

## 8. BIODIVERSITY AND NATURAL AREAS

### 8.1 INTRODUCTION

This section of the Happy Valley ERMP has been prepared to address specifically the following aspects of the proposal:

1. How does the proposal address the principles of the National Strategy for the Conservation of Australia's Biodiversity (1996)?
2. Will the proposal have a significant detrimental impact on a regionally significant natural area?
3. How does the proposal perform against the five Principles of Environmental Protection and the Native Vegetation Clearing Principles contained in the Environmental Protection Act?

The scope and approach of this section is to a large extent based on chapter B1 of the EPA's Guidance No. 33 *Environmental Guidance for Planning and Development* (EPA 2008b).

### 8.2 NATIONAL BIODIVERSITY STRATEGY

Western Australia is a signatory to the National Strategy for the Conservation of Australia's Biological Diversity. Conservation of biological diversity is a foundation stone of ecologically sustainable development. In this regard, one of the objectives of the National Strategy for Ecologically Sustainable Development (ESDSC 1992) is to protect biological diversity at the ecosystem, species and genetic levels and to maintain essential ecological processes and life support systems.

The National State of the Environment Report (1996) describes biodiversity of having two key aspects:

- its functional value at the ecosystem level
- its intrinsic value at the individual species, species assemblages and genetic levels.

The EPA considers the functional values of ecosystems, defined as the roles played by the species assemblages in supporting ecosystem processes, as important to the maintenance of biological (including floristic) diversity. The functional value is "expressed through the kinds of plant and animal assemblages occurring in various parts of the landscape on different soil types" (EPA 2000a).

There are a number of specific targets (criteria) that apply to the EPA objective (and are relevant to the Proposal), derived from State and National biodiversity conservation frameworks:

- no known species of plant or animal is caused to become extinct as a consequence of the development and the risks to threatened species<sup>52</sup> are considered to be acceptable
- no association<sup>53</sup> or community<sup>54</sup> of indigenous plants or animals ceases to exist as a result of the project

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<sup>52</sup> A species that is vulnerable (high risk of extinction), endangered (very high risk of extinction) or presumed extinct (EPA PS2).

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- vegetation removal would not compromise any vegetation type<sup>55</sup> by taking it below the “threshold level” of 30% of the pre-clearing extent of the vegetation type
- there is comprehensive<sup>56</sup>, adequate<sup>57</sup> and secure representation<sup>58</sup> of scarce or endangered habitats within the project area and/or in areas which are biologically comparable to the project area, protected in secure reserves.

A preliminary assessment of how these and other criteria in relation to clearing of native vegetation, as set out in EPA Position Statement No. 2 (EPA 2000a), is shown in Table 8-2.

### 8.3 ASSESSMENT AGAINST CLEARING PRINCIPLES

Schedule 5 of the EP Act states that native vegetation should not be cleared if it is at variance with one or more of ten principles defined in the Schedule. A preliminary assessment of the Proposal against those ten principles is provided below, with the summary listed below in Table 8-1.

#### ***Principle A: Native vegetation should not be cleared if it comprises a high level of biological diversity.***

##### Relevant standards/data sources

- WA Biodiversity Audit (CALM 2003)
- Whicher Scarp Floristic Survey (Keighery et al. 2008)
- Happy Valley vegetation and flora surveys (Bennett 2006, 2007)
- searches for Whicher Scarp vegetation and floristic communities (Ekologica 2008b, 2009)
- Numerical analysis of floristic data from Happy Valley (Griffin 2008).

##### Information summary

Keighery et al (2008) recorded 917 native vascular plant taxa in their 88 quadrats along the Whicher Scarp, with a median species richness of 44 species per plot (10 m by 10 m). Bennett and Brearley (Bennett 2006, 2007) identified 381 vascular plant taxa (including weeds) from the Proposal area and

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<sup>53</sup> The basic unit of vegetation based on the component species, with particular dominants, of a given area. If the vegetation of another area has the same dominants it is the same association (EPA PS2)

<sup>54</sup> A general term applied to any grouping of populations of different organisms [vegetation] found living together in a particular environment [habitat] (EPA PS2).

<sup>55</sup> A level of classification used by Beard (1990) that has a floristically uniform structure and composition, often described by dominant species (EPA PS2, NVIS).

<sup>56</sup> Includes the full range of ecological communities recognized by an agreed scientific classification at appropriate hierarchical levels (EPA PS2).

<sup>57</sup> Sufficient to maintain ecological viability and integrity of populations, species and communities (EPA PS2)

<sup>58</sup> Reasonably reflects the biotic diversity of the ecological communities.

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surrounding control sites (99 quadrats), with a median richness of 40 species per plot. Bennett and Brearley found the vegetation to be in mostly good – excellent condition, although the effects of dieback and heavy logging are endemic. The rapidly changing landform of the Whicher Scarp is responsible for the high species richness ( $\alpha$ -diversity) and rapid species turnover ( $\beta$ -diversity) (Ekologica 2009). Consistent with this, the Proponent has classified the vegetation of the mining tenements into 14 separate site vegetation types.

Fauna diversity was not considered to be high but sites within the study area, such as yellow sands, supported a higher abundance of fauna than other sites and these sites were not restricted to the Proposal area (Bancroft and Bamford 2008). The Proposal has been amended to retain stream-side vegetation and thus maintain a level of habitat connectivity across the site.

In terms of landforms, flora, fauna and communities (EPA 2006c), the Proposal area is certainly no more diverse than other areas of the Whicher Scarp and no values identified to date are restricted to the Proposal area.

### Preliminary assessment

The area is not considered to have a high level faunal diversity but may have a substantial but not an exceptional level of flora diversity. The vegetation communities (complex level) in the Proposal area that may be affected are well represented locally and region but representation of vegetation types at the local level may be significantly affected. Rehabilitation will restore a high level of biological diversity over the longer term in the areas disturbed by mining.

The implementation of the Proposal does not materially compromise the biological diversity at local and regional levels.

***Principle B: Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a significant habitat<sup>59</sup> for fauna indigenous to WA.***

### Relevant standards/data sources

- Carnaby's Black Cockatoo Recovery Plan (Cale 2003)
- significant impact guidelines (DEH 2006a)
- significant Impact Guidelines for WRP (DEWHA 2008b)
- Chuditch Recovery Plan (Orell and Morris 1994)
- ERMP Appendix F4 EPBC Assessment of listed fauna.

### Information summary

The Proposal contains foraging habitat and potential nesting habitat for the conservation significant Black Cockatoos *Calyptorhynchus latirostris* and *C. baudinii*. These habitats are well represented both locally and regionally, with the same plant taxa and structure being well represented in the

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<sup>59</sup> Significant habitat' is defined by the EPA as habitat that provides resources (breeding, resting and feeding), connectivity or habitat area for a species or community that is important for its survival.

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surrounding >10,000 ha Argyle forest block, into which the 155 ha proposed clearing area intrudes. There are no local sub-populations of either taxa and the vegetation is not a specific part of recovery plans.

Other CS taxa include Chuditch *Dasyurus geoffroi* and the Brush-tailed Phascogale *Phascogale tapoatafa*. There are no critical or regionally significant resources within the Proposal area for either of these species. Connectivity between significant or sizeable vegetated areas will not be affected.

Potential Short Range Endemic (SRE) invertebrates have been located in areas surrounding the Happy Valley Proposal, mainly close to watercourses. Such zones have been excluded from mining, with disturbances limited to temporary crossings for internal traffic and infrastructure.

### Preliminary assessment

The native vegetation of the Proposal area is not significant habitat for indigenous fauna, as its values and functions are widely available in the area, including the surrounding Argyle forest block. The riparian environments, which may be locally restricted and provide habitat for SRE invertebrates, have been excluded from mining. Accordingly, the Proposal is not considered to be at variance with this principle.

**Principle C: Native vegetation should not be cleared if it includes, or is necessary for, the continued existence of, rare flora.**

### Relevant standards/data sources

- *Wildlife Conservation (Rare Flora) Notice 2008(2)*
- Happy Valley vegetation and flora surveys (ESM 1999, Bennett 2004, Bennett 2006, 2007)
- Application to change status of *Daviesia elongata* subsp. *elongata* (Bennett 2007, for Bemax Resources Limited).

### Information summary

One species of rare flora *Daviesia elongata* subsp. *elongata* was identified in the Proposal area. The taxa is known to be a colonising species and is thought to be associated with disturbances such as controlled burns (occurred in 1997) and exploration/survey activities. Significantly larger populations of this pioneer plant species has been identified in areas outside of the Proposal, including within existing and proposed conservation areas.

### Preliminary assessment

The clearing associated with the Proposal will not threaten the viability of *Daviesia elongata* subsp. *elongata* and therefore is not necessary for the continued existence of this species. Subsequent rehabilitation of disturbed areas provides the opportunity to enhance its abundance in the locality. The Proposal will not significantly affect the sub-population of the north Whicher Scarp and there is a high level of confidence in rehabilitation success.

Accordingly, the Proposal is not considered to be at variance with this principle.

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**Principle D: Native vegetation should not be cleared if it comprises the whole, or a part of, or is necessary for the maintenance of a threatened ecological community.**

### Relevant standards/data sources

- EPBC Act Protected Matters search tool
- List of Threatened Ecological Communities (WA Govt, DEC 2006)
- Happy Valley vegetation and flora surveys (ESM 1999, Bennett 2004, Bennett 2006, 2007)
- Whicher Scarp Floristic Survey (Keighery et al. 2008).

### Information summary

There are no Threatened Ecological Communities (TEC) or their habitats within or reasonably close to the proposal area. The proposal area includes vegetation that contains floristic characteristics similar to the DEC priority ecological communities 1a and C2 however, relatively extensive areas of vegetation with the same characteristics have been identified on other locations on the Whicher Scarp by the Proponent.

### Preliminary assessment

The Proposal is not at variance with this principle.

**Principle E. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.**

### Relevant standards/data sources

- Whicher Scarp Floristic Survey (Keighery et al. 2008)
- vegetation extent by type dataset (DAFWA-002).

### Information summary

Using the classification of the Regional Forest Agreement (JANIS 1997), the proposal will impact on the vegetation of the Jarrah Blackwood Plateau forest ecosystem by less than 0.1%, with 81% of the pre-European extent remaining.

Using the classification of Beeston, Hopkins and Shepherd (2002), the proposal will affect 0.3% of the Medium open woodland: jarrah and marri, with low woodland: banksia vegetation (Type 1017), with 64.4% of the pre-European extent remaining; and 0.2% of the Medium woodland, jarrah and *Eucalyptus haematoxylon* vegetation (Type 1181), with 46.0% remaining.

Using the classification of Mattiske and Havel (1998), the proposal will affect 5% of Whicher Scarp Valleys (WCv) Complex, leaving 50% of the pre-European extent remaining; 3% of Whicher Scarp uplands (WC) Complex, leaving 72% remaining; and less than 0.05% of Rosa Complex, with 79% remaining in a vegetated state. Note that the WCv Complex is poorly reserved and the conservation offsets offered as part of the proposal include the opportunity to double the area reserved and exceed the reservation target for this Complex.

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The vegetation proposed to be cleared is part of or contiguous with the Argyle Forest Block, which is over 10,000 ha in area, and is itself part of the >16,000 ha Boyanup State Forest. In the context of the Whicher Scarp, the landform is still approximately 46% vegetated (9,200 ha), including several existing and proposed conservation reserves such as the proposed Whicher Conservation Park. Approximately 50% is Crown land with 12% in informal reserves under the Forest Management Plan (CCWA 2004).

### Preliminary assessment

The Proposal is not at variance with this principle.

***Principle F: Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland.***

### Relevant standards/data sources

- Happy Valley Dewatering Assessment (PB 2008b)
- DEC Geomorphic Wetlands Database
- EPP Wetlands database, EPA Position Statement on Wetlands (EPA 2004b).

### Information summary

There are no wetlands within the proposal area. Paluslope wetlands and damplands do exist approx 2 km from the proposal, at the base of the Whicher Scarp. A hydrogeological investigation has been undertaken by Parsons Brinkerhoff and the absence of a significant watertable within the depth of excavation has been confirmed. Accordingly, impacts to wetlands are not a realistic hazard.

### Preliminary assessment

The Proposal is not at variance with this principle.

***Principle G: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.***

### Relevant standards/data sources

- Happy Valley Acid Sulphate Soils Assessment (PB 2008a)
- WRC Guidelines for Mining Operations (2000).

### Information summary

The negligible risks associated with disturbance of acid sulphate soils has been determined by PB in 2008. This assessment, coupled with the absence of a significant or permanent water table within the depth of mining, leaves only the management of potentially hazardous chemicals, such as diesel fuel, as the only hazard to groundwater quality.

Three ephemeral and very minor streams cross or originate within the proposal area and may be at risk from sedimentation, although none have downstream environments (all directly recharge groundwater). The watercourses will be protected by retaining a 30 – 50 m vegetated buffer and by ensuring all contaminated flows are diverted into the mine water circuit.

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### Preliminary assessment

The Proposal is not at variance with this principle.

***Principle H: Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation areas.***

### Relevant standards/data sources

- DLI Cadastral and 50 cm orthomosaic 2006 aerial photographs
- Current and proposed conservation reserves (CCWA 2002).

### Information summary

The nearest conservation area is the Gwindinup reserve, which is not directly connected by vegetation or other shared landform features to the proposal area. The Proposal includes off-site mitigation measures such as the control of feral foxes that will benefit the Reserve.

### Preliminary assessment

The Proposal is not at variance with this principle.

***Principle I: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.***

### Relevant standards/data sources

- Happy Valley Dewatering Assessment (PB 2008b)
- Happy Valley Acid Sulfate Soils Investigation (PB 2008a).

### Information summary

The original Proposal as referred to EPA has been amended to retain a buffer from mining and stockpiles around each creekline and to enhance the existing vegetation within the buffers. These buffers will ensure that there will be no deterioration in the water quality of streams.

There is no significant or permanent watertable within 20+ meters of the ground surface, so vegetation clearing is not expected to result in groundwater rise and certainly not to the extent of causing waterlogging. The risk of disturbing acid sulfate soils has been shown to be low.

### Preliminary assessment

The Proposal is not at variance with this principle.

***Principle J: Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.***

### Relevant standards/data sources

- ERMP Section 7 (Water Resources)

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- Bemax Rehabilitation Review (URS 2008).

## Information summary

Clearing will be conducted across six sub-catchments. Catchment modelling has been unsuccessful due to the episodic flows in the watercourses and the deep sandy soils. Regardless, any stormwater from the disturbed area will be harvested for use in the mine water circuit. The Proponent has successfully rehabilitated similar catchments, although in this instance the streams themselves will not be significantly impacted (crossings only, no mining).

## Preliminary assessment

The Proposal is not at variance with this principle.

**Table 8-1 Summary of preliminary assessment against vegetation clearing principles**

Principle	Assessment outcome
Does the vegetation comprise a high level of biological diversity?	The Proposal is not at variance with this principle
Does the vegetation comprise the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia?	The Proposal is not at variance with this principle
Does the vegetation include, or is necessary for the continued existence of, rare flora?	The Proposal is not at variance with this principle
Does the vegetation comprise the whole or a part of, or is necessary for the maintenance of, a threatened ecological community?	The Proposal is not at variance with this principle
Is the vegetation significant as a remnant of native vegetation in an area that has been extensively cleared?	The Proposal is not at variance with this principle
Is the vegetation growing in, or in association with, an environment associated with a watercourse or wetland?	The Proposal is not at variance with this principle
Will clearing of the vegetation is likely to cause appreciable land degradation?	The Proposal is not at variance with this principle
Is clearing of the vegetation likely to have an impact of the environmental values of any adjacent or nearby conservation area?	The Proposal is not at variance with this principle
Is clearing of the vegetation likely to cause deterioration in the quality of surface or underground water?	The Proposal is not at variance with this principle
Is the clearing of the vegetation likely to cause, or exacerbate, the incidence or intensity of flooding?	The Proposal is not at variance with this principle

## **8.4 POTENTIAL IMPACTS TO SIGNIFICANT NATURAL AREAS**

A 'regionally significant natural area' is defined by the EPA as a component of remnant native vegetation, rock outcrop or water body that collectively aims to form a comprehensive, adequate and representative system of conservation areas. In order to establish whether an area falls into this category it needs to be part of the existing or proposed conservation system or to meet (in part or whole) a range of agreed criteria (EPA 2006c). Significant natural areas are considered by the EPA to require a high level of protection.

## 8.4.1 Regional significance of the Whicher Scarp

Keighery et al. (2008) determined that, when the remaining naturally vegetated areas of the Whicher Scarp are considered together, that area meets the six criteria for regionally significant areas. Consequently, the report recommended that the entire remaining extent of the Whicher Scarp should be retained.

### ***Significance of proposed impacts***

The EPA is unlikely to recommend the approval of proposals that have significant adverse impacts on areas that are regionally significant (EPA 2008b). Table 8-3 provides the results of an assessment whether the Happy Valley Proposal will significantly affect the capacity of the remaining natural areas of the Whicher Scarp to meet the six EPA criteria for regional significance. The assessment is a summary of Appendix B1 and lists the regionally significant conservation values of the Proposal area as identified in the ERMP and identifies if they are critically restricted to, or reliant on, the Proposal area.

## 8.5 ASSESSMENT AGAINST BIODIVERSITY CONSERVATION PRINCIPLES

The principles of biodiversity conservation, as adapted for use by the EPA in Western Australia from the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996), are listed and addressed in Table 8-4.

## 8.6 ASSESSMENT AGAINST ENVIRONMENTAL PRINCIPLES

The principles of environmental protection, as set out in section 4A of the Environmental Protection Act and expanded upon in EPA Position Statement No. 7 (EPA 2004b), are listed and addressed in Table 8-5.

## 8.7 PREDICTED ENVIRONMENTAL OUTCOME

The Proponent has demonstrated in the ERMP and summarised in this section, that the Proposal:

- will be consistent with the EPA position on clearing (EPA 2000a)
- will not be at variance with the vegetation clearing principles of Schedule V of the Environmental Protection Act
- will not have a significant detrimental impact on the regionally significant natural values of the Whicher Scarp
- will be consistent with the national principles of biodiversity conservation (Commonwealth of Australia 1996)
- will be consistent with those environmental protection principles that are relevant to the Proposal (EPA 2004b and 2007b).

### 8.7.1 Potential residual impacts

Following assessment of the Proposal against the environmental principles, the Proponent predicts that the following aspects of the Proposal might not be consistent with those principles:

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- the Proposal will affect the Whicher Valleys (WCv) vegetation complex, which is not adequately reserved.

The significance of this residual impact and measures proposed for its off-setting are discussed in Section 11 of the ERMP.

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**Table 8-2 Preliminary assessment against EPA clearing considerations (EPA 2000b)**

Element	Preliminary assessment
A comparison of development scenarios, or options, to evaluate protection of biodiversity at the species and ecosystem levels, and demonstration that all reasonable steps have been taken to avoid disturbing native vegetation.	The Proponent has sought options to clearing native vegetation, including the purchase of additional freehold land and efforts continue to purchase additional titles. Clearing in the State Forest is restricted to mine pits, access ways, topsoil stockpiles, safety buffers and acoustic bunds.
No known species of plant or animal is caused to become extinct as a consequence of the development and the risks to threatened species are considered to be acceptable.	The Proponent has rigorously demonstrated that the Proposal will not cause any species to become extinct and that the risks to current threatened species can be managed and are not significant.
No association or community of indigenous plants or animals ceases to exist as a result of the project.	The Proponent has rigorously demonstrated that the Proposal will not critically or significantly impact on any association/community, including restricted creekline habitats.
There would be an expectation that a proposal would demonstrate that the vegetation removal would not compromise any vegetation type by taking it below the "threshold level" of 30% of the pre-clearing extent of the vegetation type.	The Proponent has rigorously demonstrated that the Proposal will not take any vegetation type (at regional and local scales and using a variety of classifications) below the 30% threshold level.
Where a proposal would result in a reduction below the 30% level, the EPA would expect alternative mechanisms to be put forward to address the protection of biodiversity.	Not applicable.
There is comprehensive, adequate and secure representation of scarce or endangered habitats within the project area and/or in areas which are biologically comparable to the project area, protected in secure reserves.	There are biologically comparable examples of the restricted habitats within the Proposal area elsewhere along the Whicher Scarp, some within Nature Reserves and others within State Forest. The Proponent has identified that the conservation target for Whicher Valley vegetation complex has not been met in the existing reserves system (addressed through offsets).
If the project area is large (and what is meant by large will vary depending on where in the State) the project area itself should include a comprehensive and adequate network of conservation areas and linking corridors whose integrity and biodiversity is secure and protected.	The Proposal will retain the three major creeklines that run across the site and implement measures to enhance the functionality of these areas as fauna habitat/corridors. The Proposal also contains measures to reduce the pressures on the overall fauna habitat of the area, including nest boxes, and baiting of feral animals.
The on-site and off-site impacts of the project are identified and the proponent demonstrates that these impacts can be managed.	The Proponent has rigorously identified, assessed and planned how it can manage the potential environmental impacts associated with the proposal. All residual risks have also been identified and will be addressed through appropriate offsets (section 9).

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**Table 8-3 Assessment of the significance of the Proposal against the criteria of EPA (2006c)**

Criterion	Conservation objective	The Proposal
Representation of ecological communities	A number of areas selected to represent the range of ecological communities and the places in which these communities merge	<ul style="list-style-type: none"> <li>- will not take any vegetation complex below the 30% threshold</li> <li>- does not represent the only location where vegetation communities of the Whicher Scarp, Blackwood Plateau and Swan Coastal Plain are relatively continuous</li> <li>- does not significantly impact on the Priority ecological communities 1a, 21b or C2</li> <li>- does not contain habitat critical the survival of fauna species, but does contain areas of high abundance (near-permanent water and yellow sands), examples which are available elsewhere</li> <li>- contains vegetation that is approximately 50% infested with dieback and has been affected by logging</li> <li>- does not contain and will not affect any wetlands .</li> </ul>
Diversity	Areas with a high diversity of flora and/or fauna species or communities in close association	<ul style="list-style-type: none"> <li>- is located in an area (study area) that has four landform-soil units, five vegetation complexes, four to five floristic community types, 14 site vegetation types and supports 381 plant taxa and 104 vertebrate fauna taxa, however, the study area has been shown to be not unique in this regard, as other areas of the Whicher Scarp contain similar diversity</li> <li>- contains vegetation that is approximately 50% infested with dieback and has been affected by logging.</li> </ul>
Rarity	Areas containing rare or threatened communities or species, or species of restricted distribution	<ul style="list-style-type: none"> <li>- will affect one DRF and three-four priority flora, for which rehabilitation criteria are established</li> <li>- will affect three plant taxa at their range end, including the DRF</li> <li>- is part of a larger habitat area that supports eight fauna species of conservation significance.</li> </ul>
Maintaining ecological processes or natural systems	Maintenance of ecological processes or natural systems at a regional or national scale	<ul style="list-style-type: none"> <li>- is a small part of the Argyle forest block (&gt;10,000 ha)</li> <li>- contains vegetation that is approximately 50% infested with dieback and has been affected by logging</li> <li>- contains habitat for eight fauna species of conservation species, but it has been demonstrated that these habitats are not restricted to the Proposal area</li> <li>- does not contain significant habitat for migratory birds</li> <li>- will effectively isolate or reduce connectivity to remnant vegetation, until rehabilitation is sufficiently progressed.</li> </ul>
Scientific or evolutionary importance	Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work	<ul style="list-style-type: none"> <li>- contains two regional floristic monitoring sites (as reported in Keighery at al. 2008)</li> <li>- contains a number of relictual plant taxa, but these are not restricted to Proposal area</li> <li>- includes buffers to creeklines that may support relictual plant and fauna taxa, including SRE</li> <li>- does not contain any specific geomorphological sites or features</li> <li>- does not significantly impact on any landforms, soils and landform units that are not present elsewhere.</li> </ul>
General criteria for protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation	Conservation category wetland areas including fringing vegetation and associated upland vegetation; Coastal vegetation within the accepted coastal management zone	<ul style="list-style-type: none"> <li>- does not contain any wetlands, but does support taxa associated with wetlands (damp sand taxa), examples of which have been recorded in multiple locations outside of Proposal area</li> <li>- excludes creek buffers from mining</li> <li>- is not in or near a coastal management zone.</li> </ul>

**Table 8-4 Preliminary assessment against Principles of biodiversity conservation**

Principle	Preliminary assessment
Biological diversity is best conserved in-situ	The first principle of biodiversity conservation has been addressed by careful mine planning to ensure the necessary minimum of clearing of native vegetation is proposed. This includes the purchase of private farmland for placement of infrastructure and the establishment of environmental buffers for the creeklines that cross the Proposal area.
Although all levels of government have clear responsibility, the cooperation of conservation groups, resource users, indigenous peoples, and the community in general is critical to the conservation of biological diversity	The Proponent has consulted and interacted with stakeholders to the Proposal, including neighbours, representatives of government agencies, local conservation groups and indigenous peoples.
It is vital to anticipate, prevent and attack at source the causes of significant reduction or loss of biological diversity	The Proponent has prepared a comprehensive environmental impact assessment, including the peer review of important ecological aspects of the Proposal. All reasonably potential environmental impacts have been identified, studied and presented in the ERMP, in a conservative fashion. The Proponent's commitments for management measures and outcomes to address these potential impacts are also presented. These measures, where appropriate, represent best practice and, in some cases, even go beyond best practice. Previous performance of the Proponent is presented and, in the case of rehabilitation, externally reviewed.
Processes for and decisions about the allocation and use of Western Australia's resources should be efficient, equitable and transparent	
Lack of full knowledge should not be an excuse for postponing action to conserve biological diversity	
The conservation of Western Australia's biological diversity is affected by national and international activities and requires actions extending beyond Western Australia's jurisdiction	Not relevant to the Proposal.
Western Australians operating beyond their State's jurisdiction should respect the principles of conservation and ecologically sustainable use of biological diversity and act in accordance with any relevant national or international laws	
Central to the conservation of Western Australia's biological diversity is the establishment of a comprehensive, representative and adequate system of ecologically viable protected areas, integrated with the sympathetic management of all other areas, including agricultural and other resource production systems	The Proponent has demonstrated that the Proposal will not compromise the State's objectives in regards to establishing a comprehensive, representative and adequate system of ecologically viable protected areas. Furthermore, the Proponent has described how it intends to restore the productivity of both the natural and agricultural areas of the Proposal.
The close, traditional association of Western Australia's indigenous peoples with components of biological diversity should be recognised, as should the desirability of sharing equitably the benefits arising from the innovative use of traditional knowledge of biological diversity	The Proponent has a Native Title agreement with the indigenous claimants and works cooperatively with them in many regards.

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**Table 8-5 Preliminary assessment against Principles of environmental protection (from EPA 2007b and 2004b)**

Principle	Guidance	Preliminary assessment
The precautionary principle	Decisions should be guided by careful evaluation to avoid, where practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options.	<p>The Proposal has been iteratively reviewed to minimise the clearing of native vegetation, particularly in State Forest areas. Additional measures that will be taken to ensure damage to the environment is avoided where possible and is not otherwise irreversible include: creek buffers; retention of topsoils and subsoils (to the depth of 0.7 m in some areas); collection of propagative material pre-disturbance; minimum targets for the direct and seasonal return of topsoil; prescriptive soil profile reconstruction; dieback and weed management programs; rehabilitation performance criteria; etc.</p> <p>Rehabilitation will to a substantial extent reverse damage done by the mining. In addition, proposed offsets may result in positive benefits to threatened mammal and bird species over the longer term.</p>
The principle of intergenerational equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (stewardship).	<p>The Proposal has been designed to only disturb the absolute minimum to economically recover the maximum amount of ore. A final landscape plan has been prepared and the level of rehabilitation commitment is very significant and goes beyond best practice targets, with the aim of restoring vegetation communities that closely resemble those of pre-mining and are capable of being sustained with 'normal' inputs.</p> <p>Rehabilitation will reduce any future biodiversity legacy and offsets will more than compensate from any diminution in short abundance of threatened fauna at risk from the implementation of the proposal.</p>
The principle of the conservation of biological diversity and ecological integrity	<p>Biological diversity is considered at three levels: genetic, species and ecosystem diversities.</p> <p>The EPA uses and adapted version of the Australian biological diversity conservation principles.</p>	Refer to Table 8-4.
Principles relating to improved valuation, pricing and incentive mechanisms	<p>Environmental factors should be included in the valuation of assets, goods and services.</p> <p>The polluter pays.</p>	The cost of environmental management, rehabilitation and decommissioning (and offsets) has been factored into the economic model for the mine, however, prices are set in the international market.
The principle of waste minimisation	Wastes should be managed in accordance with the waste management hierarchy: reduction, recycling, disposal.	The Proposal will not produce significant amounts of waste, however, the Proponent has committed to waste minimisation through its Environmental Policy.