data bases undertaken for both flora and fauna prior to field surveys commencing.

Fauna surveys undertaken by Outback Ecology included two trips to Barrambie. Flora surveys undertaken by E. Mattiske and associates included four trips to Barrambie.

Valle Family Pastoral Lease Holders Comment 13

“employees or people related to the mine traversing our pastoral lease. These dog traps are not visible to the untrained eye and anyone could step out of their car or walk into one”.

Reed Response

Reed will advise the pastoral Lease holders of any future exploration programmes it plans on Barrambie and would expect the Pastoralists to advise the Company of any areas it was not safe for its exploration crews to go due to the presence of dog traps.

Valle Family Pastoral Lease Holders Comment 14

I currently am applying for Landcare grants myself to fence some of the area of most significance. This is outlined in the map of V.A.E.S. (Valle Agribusiness and Environmental Services) proposed conservation area (Handprint area).

Reed Response

Reed is not sure of the legal standing of a the privately created conservation area that the Valle family are proposing for the Barrambie Pastoral Lease, however Reed has no need to go into the Ballanhoe Peaks area as the area of Reeds interest is (at this point in time) confined to Mining Lease M57/173 that contains the vanadiferous titanite ore bodies and is situated on the flat ground to the West of the Ballanhoe Hills.

However Reed wishes to point out that the conservation area proposed by Ms Joy Valle encroaches on M57/173 and suggests that the Western boundary of Ms Valles proposed conservation area is modified to run outside M57/173 eastern boundary.

Valle Family Pastoral Lease Holders Comment 15

3. Aerodrome - not far off our North Boundary. The watering points on our North Side of station, close too if not in Reeds Operation area, are our main and best source of water. They are part of one of our principal grazing areas. With this in mind, I am concerned about the disruption to grazing livestock by low flying planes landing nearby.

Reed Response

This gravel air strip was initially put in by Ferrovanadium Corporation in the 1970's and was recently maintained by Reed to enable medical evacuation during the drilling program. It is not Reeds intention that this air strip is used on a permanent basis. The permanent sealed air strip will be situated approximately three kilometres to the West of M57/173 on ML 57/29. There will be approximately one fly in fly out plane every second day landing and taking off three kilometres to the west of Barrambies north eastern boundary.

Valle Family Pastoral Lease Holders Comment 16

4 European Heritage, Aboriginal Heritage, Local Recreation Area, Regional Planning, Pastoral Business Planning. - I know there will be environmental management systems for the workforce in place but how will you enforce it in relation to them going outside your mining tenement and traversing over our pastoral lease.

Reed Response

Employees will receive an induction pointing out the heritage value of the Ballanhoe Peaks area and they will be banned from going into the area. Employees will be working 12 hour shifts on a "fly in fly out" roster and will have very little leisure time and will not have their own vehicles. Company vehicles will be banned from entering the Ballanhoe Peaks area.

Reed rejects the suggestion that its exploration crews did any damage to the heritage values of the Ballanhoe Peaks and points out that the crews were under the constant supervision of a professional geologist at all times.

The Ballanhoe Peaks are situated approximately one kilometre off the Meekatharra Sandstone Road and members of the public have access to the area.

Valle Family Pastoral Lease Holders Comment 17

4 Continued - I am currently applying for Landcare grants, myself to fence and revegetate some of the areas of most significance. This is outlined in the map of V.A.E.S proposed conservation area below.

Reed Response

Reed was given the coordinates of the proposed Barrambie Station conservation area on 20th August 2010 and notes that the proposed private conservation area encroaches on Mining Lease M57/173. Reed requests that the Barrambie Pastoral Station owners move the boundary of the proposed conservation area to the east so that it does not encroach on M57/173.

Valle Family Pastoral Lease Holders Comment 18

Aboriginal Heritage - while there are none of the traditional landowners alive from this area, and so they could not claim native title, this area is an amazing part of Australian History.

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Reed Response

Reed has acknowledged the Yugunga-Nya community as Native Title Claimants for the area and have reached agreement with the claimants. Reed also acknowledges the value of the Ballanhoe Peaks and will adopt reasonable management measures to prevent disturbance of any of the potential Aboriginal ethnographic or archaeological heritage sites. These management measures were outlined in the PER document will include:

- Restriction of access from the Barrambie Project area to the area known as the Ballanhoe Peaks through the placement of the mine safety bund wall and fencing, including the relocation of portion of the Rabbit Proof Fence to the south east of the proposed mining operations.
- Advise all employees and contractors of the restrictions on access to the Ballanhoe Peaks area and One Tree Hill through inductions and information materials.
- Include information on archaeological items which could be found within the Project area in inductions so that employees and contractors are able to identify, report the location and avoid disturbance to such items.
- Record One Tree Hill as a potential ethnographic site on Reeds spatial files and quarantine from any disturbance as an interim measure until the final status of the place is determined in consultation with the Yugunga-Nya NT claimants group.
- Reed will delineate a buffer zone boundary of at least 10 metres around One Tree Hill by either flagging or fencing, as deemed appropriate.

Valle Family Pastoral Lease Holders Comment 19

“it has become evident that there is absolutely no room in the area, for operations of any kind, and the mining company cannot possibly keep this area protected unless it is fenced as specified”.

Reed Response

Reed believes that by putting in place appropriate bunds, fences and procedures it can ensure its workforce does not enter the Ballanhoe Peaks.

Valle Family Pastoral Lease Holders Comment 20

Reeds stated that there were no significant noise impacts on nearby residents and other sensitive premises. This is clearly not the case considering how close our operations will be.

Reed Response

On Pages ES-15 and 16 of the PER, Reed was referring to the Barrambie and Cogla Downs homesteads which are 16 and 20 kilometres away from its operations.

Valle Family Pastoral Lease Holders Comment 21

Also stated was medium change to visual amenity of the local area through the creation of rehabilitated waste landforms. Whilst this is not desirable, I believe with measurable parameters for rehabilitation and the regulations required, Reeds will be able to meet this criteria.

Reed Response

Reed is proposing to build land forms with gentle slopes no greater than 15 degrees and to progressively rehabilitate the land forms with locally occurring native vegetation so that they blend in with the surrounding country.

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Valle Family Pastoral Lease Holders Comment 22

From my understanding so far, Reeds has stated that they are not going to mine within 100 metres of Ballanhoe Peaks in accordance with supposed native title agreements. And they have generally expressed that they are not going to touch them. On Cogla Station a good part of these peaks are going to be gone, that means all that is left really beside a ten metre circle around a sacred site (one tree hill) at Cogla is this special area on Barrambie Station.

Reed Response

The hills that Reed understands to be the Ballanhoe Peaks are those that are approximately 2 kilometres to the East of the Sandstone to Meekatharra road and contain aboriginal rock paintings.

Valle Family Pastoral Lease Holders Comment 23

On their map and according to some marker pegs, it looks to me that they are going to mine straight into a little section of Ballanhoe Peaks. (the marker pegs in this section continue up the into the peaks).

Reed Response

Reed intends to mine within its mining lease M57/173 generally speaking the vanadiferous titanomagnetite beds are on the flats to the west of the ridges. The marker peg referred to in submission 23 is a local grid peg and does not indicate the open pit boundary.

Valle Family Pastoral Lease Holders Comment 24

Whilst one area in question the right of the proposed pit, before this bottom corner has little more than a hundred metres, between their operations and the bottom of Ballanhoe Peaks, this only encompasses a tiny area and only occurs on small random areas towards the lower end.

Reed Response

Reed agrees that the corner of M57/173 comes close to the hills in this area. However, Reed's mining activities will be confined to M57/173, and at this point the open pit is approximately 500 metres to the north. Reed will not be mining the "at risk land forms".

Valle Family Pastoral Lease Holders Comment 25

If the rabbit proof fence is being shifted south east, but they suppose not to damage that area of Ballanhoe Peaks, how is it possible to do this, when there is nearly no room in places to spare.

Reed Response

Reed has met with the Murchison Regional Vermin Council and agreed to reposition a portion of the fence at a future date and under their direction. In general the fence would be positioned on the eastern boundary of M57/173. Reed would not propose to alter the position of the fence in the region of the old gold mine. Reed will not be mining the old gold mine as mining will be confined to M57/173.

Valle Family Pastoral Lease Holders Comment 26

5. Soil and Ground Water Contamination and Landfill - It has been identified that all hydrocarbons will be cleaned up and disposed of as per regulations but most important point I would like to verify is, in the areas where any potential spills can occur will the ground be sealed? Are you willing to be able to actively show to the public/government organisations that Environmental Management Systems are in place and if they are successful or not at any time in your operating life?"

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Reed Response

The truck fuelling bay and the mobile work shop are all concrete bunded to manage the potential hydrocarbon spills. Reed currently has environmental management standards for its exploration programmes and in future operations will have a fully integrated best practice environmental management system and a senior full time environmental officer. Reed will be able to demonstrate the effectiveness of its environmental management systems.

Valle Family Pastoral Lease Holders Comment 27

Below are some photos, examples of the level 1 and possibly higher, Environmental Incidences that have already occurred. I acknowledge that not all uncapped drill holes, old sample bags etc. are from Reed Resources (those I did not include).

Reed Response

Reed have plotted the coordinates of the “Environmental Incidences” and have determined that they were not drilled by Reed. The Barrambie Project drilling programme was confined to M57/173. Furthermore the Department of Mines Environmental Division inspected the rehabilitation of reeds drilling on M57/173 and advised that it had been rehabilitated to the Departments Satisfaction and “No further action is required”.

Valle Family Pastoral Lease Holders Comment 28

The landfill facility as I left it was two big half filled holes, I normally in this situation would fill it in myself and revegetate native species on the area. Reed Resources in the time at the homestead filled up my two holes, started another that was left open for the rubbish to blow away, and left masses of rubbish at the original dump on top of the ground to blow away. Also the homestead was surrounded by litter and things left by the people involved that I have already corrected and spent four days clearing.

Reed Response

The landfill facility to which this submission refers is situated near the homestead and is mainly used for domestic rubbish. Reed Resources apologises to Ms Joy Valle for not tidying the area upon vacating the homestead, and for leaving the rubbish holes open. Since being made aware of this issue Reed has arranged with a contractor for the holes to be filled in.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

Response to Department of Environment and Conservation – Air Quality Branch Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of the Department of Environment and Conservation – Air Quality Branch (DEC AQB) and in particular Reed addresses the issues raised by DEC AQB as follows;

DEC AQB Comment 1

There does not appear to be any quantitative prediction of odour or dust concentrations. While PM₁₀ concentrations appear low enough to ensure dust levels are also low, there is no basis for the assertion about the acceptability of the odour concentrations.

Reed Response

Reed understands that the 'odour' threshold for SO₂ is well above the ambient assessment criteria for human sensitive receptors of 571µg/m³ (1-hour averaging period). For example, an odour threshold of around 0.5ppm would equate to approximately 1428µg/m³. Therefore controlling SO₂ emissions to remain within human health criteria will also control for odour.

DEC AQB Comment 2

In section 3.1, it is stated that "Reed Resources installed a weather station near the proposed aerodrome site in August 2008 which will provide comparative, local baseline climatic data". This is identical to the statement made a year previously, and by this stage there should be a sufficiently long period of monitoring to have allowed use of this data set.

Reed Response

Although the weather station was installed in August 2008 prolonged periods have occurred where data has not been obtained or is unreliable due to malfunction. This has been due to factors such as lightning strike and software issues. As the weather station is located in a remote location, it has been difficult to repair and service *insitu*. The weather station control box was recently been removed from site, completely refurbished and re-installed.

DEC AQB Comment 3

- (i) The wording implies that the control strategy will be invoked after a rise in SO₂ concentrations has been detected. Given the two-hour residence time of sulphate flux in the roasting system, and that the relevant air quality criterion is a one-hour average, it is clear that such a strategy will have no opportunity to prevent a one-hour standard being exceeded.*
- (ii) The potential to use a predictive management scheme instead was discussed in the original Air Quality Assessment report (SKM, March 2009). One based on a combination of predicted mixing depth and wind direction would have some chance of limiting SO₂ concentrations in the village area.*
- (iii) A commitment has been made to use a reactive strategy to limit SO₂ concentrations, this approach can not succeed due to the relatively long timescale required for the sulphate flux to pass through the roaster system. The use of a reactive strategy to control SO₂ concentrations at a specific location is less than ideal. A continuous SO₂ monitor should be required at the village to monitor the effectiveness of the control strategy for as long as the strategy is employed.*
- (iv) The possibility of using a lower fraction of sulphate flux is noted. This would reduce SO₂ concentrations in proportion, but no commitment to do so is made.*

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Reed Response

Reed Resources is committed to implementing an Adaptive Emissions Management Strategy as a predictive strategy rather than a reactive strategy. The basic approach for the Adaptive Emissions Management Strategy as a predictive management measure was described in Section 5.6.4 on Air Quality Management in the PER. The Adaptive Emissions Management Strategy will use predictive weather modelling to model potential ground-level SO₂ concentrations at the accommodation village and other selected sites. The addition of sodium sulphate to the kiln will be adjusted in advance, based on the model predictions, to ensure that nominated maximum ground level concentrations are not exceeded.

The purpose of the ambient monitoring programme, involving the use of continuous SO₂ monitors, will be to confirm satisfactory performance of the predictive emissions control strategy. This monitoring will feed into the predictive model, facilitating the identification of those days/times likely to contribute to poor dispersion, and in turn assisting decision making on the operating parameters for the process.

DEC AQB Comment 4

In section 5.6, the statement "The ground level concentration for PM₁₀ at the accommodation village is 6.3 µg/m³ and 12.6% of the assessment criteria" is made. The shortcoming of this point was noted in our initial (2009) response: it should state the relevant averaging period, which is 24 hours.

Reed Response

Reed Resources accepts that the relevant averaging period was not indicated in the particular statement as referenced above. However, Table 5.11 Air Quality Assessment Criteria Comparison of Modelled Results against Assessment Criteria on the following page in the PER provides averaging periods for all of the air quality parameters.

DEC AQB Comment 5

The potential for vanadium pentoxide to produce health effects other than as a component of the total ambient particulate concentration has still not been addressed. Our previous (2009) response suggested a limit of 18µg/m³, and at the it appears it will not be exceeded. However, this issue should be covered in the PER.

Reed Response

The potential health effects of vanadium compounds such as V₂O₅ include eye irritation, green tongue, metallic taste, throat irritation, coughing, fine rales, wheezing, bronchitis, dyspnoea (shortness of breath) and eczema. However, any potentially significant exposures to V₂O₅ which could possibly result in impacts on human health are confined to within the facility footprint.

Potential V₂O₅ exposure is therefore an occupational health matter which will be addressed in considerable detail under the *Mines Safety and Inspection Regulations* (MSIR) administered by Resources Safety Division of the Department of Mines and Petroleum. Comments provided by the Resources Safety Division on the PER acknowledge that the adequacy of the plant design, operational management and dust/ emissions will be further assessed prior to construction and during operations under the MSIR. The Resources Safety Division also commented that at this stage the dust control techniques described within the PER appear to be adequate.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

As potential V₂O₅ exposure is confined with the boundaries of the proposed Project and occupational health aspects will be further assessed and controlled under the *Mines Safety and Inspection Regulations*, this matter was considered to be outside the scope of the PER.

DEC AQB Comment 6

We do not assess the proposed technology in terms of emission control, and how this relates to requirements for implementation of "Best Practice" as per EPA Guidance Statement No. 55.

Reed Response

Reed Resources is committed to applying “Best Practice” technologies for emission control for Barrambie processing facilities, as appropriate. In this context, Reed Resources understands that Works Approval and Licencing is required under Part V of the *Environmental Protection Act*.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

Response to Department of Indigenous Affairs Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of Department of Indigenous Affairs (DIA) and in particular Reed addresses the issues raised by DIA as follows;

DIA Comment 1

It is noted that there is a potential Aboriginal heritage site within the Project area. Page 3-81 states that "the status of One-Tree Hill as a heritage site has not been confirmed in consultation with a necessary and sufficient portion of the Yugunga-Nya community." The proponent should seek further information regarding this site in order to be certain of the area's Aboriginal heritage values. The Proponent should also be reminded that only the Aboriginal Cultural Material Committee has the statutory authority to determine whether a place can be considered a site to which the terms of the Aboriginal Heritage Act 1972 (AHA) apply. Furthermore, the proponent should be aware of section 15 of the AHA. Section 15 discusses the obligatory reporting of any place to which the AHA might apply to the Registrar of Aboriginal Sites. As such, One-Tree Hill should be reported to the Registrar of Aboriginal Sites.

Reed Response

Reed Resources intends to commission further ethnographic and archaeological surveys, including further consultation with the Yugunga-Nya community, with regard to One Tree Hill as a potential Aboriginal site. This information will be referred to the Registrar for Aboriginal Sites for consideration by the Aboriginal Cultural Material Committee, prior to the commencement of ground disturbing activities associated with the implementation of the Project.

As stated in the PER, Reed Resources has recorded One Tree Hill on it's spatial files as a 'no-go' area with a 10m radius buffer zone.

DIA Comment 2

Mine Pit dewatering and Barrambie Borefield - It is noted that the project will require approximately 2.5GL/annum of water and that this will be primarily sourced from the Barrambie Borefield (p2-15). The sourcing of water from the bores has some ability to impact on groundwater levels in the region of the calcrete aquifer found in the Cogla Downs drainage system. It is also noted that dewatering of the mine pit is expected to result in a large cone of depression that may extend up to 2 km from the pit. The proponent should make themselves aware of all Aboriginal heritage sites in the general region that have cultural significance as a water source and ensure that potential drawdown of the watertable does not result in adverse impact to local Aboriginal heritage sites with associated water sources. It is suggested that any monitoring program implemented also address possible impact to Aboriginal cultural values caused by groundwater drawdown and that mitigative measures that will reduce impact to Aboriginal cultural values that may be caused by groundwater drawdown be formulated.

Reed Response

No natural surface expressions of the groundwater such as springs or soaks which would be likely to have cultural significance occur in the vicinity of either the proposed Barrambie Borefield or the minesite. Any impact of dewatering will be monitored in existing pastoral wells or bores to ensure that water supplies are maintained. As Reed progresses with the detailed project design, which will include further groundwater investigations knowledge will continue to be gained of the location and significance of the Aboriginal Heritage sites within the region.

REED RESOURCES LTD RESPONSES TO SUBMISSIONS ON THE BARRAMBIE VANADIUM PROJECT PUBLIC ENVIRONMENTAL REVIEW

DIA Comment 3

It is also noted that the proponent now plans to bury approximately 80% of the water supply pipeline (p2-15) and that when archaeological surveys were undertaken over the area in 2008 the heritage consultant was under the impression that the water pipeline would be laid on top of the ground surface. As such the proponent should ensure that they are satisfied that the ground disturbing works that will be required in order to bury the pipeline will not be affecting any Aboriginal heritage values.

Reed Response

Much of the alignment of the water supply pipeline will be in areas of previous disturbance immediately adjacent to the Meekatharra to Sandstone Road. The archaeological survey conducted in August 2009 covered the proposed pipeline alignment within L57/30. While no items of cultural or scientific significance were identified during this survey, Reed understands that areas such as creek lines may contain some artefact materials and will ensure that personnel involved in ground clearing and trenching operations are trained to identify, report the location and avoid disturbance to such items.

DIA Comment 4

Page 5-53 states that there will be no adverse impacts to Aboriginal heritage values. Should it become apparent that there will be impact to Aboriginal heritage values the proponent must obtain consent under section 18 of the AHA in order to avoid breaching section 17 of the AHA.

Reed Response

Reed Resources understands its obligations under the *Aboriginal Heritage Act* and will ensure that consent is obtained under Section 18 of the Act should any Aboriginal Heritage values be identified at any time during the life of the Barrambie Project.

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Response to Department of Water Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambee Public Environmental Review (PER) of the Department of Water (DoW) and in particular Reed addresses the issues raised by DoW as follows;

DoW Comment 1

The department's main concern is that the Barrambee Vanadium Project PER and associated supporting appendices do not provide the confidence to substantiate that the Cogla Downs calcrete aquifer can sustainably support the abstraction of 2.5 GL/a without substantial drawdown, aquifer dewatering or subsequent impact upon the documented stygofauna population. The EPA objective for the management of groundwater is to maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected. The department believes the proponent has not provided sufficient information to satisfy the EPA's objective regarding groundwater.

Reed Response

Reed Resource's preferred water supply for the Barrambee Vanadium Project is based on a section of the Cogla Downs calcrete aquifer on Yarrabubba Station as identified in the PER. Initial hydrogeological investigations and groundwater modelling were undertaken for the proposed Barrambee Borefield as the first step in a staged approach to provide a desired level of confidence for the security of a water supply for the Project Definitive Feasibility Study.

The field investigations included the installation of fifteen exploration holes, three of which were completed as test production bores, in the calcrete aquifer along the main channel. Seven of the exploration holes were completed as monitoring bores for use as observation points during the subsequent pumping tests which were undertaken, and to establish a monitoring bore network for future groundwater monitoring. A numerical groundwater model was developed to evaluate the potential of the calcrete aquifer to meet the projected water supply demand and optimise the initial Borefield design.

The initial hydrogeological investigations and modelling have also been used to determine potential environmental impacts and develop appropriate management strategies to protect the environmental values.

While Reed is satisfied that there is sufficient water available within this section of the calcrete aquifer system to supply up to 2.5 GL/a for the 12 year life of the Project, a range of potential contingencies have also been identified as supplementary and/or replacement water supplies, should abstraction exceed conservative trigger levels.

Reed Resources recognise that further detailed hydrogeological investigations and monitoring need to be undertaken to prove the viability of the preferred water supply option, prior to commencing abstraction. Reed also understands that the results of further detailed investigations must satisfy the Department of Water for a Licence to Take Water to be granted under Section 5C of the *Rights in Water and Irrigation Act*.

Groundwater monitoring equipment has been purchased and will be installed shortly to collect baseline water level data. Detailed Project design work will commence immediately upon obtaining Project finance which will include further hydrogeological investigations of the preferred Barrambee Borefield within the calcrete aquifer on Yarrabubba Station. Hydrogeological investigations will also be undertaken for the identified contingency options.

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The *Mining Act* Miscellaneous Licence (L20/49) for the purpose of groundwater search has been retained by Reed Resources over the contingency areas for this very reason.

Reed believes that the additional hydrogeological investigation on the proposed Borefield will support its assertion that there is sufficient water in this section of the aquifer system to provide a sustainable water supply. However, should these more detailed investigations indicate that the proposed Borefield cannot provide a sustainable water supply for the life of the Project or significant environmental impacts may occur, Reed will consider development of identified contingencies.

The range of contingency options identified in the PER should be sufficient, either individually or collectively, to provide a sustainable water supply. Furthermore, groundwater resources are extensive throughout the Midwest region within economic development range of the Barrambie Project area. A water supply for the Project is therefore only limited by the distance/ cost of a pipeline. Reed Resources consider the potential cost implications of further pipeline and borefield development as an acceptable commercial risk.

Reed Resources understands that there is around six (6) GL of suitable quality water contained within the previously mined Gidgee open pits approximately 35km from Barrambie as an interim contingency. The owner of the Gidgee assets, Apex Minerals, has agreed in writing to allow Reed Resources to abstract water from the open pits.

Reed Resources believes that the EPA objective for the management of groundwater; “*to maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected*”, can be achieved.

The most significant environmental values associated with the calcrete aquifer system have been identified as:

- stygofuana populations
- potentially groundwater dependent vegetation
- pastoral water supplies

Reed Resources committed to trigger levels in the PER to retain 75% of the saturated thickness averaged across the area of drawdown within a section of the aquifer for the first five (5) years and not falling below 50% over the life of the Project. Reed has also committed to undertaking measures for monitoring and management of stygofauna and groundwater dependent vegetation to be agreed by DEC. Comments received from the DEC Environmental Management Branch on the PER recommended that appropriate outcome based conditions be placed on the Proposal to enforce these commitments. Reed Resources consider that the commitments for trigger levels, monitoring and management of potential impacts on groundwater dependent ecosystems can be adequately enforced through both Ministerial Conditions under the *Environmental Protection Act* and the Groundwater Operating Strategy which will be required for a Licence to Take Water under Section 5 C of the *Rights in Water and Irrigation Act*.

Concerns were also raised by the owners of Yarrabubba station regarding the potential long-term effect of pumping from the aquifer on stock water supplies. In response to these concerns, Reed Resources has now provided the Station owners with a written guarantee for the stock water supplies.

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DoW Comment 2

The department gave similar advice when commenting on the draft PER in July 2009. However, it appears the proponent has not revised the PER document and associated supporting appendices to alleviate the department's concerns and prove the proposed abstraction is sustainable.

Reed Response

Reed Resources appreciated DoW comments provided on the draft PER and made substantial changes to the document to include commitments to undertake further hydrogeological investigations, modelling and monitoring as requested. We understand that DoW requires the results of the additional investigations, modelling and monitoring to demonstrate that abstraction from the preferred Barrambie Borefield within the calcrete aquifer is sustainable. We also understand that further investigations need to be undertaken for the identified contingency options.

However, the further investigations and monitoring will require considerable time (4 – 6 months and expense. Reed has therefore progressed with a strategy for the PER which identifies several contingency options which should be sufficient, either individually or collectively, to provide a sustainable water supply. Detailed Project design work will commence immediately upon obtaining Project finance which will include further hydrogeological investigations in consultation with DoW.

Reed understands that the results of further detailed investigations must satisfy the Department of Water for a Licence to Take Water to be granted under Section 5C of the *Rights in Water and Irrigation Act*.

DoW Comment 3

The department presents the following issues and suggested additional work required to alleviate concerns and give confidence the 2.5 GL/a required for the project can be sustainably abstracted from the Colga Downs calcrete aquifer.

The bore hole network, design and associated pump testing is not adequate to provide appropriate information required to evaluate the resource.

Reed Response

Additional detailed Project design work will commence immediately upon obtaining Project finance which will include further hydrogeological investigations, drilling, test pumping and modelling as the basis for refining the final Borefield design. The programme for the additional work will be developed in close consultation with DoW and results will be provided in support of an application for a 5C licence.

DoW Comment 4

The use of the Sandstone 1:250 000 Geological Series map is not considered appropriate to determine the spatial boundaries of the palaeovalley / channel of the Colga Downs drainage system.

Reed Response

The preferred Barrambie Borefield is located on a portion of the Colga Downs calcrete drainage system on Yarrabubba Station and does not include the underlying palaeochannel. While the spatial boundaries of the calcrete aquifer on the *Sandstone 1:250 000 Geological Series* map may not be precise, the expected area of drawdown represents only a minor extent of the calcrete

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aquifer (around 15%). More recent radiometric data obtained by Reed Resources indicates the extent of the calcrete being reasonably in line with the Geological Series map.

As stated above, Reed Resources recognise the requirement for further hydrogeological investigations to be undertaken to satisfy the DoW when applying for a 5C licence. The proposed investigations and programme of works will be developed in close consultation with the Department of Water (DoW) and will include:

- The accurate designation of the palaeochannel system, by gravity survey.
- Additional deep-drilling to define the base of the palaeochannel sequence with targets chosen following the assessment of the gravity survey.
- Extended pump testing in relation to appropriately designed monitoring bores.
- Design and construction of an agreed monitoring bore network and the development of trigger levels and contingency measures.

DoW Comment 5

The accuracy of the model is highly questionable as it is built upon a set of aquifer characteristic assumptions and estimations that have not been defined by appropriate aquifer testing and evaluation.

Reed Response

The numerical groundwater flow model was developed to evaluate the potential of the calcrete aquifer to meet the projected water supply demand and predict the potential impact of groundwater abstraction from the Barrambie Borefield. The groundwater model was developed using data obtained during the field investigations including the testing of three production bores, in the calcrete aquifer along the main channel. Seven monitoring bores were used as observation points during the pumping tests.

The numerical model maintains a conservative approach as:

- It does not take into account recharge from rainfall, which is thought to contribute a significant portion of the recharge to the aquifer.
- The results of the predicted model water balance show that groundwater abstraction is sourced mainly from groundwater storage and had minimal groundwater inflow from the model boundaries. However, it is expected that groundwater throughflow will contribute to the calcrete aquifer resource (although this has not been allowed for in the model), in which case, it would reduce the volume of water abstracted from storage in the real system.
- The modelled calcrete does not take into account the eastern branch of the Cogla Downs drainage system, which would substantially increase the volume of groundwater available in storage.
- The inflow to the calcrete aquifer from adjacent alluvial sediments has not been included in this model. These surrounding alluvial sediments are expected to be in hydraulic connection with the calcrete aquifer.

As stated in the PER, Reed Resources will conduct additional numerical modelling based on more detailed hydrogeological investigations to more accurately assess groundwater drawdown and appropriate yield from the Cogla Downs calcrete aquifer system in consultation with the DoW. This modelling will incorporate an updated conceptual model of the Cogla Downs aquifer system based upon assessment of drilling results. The model will be used to develop predicted groundwater drawdown impacts on groundwater levels within the Cogla Downs aquifer system

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and regional areas. The additional numerical model will be redesigned through the input of new data on aquifer characteristics derived from the drilling, installation and testing of the proposed additional production and monitoring bores, the review of recharge to the calcrete aquifer and establishment of a more comprehensive baseline data set from the groundwater monitoring programme.

DoW Comment 6

Additional work on the two alternative Colga Downs calcrete aquifer water supply options, similar to what is needed for the proposed Colga Downs calcrete aquifer water supply, is required before these resources can be considered as viable.

Reed Response

Investigative drilling will be undertaken in the eastern area toward Errolls bore at the same time as the production bore drilling programme is implemented for the preferred Barrambie Borefield on Yarrabubba Station in order to assess the extent and saturated thickness of the calcrete aquifer in the east-west trending branch of the Cogla Downs drainage system. The programme for the investigations will be developed in consultation with DoW.

Data from this evaluation will be provided to the DoW for evaluation and consideration for an additional Section 5C licence, if required.

Previous investigations by Geotechnics (1972) identified the presence of a calcrete aquifer in the Scotties Well area to the south. However, it is recognised that preliminary calculations of potential yields from the Cogla Downs calcrete in the vicinity of Scotties Well would need to be confirmed by exploration drilling and aquifer testing.

This area is a lesser priority as a supplementary water contingency as the Gidgee open pits and/or the eastern area near Errolls bore are more strategically located. Therefore, a programme for detailed investigations of this part of the calcrete aquifer is not planned to commence at the same time as the development of the proposed Barrambie Borefield. It is envisaged that the lead time for the development of a supplementary water supply within the Cogla Downs calcrete aquifer in the vicinity of Scotties Well would be between 12 and 18 months depending upon response time and access for groundwater investigations to be undertaken, approvals to be granted and infrastructure to be established.

DoW Comment 7

The PER findings are based upon limited field observations. The background data gathered is considered insufficient for the development of a high priority project resource with a mine life of 12 years.

Reed Response

As indicated above, Reed Resources acknowledges that the initial hydrogeological investigations and groundwater modelling were undertaken for the proposed Barrambie Borefield to provide a desired level of confidence for the security of a water supply for the Project Definitive Feasibility Study.

Reed Resources recognise that further detailed hydrogeological investigations and monitoring are required to prove the viability of the preferred water supply option, prior to the commencing abstraction. In the unlikely event that these more detailed investigations indicate that the proposed Borefield cannot provide a sustainable water supply for the life of the Project or significant environmental impacts may occur, Reed will consider development of identified contingencies.

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The range of contingency options identified in the PER should be sufficient, either individually or collectively, to provide a sustainable water supply. Furthermore, groundwater resources are extensive throughout the Midwest region within economic development range of the Barrambie Project area. A water supply for the Project is therefore only limited by the distance/ cost of a pipeline. Reed Resources has considered the potential cost implications of further pipeline and borefield development as an acceptable commercial risk.

DoW Comment 8

More detail is required for mine dewatering and how water will be used in whole mine water balance. At peak dewatering the excess water will represent 35% of the total water requirement.

Reed Response

More detail on mine dewatering requirements will be obtained through operational resource development drilling and the early years of mine development before the water table is intersected at around 35 – 50 metres below ground level. Dewatering will be achieved through sumps established within the pits. Dewatering bores may also be installed if higher yielding fractures are encountered during mining.

All water extracted for mine dewatering will be pumped to the process water circuit or recycled for dust suppression. If peak dewatering does produce up to 35% of the total Project water demand, this will be a significant benefit as it will directly off-set production from the water supply Borefield. It is highly unlikely that mine dewatering will ever exceed the total Project water demand for any period of time.

DoW Comment 9

The department also notes that the 5C licence applications for the Cogla Downs calcrete aquifer and dewatering at mine site have not yet been submitted by the proponent.

Reed Response

The process plant commissioning for the Barrambie Vanadium Project is not anticipated until December 2012. Therefore, the process water supply will not be required until around mid-2012. Reed Resources believes that there is sufficient time to undertake the more detailed hydrogeological investigations and monitoring required by DoW to support the 5C licence application.

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Response to Yarrabubba Station Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) from the owners of Yarrabubba Station and addresses the issue raised as follows;

Yarrabubba Station Comment

We, the owners of Yarrabubba Station, where the proposed water source is located for the above named project, are concerned about possible effects to the water table.

Many of our wells and bores rely on the small, fresh, shallow, aquifers to supply stock water. We feel that the long term effect of pumping from the proposed sites will affect these aquifers.

If our water supply needs can be guaranteed, then we have no objections to pipelines etc for the proposed project, with consultation from ourselves, to go ahead.

Reed Response

Reed Resources has now provided the Station owners with a written guarantee for the stock water supplies.

Response to Western Australian Museum Submission

Reed Resources Ltd (Reed) acknowledges the submission to the Barrambie Public Environmental Review (PER) of the Western Australian Museum and addresses the issues raised as follows;

WA Museum Comment 1

The project occurs in the centre of an area rich in subterranean fauna with several distinct communities that comprise locally endemic species in the calcrete aquifers discussed 3.5.1 and as the main target for mine water supply (3.5.2): such aquifers have broadly been proposed as priority communities. Water abstraction is likely to affect the calcrete aquifers in the region and in the longer term regions downstream such as near Lake Anneen. All calcrete bodies in the region contain distinct stygofauna communities, and by extension, likely unique troglodyte communities. The Western Australian Museum has data, for example, from Nickyloo Bore in the centre of the project area, including a new species of Haloniscus (Oniscidea), a bathynellacean (probably new) and copepods, and the PER identifies a much greater diversity of stygofauna.

Nothing is known of the basic biology of these stygofauna, so unsubstantiated assertions are unacceptable, such as (Appendix G, 3-71) 'there are a number of [unspecified] factors which mitigate the risk to these taxa' when it would be clearly more the case that there are a number of factors which exacerbate the risk to these taxa.

Proposed stygofauna management is inadequate and a sustained independent research program to investigate impacts of water abstraction needs to be established.

Reed Response

Reed Resources believe that the proposed Barrambie Borefield management strategy to adopt conservative trigger levels to retain 75% of the saturated thickness averaged across the area of drawdown within a section of the aquifer for the first five (5) years and not falling below 50% over the life of the Project will protect resident stygofauna populations. Furthermore, the expected area of drawdown represents only a minor extent of the Cogla Downs calcrete aquifer system (around 15%).

Stygofauna management will form an integral part of the borefield management strategy. A network of monitoring bores will be established for ongoing groundwater and stygofauna monitoring. An annual stygofauna monitoring programme will be undertaken for at least the first five years. This measure will provide information on the stygal communities and assist in management efforts to ensure stygal populations are not adversely affected. Additional monitoring bores will be added to the ongoing stygofauna sampling programme as further investigation of potential groundwater contingency water supply options are undertaken.