



1. Application details

1.1. Permit application details

Permit application No.: 2295/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: Mineral Lease 281SA (AML70/281) Iron Ore (Mount Goldsworthy) Agreement Act 1964
Local Government Area: Shire Of East Pilbara
Colloquial name: South Flank

1.4. Application

| Clearing Area (ha) | No. Trees | Method of Clearing | For the purpose of: |
|--------------------|-----------|--------------------|---------------------|
| 305 | | Mechanical Removal | Mineral Exploration |

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description Beard vegetation associations have been mapped at 1:250,000 scale for the whole of WA, and are a useful tool to examine the vegetation extent in a regional context. Two Beard vegetation associations are located within the area proposed to be cleared (GIS Database, 2007). These vegetation associations are:

Beard Vegetation Association 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*; and

Beard Vegetation Association 18: Low woodland; mulga (*Acacia aneura*).

A flora survey of the application area was conducted by ENV Australia from 16-23 November 2007 and 5-11 December 2007. The vegetation assessment identified 29 vegetation communities within the application area (ENV Australia, 2008a). These are:

Hill Slopes C Burnt

Corymbia hamersleyana, *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Grevillea wickhamii*, *Petalostylis labicheoides* scattered tall shrub over *Acacia maitlandii* shrubland over *Gompholobium karjini*, *Halgania gustafsenii* var. Mid West, *Acacia adoxa* var. *adoxo* low open shrubland over *Triodia wiseana*, *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) open hummock grassland.

Hill Slopes D

Eucalyptus leucophloia subsp. *leucophloia*, *Acacia aneura* var. *pilbarana*, *Corymbia deserticola* low open woodland over *Codonocarpus cotinifolius*, *Acacia marramamba*, *Acacia arida* open shrubland over *Eremophila jucunda* subsp. *pulcherrima*, *Corchorus lasiocarpus* low open shrubland over *Triodia wiseana* very open hummock grassland.

Hill Slopes E Burnt

Eucalyptus leucophloia subsp. *leucophloia* low open woodland over *Eucalyptus leucophloia* subsp. *leucophloia*, *Corchorus lasiocarpus*, *Senna notabilis*, *Senna glutinosa* subsp. *glutinosa* low shrubland over *Triodia wiseana* very open hummock grassland.

Hill Slopes F Unburnt

Eucalyptus leucophloia subsp. *leucophloia* low open woodland over *Acacia hamersleyensis*, *Acacia atkinsiana*, *Acacia adsurgens*, *Acacia marramamba* shrubland over *Corchorus lasiocarpus* low open shrubland over *Triodia wiseana* hummock grassland.

Hill Slopes G Burnt

Corymbia hamersleyana, *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Hakea chordophylla*, *Acacia inaequilatera* scattered tall shrubs over *Gompholobium karjini*, *Indigofera monophylla*, *Goodenia stobbsiana* low open shrubland over *Triodia wiseana*, *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) open hummock grassland.

Hill Slopes H Burnt

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia hamersleyana* low open woodland over *Acacia pruinocarpa* high open shrubland over *Sida* sp. *spiciform panicles* (E. Leyland s.n. 14/8/90), *Corchorus lasiocarpus*, *Eremophila latrobei* subsp. *filiformis*, *Sida pilbarensis* (ferruginous form) open shrubland over *Triodia wiseana*, *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) hummock grassland.

Undulating Low Hills A

Corymbia hamersleyana scattered low trees over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) hummock grassland over *Aristida holathera* var. *holathera* scattered grassland.

Undulating Low Hills B

Eucalyptus leucophloia subsp. *leucophloia* and *Acacia aneura* var. *pilbarana* low open woodland over *Codonocarpus cotinifolius* and *Acacia marramamba* open shrubland over *Eremophila jucunda* subsp. *pulcherrima* low open shrubland over *Triodia pungens* open hummock grassland.

Valley Plains A Unburnt

Corymbia hamersleyana, *Corymbia deserticola* low open woodland over *Eucalyptus trivalvis*, *Eucalyptus gamophylla* open mallee over *Acacia dictyophleba*, *Acacia bivenosa*, *Acacia tenuissima* shrubland over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835), *Triodia pungens* open hummock grassland over *Eulalia aurea*, *Themeda triandra* and *Paraneurachne muelleri* open tussock grassland.

Valley Plains B

Acacia aneura var. *pilbarana*, *Corymbia hamersleyana*, *Corymbia deserticola* subsp. *deserticola* scattered low trees over *Acacia aneura* var. *pilbarana*, *Codonocarpus cotinifolius* open shrubland over *Eremophila forrestii* subsp. *forrestii* low open shrubland over *Triodia melvillei* open hummock grassland.

Drainage Line A

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia hamersleyana* low woodland over *Acacia monticola*, *Grevillea wickhamii*, *Gossypium robinsonii*, *Petalostylis labicheoides*, *Acacia tumida*, *Dodonaea petiolaris* open shrubland over *Triodia pungens* hummock grassland over *Themeda triandra* tussock grassland.

Drainage Line B

Corymbia hamersleyana, *Eucalyptus xerothermica*, *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Atalaya hemiglauca*, *Acacia hamersleyensis*, *Petalostylis labicheoides*, *Acacia monticola*, *Gossypium robinsonii* shrubland over *Acacia bivenosa*, *Acacia pyrifolia*, *Indigofera monophylla* low open shrubland over *Triodia wiseana*, *Triodia pungens* hummock grassland over *Themeda triandra* open grassland.

Floodplain A

Eucalyptus xerothermica, *Acacia aneura* var. *aneura* low open woodland over *Eremophila longifolia*, *Acacia pachyacra*, *Acacia pruinocarpa*, *Acacia aneura* var. *aneura* high open shrubland over *Themeda triandra*, *Aristida inaequiglumis*, *Enneapogon polyphyllus*, *Digitaria brownii* tussock grassland over *Triodia melvillei* open hummock grassland.

Floodplain B

Eucalyptus victrix scatter low trees over *Acacia aneura* var. *pilbarana* low woodland over *Aristida contorta* and *Eriachne flaccida* open tussock grassland over *Centipeda minima* and *Alternanthera angustifolia* very open herbland.

Floodplain C

Eucalyptus xerothermica, *Corymbia hamersleyana*, *Acacia aneura* var. *pilbarana*, *Corymbia deserticola* subsp. *deserticola*, *Acacia catenulata* subsp. *occidentalis* low open woodland over *Eucalyptus gamophylla* low open mallee over *Acacia pachyacra*, *Acacia bivenosa*, *Acacia dictyophleba*, *Eremophila longifolia* open shrubland over *Pterocaulon sphaeranthoides*, *Sida fibulifera*, *Abutilon otocarpum* low open shrubland over *Themeda triandra*, *Enneapogon polyphyllus*, *Paraneurachne muelleri*, *Eulalia aurea*, *Aristida holathera* var. *holathera* tussock grassland.

Footslopes A

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia hamersleyana*, *Corymbia deserticola* subsp. *deserticola* low open woodland over *Eucalyptus gamophylla*, *Hakea chordophylla* scattered tall shrubs over *Acacia pruinocarpa*, *Acacia tenuissima*, *Acacia pachyacra*, *Grevillea wickhamii*, *Acacia dictyophleba*, *Acacia bivenosa*, *Acacia stowardii* open shrubland over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) hummock grassland.

Footslopes B

Acacia aneura var. *pilbarana*, *Acacia pruinocarpa*, *Eucalyptus gamophylla* low woodland over *Acacia aneura* var. *pilbarana*, *Acacia pruinocarpa*, *Petalostylis labicheoides*, *Acacia pachyacra* open shrubland over *Triodia pungens* hummock grassland over *Themeda triandra* open tussock grassland.

Footslopes C Lower

Acacia aneura var. *pilbarana*, *Acacia pruinocarpa* low woodland over *Acacia dictyophleba*, *Acacia bivenosa*, *Rulingia luteiflora* open shrubland over *Triodia wiseana* open hummock grassland.

Footslopes D Burnt

Eucalyptus trivalvis, *Eucalyptus gamophylla* low mallee over *Codonocarpus cotinifolius*, *Acacia* aff. *adsurgens* (2), *Acacia validinervis* open shrubland over *Sida cardiophylla* and *Indigofera monophylla* scattered low shrubs over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835), *Triodia pungens* open hummock grassland over *Themeda triandra* very open tussock grassland.

Footslopes E East

Corymbia hamersleyana, *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia deserticola* subsp. *deserticola* low open woodland over *Hakea chordophylla*, *Acacia inaequilatera* scattered tall shrubland over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835), *Triodia wiseana* hummock grassland.

Footslopes F (Plateau)

Corymbia deserticola subsp. *deserticola*, *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* low open woodland over scattered *Eucalyptus gamophylla* low mallee over scattered *Hakea chordophylla* shrubs over *Acacia bivenosa*, *Scaevola parvifolia*, *Gompholobium karjini* and *Indigofera monophylla* low open shrublands over *Goodenia stobbsiana* and *Ptilotus calostachyus* very open herbland over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835) open hummock grassland.

Gorges A

Corymbia hamersleyana, *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia ferritcola*, *Acacia aneura* var. *pilbarana*, *Acacia citrinoviridis* open woodland over *Dodonaea pachyneura*, *Capparis mitchellii*, *Dodonaea pachyneura* high open shrubland over *Sida excedentifolia*, *Sida* sp. *Shovelanna Hill* (S. van Leeuwen 3842), *Eremophila jucunda* subsp. *pulcherrima* low open shrubland over *Themeda triandra*, *Eriachne mucronata*, *Cymbopogon ambiguus* tussock grassland over *Triodia pungens* open hummock grassland.

Gorges B

Callitris columellaris, *Acacia aneura* var. *aneura*, *Acacia ayersiana*, *Acacia pruinocarpa*, *Corymbia ferritcola* low open forest over *Capparis mitchellii*, *Petalostylis labicheoides*, *Dodonaea pachyneura* high open shrubland over *Dodonaea petiolaris*, *Dodonaea pachyneura*, *Eremophila jucunda* subsp. *pulcherrima* open shrubland over *Eremophila jucunda* subsp. *pulcherrima* low open shrubland over *Themeda triandra*, *Eriachne mucronata*, *Aristida burbidgeae*, *Cymbopogon ambiguus* open tussock grassland over *Cheilanthes sieberi* very open ferns over *Triodia pungens* very open hummock grassland.

Hill Crest A Burnt (Low Undulating)

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia deserticola* subsp. *deserticola*, *Hakea chordophylla*, *Eucalyptus kingsmillii* low open woodland over *Sida cardiophylla*, *Goodenia stobbsiana*, *Indigofera monophylla* low scattered shrubs over *Triodia wiseana* open hummock grassland.

Hill Crest B Unburnt (Low Undulating)

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia hamersleyana* low open woodland over *Eucalyptus kingsmillii* scattered low mallee over *Acacia hamersleyensis*, *Acacia maitlandii* shrubland over *Triodia wiseana* hummock grassland.

Hill Crest C East Unburnt

Eucalyptus kingsmillii low woodland over scattered *Eucalyptus gamophylla*, *Acacia hamersleyensis* and *Eucalyptus leucophloia* subsp. *leucophloia* low trees over *Acacia hilliana* low shrubland over scattered *Petalostylis labicheoides* shrubs over *Triodia wiseana* hummock.

Hill Crest D

Eucalyptus leucophloia subsp. *leucophloia* scattered trees over *Eucalyptus gamophylla* and *Eucalyptus kingsmillii* low open mallee over *Hakea chordophylla* high open shrubland over *Acacia hamersleyensis* and *Acacia* aff. *adsurgens* (2) open shrubland over *Mirbelia viminalis* low open shrubland over *Triodia* sp. *Shovelanna Hill* (S. van Leeuwen 3835), *Triodia wiseana* hummock grassland.

Hill Slope A (Middle)

Eucalyptus leucophloia subsp. *leucophloia* and *Corymbia hamersleyana* low open woodland over *Acacia maitlandii*, *Grevillea wickhamii* and *Acacia monticola* high open shrubland over *Acacia maitlandii* and *Acacia monticola* open shrubland over *Triodia wiseana* and *Triodia pungens* hummock grassland.

Hill Slopes B

Eucalyptus leucophloia subsp. *leucophloia*, *Corymbia hamersleyana* low woodland over *Petalostylis labicheoides*, *Acacia pyrifolia* high open shrubland over *Acacia pyrifolia*, *Acacia maitlandii* scattered shrubland over *Acacia adoxa*, *Acacia hilliana* scattered low shrubs over *Triodia wiseana* hummock grassland.

Clearing Description

BHP Billiton Iron Ore Pty Ltd (hereafter referred to as BHP Billiton) have applied to clear 305 hectares within a 7,610 hectare purpose permit boundary for the Area C South Flank drilling program (BHP Billiton, 2008b). Clearing is required for an extensive drilling program in which both RC Drilling and Diamond Drilling methods will be used to drill up to 5000 drill holes. The proposed drill pads will be approximately 20 metres wide and 20 metres long, while associated tracks will be no wider than 4 metres wide (BHP Billiton, 2008b).

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| Vegetation Condition | The area applied to clear is located approximately 130 kilometres north-west of Newman in the Pilbara region of Western Australia (ENV Australia, 2008b). Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery 1994) |
| | To |
| | Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery 1994) |
| Comment | Vegetation within the application area was described as 'Very Good' to 'Excellent', with most of the survey sites rated as 'Very Good'. The main disturbances within the application area were associated with past drill pads and tracks and damage by fire (ENV Australia, 2008a). There were three introduced flora species located within the application area: <i>Cenchrus ciliaris</i> (Buffel Grass), <i>Setaria verticillata</i> (Whorled Pigeon Grass) and <i>Bidens bipinnata</i> (Bipinnate Beggartick) (ENV Australia, 2008a). |

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

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| Comments | <p>Proposal is at variance to this Principle</p> <p>The application area is located within the Hamersley Interim Biogeographic Regionalisation of Australia (IBRA) subregion of the Pilbara region (GIS Database). The subregion is generally described as a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges which pan out to surrounding plains (Kendrick, 2001). The vegetation of the subregion is generally described as mulga low woodland, over bunch grasses on fine textured soils in valley floors, and <i>Eucalyptus leucophloia</i> over <i>Triodia brizoides</i> on skeletal soils of the ranges (Kendrick, 2001).</p> <p>Known features of the region with special value include the gorges and waterfalls of Hamersley Range, particularly those of Karijini National Park, spectacular exposures of Banded Iron Formations, the Themed Grasslands of the Pilbara region and the Red Hill Station mulga stands (Kendrick, 2001). Grazing activities are the major land use within the region, while native pastures and mining also make up a considerable portion (Kendrick, 2001). The north-eastern part of the application area is located within the Juna Downs pastoral station (GIS Database).</p> <p>A targeted flora survey was conducted in November 2007 by ENV Australia. During the survey a total of 328 taxa were recorded in the application area (ENV Australia, 2008a). These taxa consisted of 53 families, the most represented being Poaceae (with 45 taxa recorded), Mimosaceae (35) and Malvaceae (28). Acacia was the most represented genus with 35 taxa, followed by Senna (14) and Sida (13) (ENV Australia, 2008a). ENV Australia (2008a) have stated that there was a high number of taxa compared to other surveys of the region, which have an average of 240 taxa recorded. However, this is likely to be attributable to the size and diversity of habitats in the application area, as well as increased survey effort.</p> <p>There were no Declared Rare Flora (DRF) identified within the application area (ENV Australia, 2008a), although, there were four Priority flora species recorded: <i>Spartothamnella puberula</i>, <i>Sida</i> sp. <i>Barlee Range</i> (S van Leeuwen 1642), <i>Triumfetta leptacantha</i> and <i>Eremophila magnifica</i> subsp. <i>magnifica</i>. Of these species, only <i>Eremophila magnifica</i> subsp. <i>magnifica</i> was found in proposed drill pads where vegetation will be required to be cleared (ENV Australia 2008a). However, BHP Billiton (2008a) have committed to avoid clearing within all areas where these species were identified. Additionally, BHP Billiton (2008a) have stated they will avoid all gorges and gullies within the application area, thereby avoiding the other three Priority flora species which were restricted to these habitats. BHP Billiton have committed to undertake targeted flora surveys to ensure all Priority flora species are flagged and avoided (BHP Billiton, 2008a). Should a clearing permit be granted, it is recommended that a condition be imposed for the purposes of Priority flora management</p> <p>ENV Australia (2008a) advise that the majority of the sites sampled had a vegetation condition of 'Very Good' to 'Excellent', with most rated as Very Good. The main forms of disturbance within the application area were associated with past drill pads and vehicle tracks. Many of the survey sites had recently been damaged by fire, evident by the large amount of coloniser species sighted such as the post fire-coloniser <i>Goodenia stobbsiana</i> (ENV Australia, 2008a). It is acknowledged that the species richness and biodiversity values of these areas may have been reduced from such disturbances, however, this disturbance was not widespread over the application area.</p> <p>ENV Australia (2008a) also identified three introduced flora species within the proposed clearing area. These were <i>Cenchrus ciliaris</i> (Buffel Grass), <i>Setaria verticillata</i> (Whorled Pigeon Grass) and <i>Bidens bipinnata</i> (Bipinnate Beggartick). These weed species were found in relatively low numbers (ENV Australia, 2008a). <i>Cenchrus ciliaris</i> was the most widespread of the weeds identified, with the species recorded at two survey sites. <i>Setaria verticillata</i> and <i>Bidens bipinnata</i> were recorded at one of the survey sites (ENV Australia, 2008a). Although few occurrences of weeds were recorded, the presence of weeds lowers the biodiversity value of the proposed clearing area. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Should a clearing permit be granted, it is recommended that a</p> |
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condition be imposed on the clearing permit for the purposes of weed management.

There are two Priority Ecological Communities (PECs) within the south-western corner of the application area. These are 'Coolibah woodland over lignum over Swamp Wanderrie' and 'Open Coolibah and Mulga woodland over lignum over tussock grasses on clay flood plains' (DEC, 2008). Clearing within these two PECs is likely to alter the species composition, and reduce biodiversity values of the area. However, BHP Billiton have committed to avoid clearing within these two PECs, unless approval is granted from the Director, Environment Division, Department of Industry and Resources. Should the permit be granted, it is recommended, that a condition be placed on the permit to prevent clearing within the PECs identified within the application area.

A fauna assessment of the application area was undertaken in November 2007 by ENV Australia. During the fauna assessment, 100 taxa, including 17 mammals, 23 reptiles, 4 amphibians and 56 birds were recorded within the application area. None of the mammal, reptile or amphibian species recorded were conservation significant species. All birds species recorded within the application area were conservation significant species, listed either under the *Wildlife Conservation Act 1950* or the *Environmental Protection Biodiversity Conservation Act 1999* (ENV Australia, 2008b). However, many of these bird species are largely aerial with an extensive home range. Whilst these species may utilise the project area as part of their home range, they would not specifically rely on areas within the application area for habitat.

Of the fauna species identified within the application area, four were introduced species, these were the Dingo (*Canis lupus* subsp. *dingo*), Fox (*Vulpes vulpes*), Feral Cat (*Felis catus*) and European Cattle (*Bos Taurus*) (ENV Australia, 2008b). The presence of introduced fauna within the proposed clearing area is likely to have a detrimental impact upon the floral and faunal diversity of the area.

Five major landform units/habitat types were selected as being representative of the project area during the fauna assessment (ENV Australia, 2008b). These five habitat types were Alluvial Plains, Gorge/Gullies, Hill Crests, Minor Drainage Lines and Scree Slopes. ENV Australia (2008b) have stated that the habitats identified within the application area are well represented within the Pilbara region. However, two of the habitat types were considered to be of high conservation value: the gorges/gullies and the minor drainage lines. This was based on the numerous microhabitats present for conservation significant species and the under-representation in the Pilbara (ENV Australia, 2008b). However, BHP Billiton have stated they will not require entry into Gorge/Gully areas, and have made a commitment to avoid clearing within 10 metres of any drainage lines that are 8 metres or greater in width within the application area (BHP Billiton, 2008a). This action will reduce the overall impact to significant fauna habitats. As a result it is recommended that should the permit be granted, conditions be placed on the permit to prevent clearing within 10 metres of drainage lines greater than 8 metres in width, and gorges/gullies of the application area.

Based on the above, the proposed clearing is at variance to this Principle. However, it is considered that the potential impacts of the proposed clearing can be adequately managed and minimised by imposing appropriate conditions on the permit.

Methodology ENV Australia (2008a).
ENV Australia (2008b).
BHP Billiton (2008a).
DEC (2008).
Kendrick (2001).
GIS Databases:
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments Proposal may be at variance to this Principle

ENV Australia (2008b) conducted a fauna survey of the application area during November 2007. The Area C South Flank fauna survey involved two processes:

- a detailed desktop survey - including a search of literature, data, aerial photographs and maps for information relating to habitats likely to be found in the project areas; and
- a field survey of the project area - including a fauna habitat assessment, trapping program, opportunistic searches, an ornithological census and bat recordings (ENV Australia, 2008b).

The desktop survey revealed there were 275 fauna taxa potentially occurring in the project area, comprising of 48 mammals, 101 reptiles, 9 amphibians and 117 birds (ENV Australia, 2007b). Of the species identified, 156 were listed as conservation significant, including 6 mammals, 39 reptiles and 111 birds. The subsequent ground survey identified 100 taxa within the application area, including 17 mammals, 23 reptiles, 4 amphibians and 56 species of birds. None of the mammal, reptile or amphibian species recorded were conservation significant species. However, all birds species recorded within the application area were listed as conservation significant species according to either the *Wildlife Conservation Act 1950* or the *Environment Protection and Biodiversity*

However, many of these species are largely aerial species, with an extensive home range, whilst these species may utilise the project area as part of their home range, or may visit periodically, they would not specifically rely on areas within the application area for habitat (ENV Australia, 2008b).

Based on habitat preferences and known distributions, the most likely mammal, reptile and amphibian species of conservation significance likely to be found within the application area are: Northern Quoll (*Dasyurus hallucatus*), Long-tailed Dunnart (*Sminthopsis longicaudata*), Orange Leaf nosed Bat (*Rhynonictis aurantius*), Ghost Bat (*Macroderma gigas*), and Pilbara Olive Python (*Liasis olivaceus barroni*).

The Northern Quoll (Schedule 1 - Wildlife Conservation (Specially Protected Fauna) Notice 2008) has been recorded in a range of vegetation types but prefers rocky areas, and is known to den in rocky crevices (ENV Australia, 2008b). It is possible the rocky areas associated with the Gorges/Gullies habitat type within the application area may be suitable habitat for the Northern Quoll. However, the Gorges/Gullies habitat will be avoided by BHP Billiton, as the terrain within this area is extremely rugged making exploration activities difficult. Based on this, it is unlikely there will be any significant impacts to Northern Quoll habitat as a result of this proposal.

The Long-tailed Dunnart (DEC - Priority 4) occurs in rugged rocky landscapes that support a low open woodland or shrubland of Acacia's (especially Mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and Cassias from the Pilbara and upper Gascoyne region in the West (DNREA, 2007). They have also more recently been recorded from plateaus near breakaways and scree and rugged boulder strewn scree in the Goldfields region. The habitat types found within the application area may support populations of Long-tailed Dunnart. However, it is unlikely that the vegetation to be cleared represents significant habitat for this species, given its widespread distribution (ENV Australia, 2008b).

The Orange Leaf nosed Bat (DEC - Vulnerable) is described as preferring warm humid caves for roosting, although some have been found in tree hollows (Australian Museum Online, 2008). According to ENV Australia (2008b) potential habitats in the form of large caves are present within the application area. However, no species were recorded within the application area. It should be noted that known colonies in the Pilbara occupy abandoned, deep and partially flooded mines that trap pockets of warm, humid air in the mine's constant temperature zone. There are no known natural roosting sites in the Pilbara (Department of Environment, Water, Heritage and Arts, 2008a). There are no abandoned mine shafts of substantial caves within the application area. Therefore, the vegetation within the application area is not significant habitat for this species.

The Ghost Bat (DEC - Priority 4) occupies a wide range of habitats from rainforest, monsoon and vine scrub in the tropics, to open woodlands and arid areas (Department of Environment, Water, Heritage and Arts, 2008b). The nesting habitat of this species is listed as undisturbed caves, deep fissures, or disused mine shafts in which they can roost. ENV Australia (2008b) have stated that this species may occur in the vicinity and forage in the application area, particularly in the Gorge/Gully habitat. Additionally potential roosting locations in the form of large caves may also be present within the application area (ENV Australia, 2008b). Based on this, it is likely that the Ghost Bat may be found within the application area. As a result, BHP Billiton (2008a) have committed to undertake further targeted survey work within the application area to determine if any current roosting sites for the Ghost Bat are present. Should any current roosting sites be identified, BHP Billiton have stated that they will avoid clearing within these areas (BHP Billiton, 2008a). It is recommended that should the permit be granted, a condition be placed on the permit to prevent clearing within 10 metres of any gorge/gully areas. This would ensure that Ghost Bat habitat is not impacted upon as a result of the clearing associated with this proposal.

The Pilbara Olive Python (DEC - Schedule 1) inhabits rocky gorges and gullies, usually near watercourses, but may also be found in other habitats such as drier areas or woodlands. ENV Australia (2008b) have stated that the Gorge/Gullies and Minor Drainage Line areas may provide suitable habitat for the Pilbara Olive Python. However, BHP Billiton (2008b) have stated that they will not be conducting any exploration activities within any of the Gorge/Gullies areas of the application area. Additionally, no Pilbara Olive Pythons were recorded during the ground survey. Therefore, impacts to Pilbara Olive Python habitat from the proposed clearing are likely to be minimal.

The Western Pebble-mound Mouse (Priority 4 - DEC) is found in rocky hummock grasslands and is endemic to the Pilbara (ENV Australia, 2008b). Three active pebble mounds were recorded within the application area. Therefore it is likely that the Western Pebble-mound Mouse exists within the application area. This species has been recorded in many surrounding sites to the Area C South Flank project area, and its habitat is well represented throughout the Pilbara (ENV Australia, 2008b). Additionally this species is abundant in at least five large conservation reserves found in the Pilbara (Start et al., 2000). As a result it is unlikely that the proposed clearing will have a significant impact to the overall habitat of the Western Pebble-mound Mouse.

The fauna assessment utilised previous surveys of the area and landforms identified during these surveys to form habitat types within the application area (ENV Australia, 2008b). During the assessment, 5 habitat types were identified within the application area: Alluvial Plains, Gorge/Gullies, Hill Crests, Minor Drainage Lines and Scree Slopes. ENV Australia (2008b) have stated that habitats of the application area are generally well represented throughout the Pilbara region. However, there were two habitat types identified which were of a

high conservation value, and one of medium habitat value. These are:

Gorges/gullies habitat: The gorge/gully habitat was moderately represented within the project area, ENV Australia (2008b) have stated that it is considered to be of high conservation value because of the numerous microhabitats present for fauna to exploit. These include caves, rock crevices, leaf litter and logs. Based on this, it is likely this area would be suitable habitat for conservation significant species such as the Pilbara Olive Python (*Liasis olivaceus*) and the Orange Leaf-nosed Bat (*Rhinonictus aurantius*). Species of lower conservation value likely to be found in this habitat include the Desert Cave Gecko (*Heteronotia spelea*), the Spotted Dtella (*Gehyra punctata*) and the Pygmy Spiny-tailed Skink (*Egernia depressa*).

Minor Drainage Lines: The minor drainage lines of the project area are considered to be of high conservation value to vertebrates, because of the microhabitats present and the moderate representation of this habitat elsewhere (ENV Australia, 2008b). Microhabitats present include hollow branches, vegetation build up from past floods, and soft soils suitable for burrowing reptiles such as the small skink (*Lerista flammicaudia*), as well as arboreal lizards such as the Tree Dtella (*Gehyra variegata*) and serve good foraging ground for the Yellow Spotted monitor (*Varanus panoptes*). Furthermore well vegetated drainage lines can serve as important corridors for fauna movement, connecting fragmented landscapes (ENV Australia, 2008b).

The Scree Slope habitat was identified as being of medium habitat value, as evidence was found of the Western Pebble-mound Mouse (*Pseudomys chapmani*). The rock crevices and Triodia hummocks in this habitat provide microhabitats for ground-dwelling reptiles such as the Ring-tailed dragon (*Ctenophus caudicinctus*) and ground dwelling mammals such as the Common Rock-rat (*Zyromys argurus*). This habitat type is well represented in the Pilbara region (ENV Australia, 2008b) and as a result impacts to this habitat from the proposed clearing are likely to be minimal.

BHP Billiton (2008a) have stated they will not be required to enter gorge or gully areas for the drilling program. They have also made a commitment to avoid clearing within 10 metres of any drainage lines that are 8 metres or larger in width within the application area (BHP Billiton, 2008a). This action will prevent clearing from occurring within areas listed by ENV Australia (2008) as significant habitats. As a result, it is recommended that should the permit be granted, conditions be placed on the permit to prevent clearing within 10 metres of any gorge/gully areas, or drainage lines that are 8 metres or larger in width within the application area.

Based on the above, the proposed clearing may be at variance to this Principle

Methodology Australian Museum Online (2008).
BHP Billiton (2008a).
Department of Environment, Water, Heritage and Arts (2008a).
Department of Environment, Water, Heritage and Arts (2008b).
DNREA (2007).
ENV Australia (2008b).
Start et al., (2000).

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments Proposal may be at variance to this Principle

According to available databases, no known Declared Rare Flora (DRF) or Priority flora species are found within the application area (GIS Database).

ENV Australia conducted a level two flora and vegetation assessment of the application area between 16 - 23 November 2007. This involved a detailed database search of the application area and an on ground survey to document and describe the presence of all flora species, vegetation associations and species of conservation significance in the application area (ENV Australia, 2008a).

As a result of the database search, 2 DRF species: *Lepidium catapycnon* and *Thryptomene wittweri* were identified as potentially occurring in the application area (ENV Australia, 2008a).

No DRF species were identified during the ground survey, however, 4 Priority flora species were recorded (ENV Australia, 2008a). The Priority flora species recorded were: *Spartothamnella puberula*, *Sida* sp. *Barlee Range* (S van Leeuwen 1642), *Triumfetta leptacantha* and *Eremophila magnifica* subsp. *magnifica*.

Spartothamnella puberula (Priority 2) is a shrub approximately 0.35 - 1.5 metres in height, and is found in rocky loams, sandy or skeletal soils on sandplains and hills (FloraBase, 2008). This plant species was recorded in the gorge/gullies of the application area (ENV Australia (2008a). BHP Billiton (2008a) have stated that there is no clearing required within the gorges and gullies of the application area. This is due to the rugged and rocky topography present which makes exploration activities extremely difficult. As a result, it is recommended that should the permit be granted, a condition be placed on the permit to prevent clearing within 10 metres of any gorge/gully areas within the application area.

Sida sp. *Barlee Range* (S. van Leeuwen 1642) (Priority 3) is a spreading shrub, up to 0.5 metres high, found on

red skeletal soil pockets and on steep slopes (FloraBase, 2008). This species was recorded from one opportunistic collection, on a cliff ledge (ENV Australia, 2008a). BHP Billiton have stated that they will not be required to drill within this area due to logistical constraints, therefore impacts to this species are likely to be minimal.

Triumfetta Leptacantha (Priority 3) is a spreading shrub approximately 0.25 - 0.6 metres in height which is found on stony red loams, amongst boulders and stony hillsides (FloraBase, 2008). During the survey this plant was recorded from 6 survey sites and 8 opportunistic collections with all recordings made in the gorges/gullies habitat (ENV Australia, 2007a). BHP Billiton (2008) have stated the gorges and gully habitats will be avoided due to the difficulties in completing exploration activities within these areas. Therefore the impacts to this flora species from the proposed clearing are likely to be minimal.

Eremophila magnifica subsp. *magnifica* (Priority 4) is a shrub to 1.5 metres in height and is commonly found on skeletal soils over ironstone (FloraBase, 2008). This plant was recorded at 8 opportunistic collection locations, from steep slopes and gorge or cliff lines (ENV Australia, 2008a). BHP Billiton (2008a) have committed to avoid all areas where this plant was recorded. As a result it is recommended that should the permit be granted, a condition be placed on the permit for BHP Billiton to avoid the known locations of these species.

BHP Billiton have made a commitment to avoid clearing within areas where Priority flora species occur; this includes not going within 10 metres of any gorge/gullie areas, and avoiding all known specimens of *Eremophila magnifica* subsp. *magnifica*. Additionally BHP Billiton (2008a) have committed to conducting targeted flora surveys prior to the clearing, so Priority flora species can be avoided during the drilling program. As a result it is recommended that should the permit be granted, conditions be placed on the permit for flora management.

Based on the above, the proposed clearing may be at variance to this Principle.

Methodology BHP Billiton (2008a).
ENV Australia (2008a).
FloraBase (2008).
GIS Database:
- Declared Rare and Priority Flora List - CALM 01/07/05

(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.

Comments Proposal may be at variance to this Principle

There are no known Threatened Ecological Communities (TECs) located within the application area (GIS Database), although there is one Priority Ecological Community (PEC) named Coolibah-lignum Flats located within the south-west corner of the application area (GIS Database). This PEC has been split into three separate community sub-types, two of which occur in the application area. These are: 'Coolibah woodland over lignum over Swamp Wanderrie' and 'Open Coolibah & Mulga woodland over lignum over tussock grasses on clay flood plains' (DEC, 2008).

Priority 1 Ecological Communities are defined as poorly known ecological communities with apparently few small occurrences, of which most are not actively managed for conservation (DEC, 2008). These communities are typically under immediate threat from known threatening processes across their range but have not been adequately surveyed for classification as a TEC (DEC, 2008).

The 'Coolibah woodland over lignum over Swamp Wanderrie' community is only represented by one occurrence and this is on the Coondewanna Flats (DEC, 2008). It is the basement sump of the flats and is locally known as Lake Robinson. This community is described as open woodland of *Eucalyptus victrix* over scattered tall shrubs of *Acacia aneura* var. *pilbarana* over low scattered shrubs of *Muehlenbeckia florulenta* over tussock grass of *Eriachne benthamii* & *Chrysopogon fallax* (DEC, 2008). This community is also rich in herbs including an unnamed Swainsona, and is threatened by grazing, groundwater drawdown associated with mining, clearing associated with infrastructure corridors (rail, conveyor, power and roads) and exploration (DEC, 2008).

The 'Open Coolibah & Mulga woodland over lignum over tussock grasses on clay flood plains' community is mostly found on the Coondewanna flats but there are also small occurrences on the Wanna Munna flats (DEC, 2008). This vegetation community occurs in small pockets, probably depressions and water gaining sites across the Coondewanna Flats. It is described as *Eucalyptus victrix* Open - Low Open Woodland over Low Open Woodland - High Shrubland of *Acacia aneura* var. *pilbarana* over Low Open Shrubland - Low Shrubland of *Muehlenbeckia florulenta* over Tussock Grassland-Open Tussock Grassland of *Eriachne benthamii*, *Chrysopogon fallax*, *Eulalia aurea* & *Bothriochloa ewartiana* with *Peplidium* spp forming an open herb groundcover layer. It is also threatened by clearing associated with mineral exploration activities and grazing by stock (DEC, 2008).

It is noted that BHP Billiton (2008a) have made a commitment to avoid clearing within the PEC, unless written approval from the Director, Environment Division, Department of Industry and Resources, is provided.

BHP Billiton (2008a) have stated that part of the PEC may overlap areas in which drilling might be required - this would be to ascertain the full extent of the ore body at Area C South Flank. As a result, the assessing

officer has consulted with the DEC to determine whether this action would be acceptable. In response to BHP Billiton's request, DEC (2008) have stated that the full extent of the PEC must be properly defined, mapped and submitted to DoIR, before clearing within this area can be considered. If this action is completed then BHP Billiton may be permitted to utilise part of the PEC area, provided the following conditions are followed:

- Clearing within the PEC will be restricted to scrub rolling;
- Entry to the PEC will only be permitted during dry conditions; and
- Management measures will be implemented to prevent fire.

It is recommended that should the permit be granted, a condition be placed on the permit to prevent clearing within the PEC, unless written approval from the Director, Environment Division, Department of Industry and Resources, is given.'

Based on the above, the proposed clearing may be at variance to this principle.

Methodology BHP Billiton (2008a)
DEC (2008).
GIS Database:
- Threatened Ecological Communities - CALM

(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.

Comments Proposal is not at variance to this Principle

The area applied to clear is located within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (Shepherd, 2001). According to Shepherd (2001) there is approximately 99.9% of Pre-European vegetation remaining within this bioregion.

The vegetation of the application area is classified as Beard Vegetation Association 18 - Low woodland; mulga (*Acacia aneura*) and Beard Vegetation Association 82 - Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (GIS Database, 2007). Both of these vegetation associations remain at approximately 100% of pre-European extent in both the state and in the Pilbara bioregion (Shepherd, 2001). The proposed clearing will not reduce the extent of either of the vegetation associations below current recognised threshold levels. The area proposed to clear does not represent a significant remnant of vegetation in an area that has been extensively cleared.

| | Pre-European area (ha)* | Current extent (ha)* | Remaining %* | Conservation Status** | % of Pre-European area in IUCN Class I-IV Reserves (and current %) |
|-------------------------------------|-------------------------|----------------------|--------------|-----------------------|--|
| IBRA Bioregion – Pilbara | 17,804,163 | 17,794,650 | ~ 99.9 | Least Concern | 6.3 |
| Beard veg assoc. – State | | | | | |
| 18 | 19,891,436 | 19,891,436 | ~ 100 | Least Concern | 5.8 |
| 82 | 2,565,930 | 2,565,930 | ~ 100 | Least Concern | 10.2 |
| Beard veg assoc. – Bioregion | | | | | |
| 18 | 12,403,248 | 12,403,248 | ~ 100 | Least Concern | 4.3 |
| 82 | 2,563,610 | 2,563,610 | ~ 100 | Least Concern | 10.2 |

* Shepherd et al. (2001)

** Department of Natural Resources and Environment (2002)

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology Department of Natural Resources and Environment (2002).
Shepherd (2001) updated 2005.
GIS Database:
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00
- Pre-European Vegetation - DA 01/01

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposal is at variance to this Principle

There are a number of small non-perennial drainage lines which traverse the project area (GIS Database). These drainage lines would only flow after major rainfall events (GIS Database).

Of the 29 major vegetation types identified by ENV Australia (2008a) within the application area, two are described as being associated with watercourses:

Drainage Line A: *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia hamersleyana* low woodland over *Acacia monticola*, *Grevillea wickhamii*, *Gossypium robinsonii*, *Petalostylis labicheoides*, *Acacia tumida*, *Dodonaea petiolaris* open shrubland over *Triodia pungens* hummock grassland over *Themeda triandra* tussock grassland.

Drainage Line B: *Corymbia hamersleyana*, *Eucalyptus xerothermica*, *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Atalaya hemiglauca*, *Acacia hamersleyensis*, *Petalostylis labicheoides*, *Acacia monticola*, *Gossypium robinsonii* shrubland over *Acacia bivenosa*, *Acacia pyrifolia*, *Indigofera monophylla* low open shrubland over *Triodia wiseana*, *Triodia pungens* hummock grassland over *Themeda triandra* open grassland.

BHP Billiton have committed to avoid clearing within 10 metres of drainage lines (that are 8 metres or greater in width) and riparian vegetation (BHP Billiton, 2008a). As a result it is recommended that should the permit be granted, a condition be placed on the permit to prevent clearing within 10 metres of drainage lines (that are 8 metres or greater in width) and riparian vegetation within the application area.

Based on the above, the proposed clearing is at variance to this Principle.

Methodology BHP Billiton (2008a).
ENV Australia (2008a).
GIS Database:
- Hydrography, linear (medium scale, 250k GA)
- Hydrography, linear - DOE 1/2/04
- Geodata, Lakes - GA 28/06/02

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments Proposal may be at variance to this Principle

The application area consists of a series of low ranges running east to west, and a series of associated foothills and plains (ENV Australia, 2008b). ENV Australia (2008b) have stated that there were 8 landforms within the application area: drainage lines, floodplains, foot slopes, gorges, hill crest, hill slopes, undulating low hills and valley plains.

The application area is located within five land systems, including the Newman, Pindering, Wannamunna, Platform and Boolgeeda land systems (GIS Database). Approximately half of the application area is made up of a series of low ranges running east to west found in the northern half of the application area. These areas are described as the Newman land system (ENV Australia, 2008b). The southern and central areas within the application area are made up of foothills and plains, and comprise the four remaining land systems. The Boolgeeda land system makes up most of the plains of the mid-west of the application area, while the Pindering and Platform land systems make up the low rises of the south-east of the application area. The Wannamunna land system makes up the low-lying plains of the south-western corner of the application area (ENV Australia, 2008b).

The Newman land system is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (Van Vreeswyk et al., 2004). The landform in which the application area lies is plateaux, ridges, mountains and hills - up to 400 metres; level or rounded plateaux summits and mountain crests, ridges and indented escarpments with vertical upper cliff faces and moderately inclined to very steep upper scree slopes; surface mantles of abundant to very abundant pebbles, cobbles and stones of ironstone, jaspilite, chert and other rocks. Also outcrop of parent rock (Van Vreeswyk et al., 2004). The Newman land system has a nil to minor erosion potential, which is likely to be due to the surface mantle present which provides protection from erosional forces (Van Vreeswyk et al., 2004).

The Boolgeeda land system described as stony lower plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands (Van Vreeswyk et al., 2004). The landform of this system in which the application area is found is described as stony slopes and upper plains - very gently inclined slopes and upper interfluvies immediately down slope from adjacent hill systems. The soils are described as red shallow loams or red loamy earths with surface mantles of common to abundant pebbles or chert ironstone and quartz (Van Vreeswyk et al., 2004). According to Van Vreeswyk et al., (2004) the Boolgeeda land system is not susceptible to soil erosion which is likely to be due to the stony mantle present.

The Wannamunna land system is described as hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (Van Vreeswyk et al., 2004). The hardpan plains landform is made up of red-brown shallow loams with surface mantles of few pebbles of ironstone and is subject to sheetflows. According to Van Vreeswyk et al., (2004) this system is not particularly susceptible to soil erosion. Again this is likely to be a result of the stony mantle present which provides protection from erosional forces.

The Platform land system, it is described as dissected slopes and raised plains supporting hard Spinifex grassland (Van Vreeswyk et al., 2004). The landform in which the application area lies is named Stony upper plains, which is described as upper surfaces, narrow interfluvies 50-200 metres wide and 0.5 - 1 kilometre long, with abundant pebbles and cobbles of ironstone and other rocks. This system is not susceptible to erosion, which is likely to be due to the stony mantle present.

The Pindering land system is described as gravely hardpan plains supporting groved mulga shrublands with hard and soft spinifex (Van Vreeswyk et al., 2004). The gravely hardpan plains landform in which the application area is found, is described as level plains with hardpan or gravel at shallow depth, extending for up to 4 kilometres, receiving sheet flow, surface mantles of few to abundant ironstone gravel. According to Van Vreeswyk et al., (2004) this system is not susceptible to soil erosion.

The majority of the application area in its current form is protected from erosional forces as a stony mantle is present, however some areas on the plains (parts of the Boolgeeda, Wannamunna, Pindering and Platform land systems) may not be completely covered by a stony mantle. Given the intense summer rainfall events associated with cyclonic activities (Bureau of Meteorology, 2008) and the topography present, it is likely that the removal of native vegetation may cause erosion within these areas. Soils of the Newman land system are protected by a stony mantle and are less likely to erode, however the removal of the stony mantle during clearing may initiate soil erosion.

It is acknowledged that progressive rehabilitation will be undertaken throughout the life of the proposed drilling program. BHP Billiton (2008a) have committed to rehabilitating drill pads and access tracks within 12 months of the completion of each stage of the program, and/or before the commencement of the next phase of drilling (whichever comes first). All disturbance to the land surface made as a result of the exploration program will be rehabilitated as per BHP Billiton's 'Exploration Environmental Management Plan' (BHP Billiton, 2008b).

Erosion is likely to be minimised as BHP Billiton (2008a) will not undertake any clearing (or subsequent drilling) within gorge or gully areas, or within 10 metres of drainage lines that are 8 metres or greater in width. Should a clearing permit be granted, it is recommended that conditions be imposed on the permit to exclude clearing from within 10 metres of major drainage lines that are 8 metres or greater in width, or within gorge or gully areas.

Based on the above, the proposed clearing may be at variance to this Principle.

Methodology BHP Billiton (2008a).
BHP Billiton (2008b).
Bureau of Meteorology (2008).
ENV Australia (2008b).
Van Vreeswyk et al., (2004).
GIS Database:
- Rangeland Land System Mapping - DA

(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 area.

Comments Proposal is not likely to be at variance to this Principle

There are no conservation areas located within the application area (GIS Database), although Karijini National Park is located approximately 15 kilometres to the west of the application area. This is the second largest national park in Western Australia and is noted as being a significant conservation area in the Hamersley IBRA Subregion (Kendrick, 2001). Karijini National Park is home to a variety of birds, red kangaroos and euros, rock-wallabies, echidnas and several bat species (NatureBase, 2008). There are many geckos, goannas, dragons, legless lizards, pythons and other snakes abundant as well. The National Park is also famous for its spectacular gorges many of which are up to 100 metres deep (NatureBase, 2008).

The vegetation within the application area does not contribute significantly to the overall environmental values of Karijini National Park, nor does it provide a buffer to this conservation area. The total area of Karijini National Park is approximately 627,444 hectares (NatureBase, 2008), it is unlikely that the proposed clearing of 305 hectares of native vegetation will reduce the environmental values of Karijini National Park.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Kendrick (2001).
NatureBase (2008).
GIS Database:

(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.

Comments Proposal is not likely to be at variance to this Principle

The proposed clearing area is not located within a Public Drinking Water Source Area (GIS Database).

There are no permanent watercourses or wetlands within the project area, however there are a number of non-perennial drainage lines which traverse the area (GIS Database). Care must be taken to ensure that the proposed clearing activities do not cause or increase sedimentation, erosion or turbidity to watercourses on or off site. BHP Billiton (2008b) have advised that all exploration drill sites will be located a suitable distance from natural drainage lines, including a 10 metre buffer from the boundary of drainage lines that are 8 metres or greater in width and riparian vegetation (BHP Billiton, 2008b). Sediment traps and sumps will also be constructed where necessary to minimise the potential impacts on the quality of surface water (BHP Billiton, 2008b). Should a clearing permit be granted, it is recommended that a condition be imposed on the permit to exclude clearing within 10 metres of any drainage lines that are 8 metres or greater in width within the application area.

There are no groundwater-dependant ecosystems located within the application area (GIS Database).

The proposed clearing will be non-contiguous, and will consist of discrete drill pads and access tracks (BHP Billiton, 2008b). It is not expected that the proposed clearing will significantly impact upon groundwater levels or quality within the application area.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology BHP Billiton (2008b).
GIS Database:**

- Hydrography, linear - DOE 01/02/04.
- Potential Groundwater Dependant Ecosystems - DOE 2004
- Public Drinking Water Source Areas (PDWSAs) - DOE 28/04/05.

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments Proposal is not likely to be at variance to this Principle

In a typical year, average rainfall throughout the application area is low, variable and often falls within a small time frame. Average annual rainfall ranges from 250-450 millimetres, and many years can experience no rainfall (Bureau of Meteorology, 2007). The majority of rainfall comes in summer as a result of scattered thunderstorms and the occasional tropical cyclone. A secondary rainfall period occurs in May as a result of rainfall from tropical cloud bands (Bureau of Meteorology, 2007). Flooding is possible during rainfall periods as a result of cyclonic activities where large amounts of water fall within a short time frame.

The northern region of the application area is made up of a series of ranges and foothills (GIS Database). The ranges are up to 860 metres in elevation, while the surrounding plains are approximately 690-700 metres in elevation (GIS Database). The surfaces of the ranges are heavily sloped in some places, and there are a number of small tributaries intersecting these areas which lead to the surrounding plain. Rainfall is likely to flow along these tributaries and disperse to the surrounding plains below (GIS Database). Based on this information it is unlikely that the proposed clearing will increase the flooding potential as rainfall will be moving along drainage lines towards the plains. In addition, there are high evaporation levels found within the application area. The application area experiences average evaporation rates of approximately 3,000 millimetres which is more than 6 times the annual rainfall. Based on this, there is little likelihood of flooding during normal rainfall events.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology Bureau of Meteorology (2007).
GIS Databases:**

- Evaporation Isopleths - BOM 09/98
- Topographic Contours, Statewide - DOLA 12/09/02

Planning instrument, Native Title, Previous EPA decision or other matter.

Comments

There are three native title claims in the application area (GIS Database). These claims (WC96_061, WC05_003 and WC98_062) have been registered with the National Native Title Tribunal on behalf of the claimant groups (GIS Database). However, the mining tenement has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are 13 registered Sites of Aboriginal Significance located in the area applied to clear (Site ID 7645, 8297, 15019, 15020, 11224, 15021, 15022, 15023, 15024, 15029, 15030, 15031 and 15035) (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

BHP Billiton is committed to the management and protection of Aboriginal heritage sites and consultation with the appropriate native title claimants (BHP Billiton, 2005). BHP Billiton has a heritage protocol / native title agreement with both the Martu Idja Banyjima and Innawonga Bunjima Niapaili people for the entirety of the BHPBIO Mining Area C lease. The South Flank project area lies within the Mining Area C lease and therefore within the native title agreement area. As per this agreement and BHP Billiton obligations under the WA *Aboriginal Heritage Act 1972* and other relevant legislation, no new area of land will be disturbed until it has been subject to heritage inspections, both ethnographic and archaeological, with appropriate traditional owners (BHP Billiton, 2008b). All heritage sites identified in heritage surveys will be protected and avoided during exploration activity. Management of heritage sites (fences, buffers, etc) will be agreed and decided upon between BHP Billiton heritage staff, heritage consultants and the native title claimants during the heritage surveys (BHP Billiton, 2005).

Additionally, BHP Billiton (2008b) has an internal process; the Project Environment and Aboriginal Heritage Review (PEAHR), which is designed to prevent the inadvertent disturbance of Aboriginal heritage sites within BHP Billiton operations as well as ensuring that all areas of proposed disturbance have been subject to adequate ethnographic and archaeological inspection and consultation. Prior to the commencement of any land disturbance activity, a PEAHR must be completed and submitted to BHP Billiton's Indigenous Affairs Department, for assessment. All land disturbance activities must be approved by BHP Billiton's Environment and Aboriginal Heritage staff prior to its commencement (BHP Billiton, 2008b).

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

Methodology BHP Billiton (2005).
 BHP Billiton (2008b).
 GIS Databases:
 - Aboriginal Sites of Significance - DIA
 - Native Title Claims - DLI

4. Assessor's comments

| Purpose | Method | Applied area (ha)/ trees | Comment |
|---------------------|--------------------|--------------------------|--|
| Mineral Exploration | Mechanical Removal | 305 | The Clearing Principles have been addressed and the proposed clearing is at variance to Principles (a) and (f), may be at variance to Principles (b), (c), (d), and (g), is not likely to be at variance to Principles (h), (i) and (j), and is not at variance to Principle (e). Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed management, vegetation management, fauna management, rehabilitation and permit reporting. |

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6. Glossary

Acronyms:

| | |
|-----------------|---|
| BoM | Bureau of Meteorology, Australian Government. |
| CALM | Department of Conservation and Land Management, Western Australia. |
| DAFWA | Department of Agriculture and Food, Western Australia. |
| DA | Department of Agriculture, Western Australia. |
| DEC | Department of Environment and Conservation |
| DEH | Department of Environment and Heritage (federal based in Canberra) previously Environment Australia |
| DEP | Department of Environment Protection (now DoE), Western Australia. |
| DIA | Department of Indigenous Affairs |
| DLI | Department of Land Information, Western Australia. |
| DoE | Department of Environment, Western Australia. |
| DoIR | Department of Industry and Resources, Western Australia. |
| DOLA | Department of Land Administration, Western Australia. |
| DoW | Department of Water |
| EP Act | Environment Protection Act 1986, Western Australia. |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 (Federal Act) |
| GIS | Geographical Information System. |
| IBRA | Interim Biogeographic Regionalisation for Australia. |
| IUCN | International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union |
| RIWI | Rights in Water and Irrigation Act 1914, Western Australia. |
| s.17 | Section 17 of the Environment Protection Act 1986, Western Australia. |
| TECs | Threatened Ecological Communities. |

Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005. Department of Conservation and Land Management, Como, Western Australia*} :-

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

X **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

Schedule 1 **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.

Schedule 2 **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.

Schedule 3 **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.

Schedule 4 **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna*. Department of Conservation and Land Management, Como, Western Australia} :-

P1 **Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

P2 **Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

P3 **Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

P4 **Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.

P5 **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)

EX **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.

EX(W) **Extinct in the wild:** A native species which:
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

CR **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

EN **Endangered:** A native species which:
(a) is not critically endangered; and
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

VU **Vulnerable:** A native species which:
(a) is not critically endangered or endangered; and
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

CD **Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.