



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2818/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: Iron Ore (Mount Newman) Agreement Act 1964, Special Lease for Mining Operations 3116/3687, Document I 154279 L, Lot 19 on Deposited Plan 48921, Lot 65 on Deposited Plan 48920;
Iron Ore (Mount Newman) Agreement Act 1964, Special Lease for Mining Operations 3116/4028, Lots 24, 25, 26, 92, 93, 94, 95, 96 on Deposited Plans 241430;
Iron Ore (Mount Newman) Agreement Act 1964, Special Lease for Mining Operations 3116/6301, Document No I 123595 L, Lot 48 on Deposited Plan 48928;
Iron Ore (Marillana Creek) Agreement Act 1991, Mining Lease 270SA (AM 70/270)

Local Government Area: Shire of East Pilbara
Colloquial name: Yandi Junction to Jimblebar Junction Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
243		Mechanical Removal	Railway construction and maintenance, and associated activities

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 a 1:250,000 scale for the whole of Western Australia, and are a useful tool to examine the vegetation extent in a regional context. Three Beard vegetation associations are located within the application area (GIS Database):

29; sparse low woodland; mulga, discontinuous in scattered groups;

82; hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*; and

111; hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard Spinifex.

ENV Australia Pty Ltd (2008b) undertook a Level 2 flora and vegetation survey of the Yandi Junction (chainage 281 kilometres) to Jimblebar Junction (chainage 401 kilometres) railway reserve in April 2008. The flora and vegetation assessment consisted of 123 quadrats, each 50 metres x 50 metres and 14 releve and opportunistic collections. As a result of this survey, the following vegetation associations were recorded:

Mainline Railway Lease

AdAnTp*Cc (Acacia dictyophleba shrubland): *Acacia dictyophleba* high open shrubland over mixed *Acacia* shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* tussock grassland;

AaAnTp*Cc (Acacia aneura open woodland): *Acacia aneura* (mixed subspecies) low open woodland over *A. ancistrocarpa* shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* tussock grassland;

AaAsCf*Cc (Acacia aneura shrubland): *Acacia aneura* (mixed subspecies), *Acacia ancistrocarpa*, *Acacia pruinocarpa* and *Acacia synchronicia* shrubland over *Triodia pungens* very open hummock grassland over *Chrysopogon fallax* and **Cenchrus ciliaris* tussock grassland;

EgApTp*Cc (Eucalyptus gamophylla low open mallee woodland): *Eucalyptus xerothermica* low open woodland over *Eucalyptus gamophylla* low open mallee woodland over mixed *Acacia* shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* tussock grassland;

ChAp*Cc (Corymbia hamersleyana woodland - plains): *Corymbia hamersleyana*, *Corymbia semiclara* and *Corymbia* aff. *opaca* scattered low trees over mixed *Acacia* shrubland over *Triodia basedowii* and *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* tussock grassland;

ApAsCf*Cc (Acacia pruinocarpa low woodland): *Acacia pruinocarpa* low woodland over mixed *Acacia* shrubland over *Chrysopogon fallax* and **Cenchrus ciliaris* tussock grassland;

ExAa*Cc (*Eucalyptus xerothermica* low open woodland - riparian): *Eucalyptus xerothermica* low open woodland over mixed *Acacia citrinoviridis* and other *Acacia* species shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* open tussock grassland;

AcAs*Cc (*Acacia citrinoviridis* woodland/shrubland - drain / riparian): *Acacia citrinoviridis* and mixed *Acacia* species high shrubland over **Cenchrus ciliaris* tussock grassland;

CaAn*Cc (*Corymbia aspera* low open woodland): *Corymbia aspera* low open woodland over mixed *Acacia* species shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* open tussock grassland;

EvAc*Cc (*Eucalyptus victrix* low woodland - drains / riparian): *Eucalyptus victrix* low woodland over mixed *Acacia* species shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* tussock grassland;

ApSaCf (*Acacia pruinocarpa* shrubland over *Senna artemisioides* scrub): *Acacia pruinocarpa* and mixed *Acacia* species shrubland over *Senna artemisioides* (mixed subspecies) low shrubland over *Chrysopogon fallax* and **Cenchrus ciliaris* tussock grassland;

AsTp/*Cc (*Acacia synchronicia* shrubland): *Acacia synchronicia* and mixed *Acacia* species shrubland over *Triodia pungens* hummock grassland over **Cenchrus ciliaris* and *Chrysopogon fallax* tussock grassland;

AdTp (*Acacia dictyophleba* and *Acacia ancistrocarpa* high shrubland - drain / riparian): *Acacia dictyophleba*, *Acacia marramamba* and *Acacia ancistrocarpa* high shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris*, *Chrysopogon fallax* tussock grassland; and

EIAaTw/Tp (*Eucalyptus leucophloia* subsp. *leucophloia* low open woodland on hill slopes): *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia aneura* var. *aneura*, *Acacia bivenosa*, *Senna glutinosa* subsp. *glutinosa* shrubland over *Triodia wiseana*, *Triodia pungens*, *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) hummock grassland over **Cenchrus ciliaris* open tussock grassland.

ENV Australia Pty Ltd (2008g) undertook a Level 2 flora and vegetation survey of Rail Repeater Stations Six, Seven and Eight, and their associated access roads. The flora and vegetation assessment consisted of eight quadrats, each 50 metres x 50 metres and one releve and opportunistic collections. The following vegetation associations were described from each Rail Repeater Station.

Vegetation associations recorded at Rail Repeater Station Six

AaAh*Cc: Open *Acacia aneura* var. *conifera* and *Corymbia* aff. *opaca* woodland over mixed *Acacia* shrubland over **Cenchrus ciliaris* tussock grassland; and

Ah*Cc: High *Atalaya hemiglauca* shrubland over **Cenchrus ciliaris* tussock grassland.

Vegetation associations recorded at Rail Repeater Station Seven

EgSnTp: *Eucalyptus gamophylla* and *Corymbia opaca* low open woodland over *Acacia hilliana*, *Senna notabilis*, *Scaevola* spp. Low open shrubland over *Triodia pungens* / *T. basedowii* open hummock grassland; and

CoAhTp/Tb: *Corymbia opaca* and *Eucalyptus gamophylla* low open woodland over *Acacia pruinocarpa* shrubland over *A. hilliana* low shrubland over *Triodia pungens* / *T. basedowii* hummock grassland over *Eriachne mucronata* very open tussock grassland.

Vegetation associations recorded at Rail Repeater Station Eight

EIAaTs: *Eucalyptus leucophloia* low open woodland over *Acacia tumida* var. *pilbarensis* open scrub over *Acacia* spp., *Grevillea wickhamii*, *Rulingia luteiflora* and *Gossypium robinsonii* open heath over *Gompholobium karjini*, *Senna* spp. and *Corchorus* spp. low shrubland over *Triodia* sp. Shovelanna Hill hummock grassland over *Themeda triandra* open tussock grassland;

AaAs*Cc: *Acacia aneura* and *Corymbia hamersleyana* open woodland over *Acacia* spp. high shrubland over *Senna artemisioides* (mixed subsp.) shrubland over *Sida platycalyx* and *Maireana villosa* low shrubland over **Cenchrus ciliaris* and *Chrysopogon fallax* open tussock grassland;

CcAsTp: *Corymbia candida* scattered low trees over *Acacia sericophylla*, *A. ancistrocarpa* and *A. pruinocarpa* shrubland/scrub over *Senna artemisioides* and *Maireana villosa* low open heath over *Triodia pungens* open hummock grassland;

EIAaTs: *Eucalyptus leucophloia* low open woodland over *Hakea lorea* subsp. *lorea* scattered shrubs over *Acacia arida*, *Senna artemisioides* subsp. *oligophylla* x *helmsii*, *Dodonaea pachyneura*, *Eremophila latrobei* subsp. aff. *filiformis*, *Calytrix carinata*, *Gompholobium karjini* and *Acacia rhodophloia* low shrubland over *Triodia* sp. Shovelanna Hill closed hummock grassland; and

ChAiTI: *Corymbia hamersleyana* low open woodland over *Acacia inaequilatera*, *A. sclerosperma* subsp. *sclerosperma*, *Hakea lorea* subsp. *lorea* and *Gossypium robinsonii* high shrubland over *Acacia* spp., *Senna artemisioides* subsp. *oligophylla* shrubland over *Corchorus tectus* low shrubland over *Triodia lanigera* hummock grassland over *Aristida inaequiglumis* closed tussock grassland.

ENV Australia Pty Ltd (2008f) undertook a Level 2 flora and vegetation survey of the Quarry Six lease area (part of the application area) in May 2008. During the flora and vegetation survey, twenty-four 50 x 50 metre quadrats and four releves were executed. The quadrats were selected as being representative of the flora and vegetation of the project area. As a result, the following vegetation associations were recorded:

Quarry Six Lease

EgAaTp (*Acacia ancistrocarpa* shrubland- floodplain): *Eucalyptus gamophylla* and *E. xerothermica* low open woodland over mixed *Acacia* spp. shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* tussock grassland;

Ex/EgAsTp (*Eucalyptus xerothermica* and *E. gamophylla* woodland): *Eucalyptus xerothermica* and *E. gamophylla* low woodland over *Acacia sclerosperma* subsp. *sclerosperma* and other mixed *Acacia* spp. open shrubland over *Triodia pungens* hummock grassland;

Ex/AaAsTp (*Eucalyptus xerothermica* and *Acacia aneura* var. *pilbarana* high shrubland)

General characteristics: *Eucalyptus xerothermica* and *Acacia aneura* var. *pilbarana* over *Acacia* spp., *Eremophila* spp. *Ptilotus obovatus* var.

obovatus, *Psydrax latifolia* and *Anthobolus leptomerioides* open shrubland over *Maireana triptera* low open shrubland over *Triodia pungens* and **Cenchrus ciliaris* hummock/tussock grassland;

AsMtTp (Maireana triptera low shrubland): *Acacia synchronicia* scattered tall shrubs scattered over *Maireana triptera* and *Eremophila cuneifolia* low shrubland over *Triodia pungens* and **Cenchrus ciliaris* scattered tussock grasses;

ExAsTa (Triodia angusta hummock grassland): *Eucalyptus xerothermica* scattered low trees over *Acacia sclerosperma* subsp. *sclerosperma* and other *Acacia* spp. shrubland over *Triodia angusta* hummock grassland;

Ex/ApTp (Acacia paraneura low woodland): *Acacia paraneura* low woodland over *A. sclerosperma* subsp. *sclerosperma*, *A. aneura* and *A. synchronicia* and *Eremophila* spp. shrubland over *Triodia pungens* hummock grassland over **Cenchrus ciliaris* scattered grasses;

ChAp*Tp (Acacia pruinocarpa high shrubland): *Corymbia hamersleyana* scattered low trees over *Acacia pruinocarpa* and mixed *Acacia* spp. high shrubland over *Triodia pungens* open hummock grassland;

ChGwTb/Tw (Corymbia hamersleyana open woodland): *Corymbia hamersleyana* and *Eucalyptus gamophylla* low open woodland over *Grevillea wickhamii* subsp. *hispidula*, *Acacia pyrifolia* and *A. pruinocarpa* high shrubland over *Keraudrenia velutina* subsp. *elliptica* low scattered shrubs over *Triodia basedowii* and *T. wiseana* open hummock grassland; and

CcGwTb (Corymbia candida subsp. dipsodes low open woodland – drainage line): *Corymbia candida* subsp. *dipsodes*, *C. hamersleyana* and *Eucalyptus gamophylla* low open woodland over *Grevillea wickhamii* subsp. *hispidula*, *Acacia dictyophleba* and *Eremophila longifolia* open shrubland over *Keraudrenia velutina* subsp. *elliptica* over *Triodia basedowii* open hummock grassland.

ENV Australia Pty Ltd (2008d) undertook a Level 2 flora and vegetation survey of a 488 hectare area of Mining Lease 270SA in May 2008. Part of the application area occurs within this survey area. During the survey seven 50 x 50 metre quadrats and one releve were executed. The quadrats were selected as being representative of the flora and vegetation of the project area. The following vegetation associations were recorded in the application area:

Mining Lease 270SA

EgAtTb: Low open *Eucalyptus gamophylla* mallee woodland over *Acacia trudgeniana* and *Grevillea wickhamii* shrubland over *Triodia basedowii* hummock grassland;

CoAtTb: *Corymbia opaca* scattered trees over mixed *Acacia* spp. and *Grevillea wickhamii* shrubland over low shrubland of *Corchorus sidoides*, *Bonamia rosea*, *Cullen leucochaetes*, *Tephrosia densa*, *Senna notabilis* over *Triodia pungens* / *T. schinzii* / *T. lanigera* / *T. basedowii* hummock grassland over *Cleome viscosa* and *Mollugo molluginea* very open herbland;

AtTI: High open shrubland of *Acacia trudgeniana* and *Hakea lorea* subsp. *lorea* over scattered *Grevillea wickhamii* over low open *Corchorus* / *Tephrosia* spp. shrubland over *Triodia lanigera*;

EgTdTp: Low open *Eucalyptus gamophylla* mallee and *Corymbia* aff. *opaca* woodland over *Hakea lorea* over low open shrubland of *Tephrosia* / *Sida* / *Corchorus* spp. over *Triodia basedowii* hummock grassland; and

EIGwTs: *Eucalyptus leucophloia* low open woodland over *Grevillea wickhamii* and *Hakea lorea* high open shrubland over low open shrubland of *Acacia* spp., *Calytrix carinata*, *Corchorus lasiocarpus*, *Dampiera candidans* over *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) / *Eriachne mucronata* open grassland.

* means introduced flora species.

Clearing Description

BHP Billiton Iron Ore Pty Ltd (BHP Billiton) have applied to clear up to 243 hectares of native vegetation within a purpose permit boundary of approximately 1,056 hectares located approximately 15 kilometres north-east of Newman (BHP Billiton, 2008b). The proposed clearing is for the purposes of:

- Duplicating a four kilometre section of the Newman to Port Hedland rail line between chainage 281 and 285 kilometres on Special Lease 3116/3687 (Mainline Lease) (BHP Billiton, 2008b);
- Laying of approximately 125 kilometres of fibre optic cable between chainage 281 and 401 kilometres along the Mainline Railway Lease (BHP Billiton, 2008b);
- Upgrading Rail Repeater Stations Six, Seven and Eight on Special Lease 3116/4028 (BHP Billiton, 2008b);
- The construction of site office facilities, laydown areas and borrow pits on Mining Lease 270SA and Special Lease 3116/4028 (BHP Billiton, 2008b); and
- The construction of site office facilities, laydown areas and borrow pits on Special Lease 3116/6301 (Quarry Six Lease) (BHP Billiton, 2008b).

Vegetation Condition

Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).

to

Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).

Comment

BHP Billiton commissioned ENV Australia Pty Ltd (2008b; 2008d; 2008e; 2008f; and 2008g) to conduct flora and vegetation surveys of the application area in 2008. Factors taken into consideration when determining the vegetation condition were; weeds, grazing, litter and ground disturbance (tracks and other cleared areas). Based on these surveys the vegetation condition was derived.

3. Assessment of application against Clearing Principles

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

Comments **Proposal may be at variance to this Principle**

The application area is located within the Fortescue subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). The Fortescue subregion is characterised by extensive salt marsh, mulga-bunch grass, and short grass communities on alluvial plains in the east. Whilst river gum woodlands fringe the drainage lines of the west. Plains support shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, whilst *Eucalyptus leucophloia* tree steppes occur on ranges (Kendrick and McKenzie, 2002).

ENV Australia Pty Ltd (2008b) recorded 353 flora taxa from 42 families and 123 genera during a flora and vegetation survey of the Mainline Lease between Yandi Junction and Jimblebar Junction. No Declared Rare Flora (DRF) or Threatened Ecological Communities (TEC's) were recorded during floristic surveys of the application area (ENV Australia Pty Ltd, 2008b). Floristic richness was higher than other areas along the Mainline Railway Lease, as suggested by a comparison to other vegetation and flora surveys conducted for BHP Billiton. For example, 272 flora taxa from 46 families and 124 genera were recorded during the Spring Siding to Hesta Siding flora and vegetation survey (Ecologia Environment Pty Ltd 2008). This is most likely attributed to the many different habitats encountered as this section of the proposed rail duplication traverses 10 land systems over a linear corridor spanning approximately 120 kilometres (ENV Australia Pty Ltd, 2008b). All of the recorded vegetation communities were typical of vegetation units previously described for the Pilbara bioregion. Vegetation condition of the proposed rail duplication area was rated as 'degraded' to 'excellent'. Degraded areas were the result of disturbance from existing access tracks either side of the existing rail formation, large numbers of introduced flora species and grazing by cattle (ENV Australia Pty Ltd, 2008b).

ENV Australia Pty Ltd (2008g) recorded 39, 58 and 78 flora taxa from Rail Repeater Stations Six, Seven and Eight respectively. Rail Repeater Stations Six and Seven showed low numbers of flora taxa when compared to comparable flora surveys along the rail corridor and generally contained vegetation in degraded condition (ENV Australia Pty Ltd, 2008g). Rail Repeater Station Eight showed average numbers of flora taxa and contained vegetation in degraded to very good condition (ENV Australia Pty Ltd, 2008g). Vegetation units described at Rail Repeater Stations Six, Seven and Eight are typical of vegetation units previously described for the Pilbara bioregion (ENV Australia Pty Ltd, 2008g).

ENV Australia Pty Ltd (2008f) recorded 166 flora taxa comprising 38 families and 78 genera in the Quarry Six lease area. Floristic richness was comparatively high, when compared to other nearby flora surveys (using 50 metre x 50 metre quadrats) (ENV Australia Pty Ltd, 2008f). The average species richness per quadrat was 29 taxa, whereas, 23.4 and 24.4 taxa per quadrat were recorded from the Mindy North exploration tenement and the Mindy East exploration tenement respectively (ENV Australia Pty Ltd, 2008f). A similar level of species richness was recorded in the Jimblebar Junction to Yandi Junction flora survey (ENV Australia Pty Ltd, 2008f). No Declared Rare or Priority Flora was recorded within the Quarry Six Lease area. Twelve vegetation communities were mapped, all of which are typical of vegetation communities mapped in the Pilbara bioregion.

Desktop studies revealed that 298, 302 and 296 vertebrate fauna species may potentially occur in the Mainline and Rail Repeater Stations, Mining Lease 270SA and Quarry Six survey areas respectively (ENV Australia Pty Ltd, 2008a; 2008c; and 2008c). The application area transverses 10 land systems over a 120 kilometre linear corridor, therefore, the potential for large numbers of fauna species to occur in the application area is high (ENV Australia Pty Ltd, 2008a; 2008c; 2008c).

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

One introduced fauna species, cattle (*Bos Taurus*), was recorded during the ENV Australia Pty Ltd (2008a) fauna survey, however, the following feral fauna have also been noted in previous surveys in proximity to the application area; House Mouse (*Mus musculus*); Cat (*Felis catus*); Donkey (*Equus asinus*); and Camel (*Camelus dromedaries*) (ENV Australia Pty Ltd, 2008a). Introduced species are capable of out-competing native fauna for food and shelter sources. Furthermore, larger carnivorous introduced species are likely to feed directly on native fauna, reducing the biodiversity of the area (ENV Australia Pty Ltd, 2008a).

No flora species listed as Declared weeds under the *Agriculture and Related Resources Protection Act 1976* were recorded during the Yandi Junction to Jimblebar Junction flora survey, while 11 general environmental weeds were recorded (ENV Australia Pty Ltd, 2008b; 2008d; 2008f; 2008g): (Kapok bush) (*Aerva javanica*), Bipinnate Beggartick (*Bidens bipinnata*), Buffel Grass (*Cenchrus ciliaris*), Birdwood grass (*Cenchrus setiger*), Feathertop Rhodes Grass (*Chloris virgata*), Ulcardo Melon (*Cucumis melo* subsp. *agrestis*), Couch (*Cynodon dactylon*), Spiked Malvastrum (*Malvastrum americanum*), Purslane (*Portulaca oleracea*), Whorled Pigeon Grass (*Setaria verticillata*), and Mimosa Bush (*Vachellia farnesiana*) (ENV Australia Pty Ltd, 2008b; 2008d; 2008f; 2008g).

The presence of introduced species diminishes the biodiversity value of the proposed clearing area (CALM, 1999). Care needs to be taken to ensure that vehicles and machinery brought onto the Rail Lease areas do not introduce weeds to non-infested areas. Should a clearing permit be granted, it is recommended that appropriate conditions be imposed to minimise the risk of clearing operations spreading or introducing weeds to non-infested areas.

ENV Australia Pty Ltd (2008a) concluded that the application area was largely comprised of land systems and vegetation types that are well represented both locally and regionally. None of the flora or fauna species identified are likely to be specifically dependant on habitats and native vegetation found within the application area (ENV Australia Pty Ltd, 2008a). The flora and fauna habitats occurring within the application area are well represented within several conservation reserves, and in the Pilbara region generally (ENV Australia Pty Ltd, 2008a). The application area contains historic disturbance from the installation of road and rail infrastructure, earth works and quarries. Some of the surrounding Acacia scrub and hummock grassland appears to be degraded by grazing, and in some places (such as near creek lines and other water sources) the level of vegetation and soil disturbance is high (ENV Australia Pty Ltd, 2008a).

Methodology CALM (1999)
 Ecologia Environment Pty Ltd (2008)
 ENV Australia Pty Ltd (2008a)
 ENV Australia Pty Ltd (2008b)
 ENV Australia Pty Ltd (2008c)
 ENV Australia Pty Ltd (2008d)
 ENV Australia Pty Ltd (2008e)
 ENV Australia Pty Ltd (2008f)
 ENV Australia Pty Ltd (2008g)
 Kendrick and McKenzie (2002)
 GIS Database:
 - Interim Biogeographic Regionalisation for Australia
 - Interim Biogeographic Regionalisation for Australia (Subregions)

(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 is not likely to be at variance to this Principle**
 ENV Australia Pty Ltd (2008a; 2008c; 2008e) conducted three separate Level 1 vertebrate fauna surveys over the application area. These were:

- the Mainline Railway Lease and Rail Repeater Stations Six, Seven and Eight survey between Yandi Junction and Jimblebar Junction in May 2008 (ENV Australia Pty Ltd, 2008a);
- the Mining Lease 270SA survey located approximately 107 kilometres north-west of Newman in May 2008 (ENV Australia Pty Ltd, 2008c); and
- the Quarry Six survey located approximately 66 kilometres north of Newman in May 2008 (ENV Australia Pty Ltd, 2008e).

All three surveys conducted by ENV Australia Pty Ltd (2008a; 2008c; 2008e) involved desktop database searches and literature reviews prior to field reconnaissance in order to compile potential species inventories for the study sites.

Desktop studies revealed that 298, 302 and 296 vertebrate fauna species may potentially occur in the Mainline Railway Lease and Rail Repeater Stations, State Agreement and Quarry Six survey areas respectively. The ENV Australia Pty Ltd (2008a; 2008c; and 2008e) fauna surveys identified that suitable habitat occurs in the application area for the following twelve species of conservation significant fauna.

- Mulgara (*Dasyercus cristicauda*);
- Long-tailed Dunnart (*Sminthopsis longicaudata*);
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*);
- Lake Downs Mouse (*Leggadina lakedownensis*);
- A Lizard (*Lerista macropisthopus remota*);
- Australian Bustard (*Ardeotis australis*);
- Black-footed Rock-wallaby (*Petrogales lateralis lateralis*);
- Pilbara Olive Python (*Liasis olivaceus barroni*);
- Blind Snake (*Ramphotyphlops ganei*);
- Ghost Bat (*Macroderma gigas*);
- Western Pebble-mound Mouse (*Pseudomys chapmani*); and
- Grey Falcon (*Falco hypoleucos*).

Field reconnaissance of the application area was undertaken in May 2008 in all three of the fauna survey areas (ENV Australia Pty Ltd, 2008a; 2008c; 2008e). The main objectives of the field reconnaissance surveys included:

- to provide a description of the main habitat types;
- to look for species of conservation significance;
- to undertake a risk assessment to determine likely impacts and threatening processes on vertebrate fauna; and
- to make recommendations to minimise impacts to fauna (ENV Australia Pty Ltd, 2008a; 2008c;

2008e).

ENV Australia Pty Ltd (2008a; 2008c; 2008e) described the following fauna habitats from the application area:

Low Rise: the Low Rise habitat type is considered to be of the lowest value in terms of the fauna that it may support as it provides a limited number of microhabitats (ENV Australia Pty Ltd, 2008a; 2008e). The Low Rise habitat type is characterised by large open rocky areas with sparse *Triodia* hummocks. There are very few trees within this habitat with little to no leaf litter. Thus, the number of bird species and arboreal lizards in this habitat is likely to be restricted, as is to a lesser extent, the number of ground-dwelling reptiles and mammals. The Low Rises are also unsuitable for burrowing species (ENV Australia Pty Ltd, 2008a; 2008e).

Rocky Hills: the Rocky Hills and their associated valleys are habitat types considered to be of medium importance to fauna. These habitat types are represented by Eucalyptus open woodlands with *Acacia* species over hummock grasslands, and are uncommon in the application area (ENV Australia Pty Ltd, 2008a; 2008c). The Rocky Hills and valleys of the application area offer rock crevices and *Triodia* hummocks that provide microhabitats to a number of ground-dwelling reptiles and mammals. The Northern Quoll (*Dasyurus hallucatus*) may utilise this habitat, although it is not as optimal as gorge and gully habitats (ENV Australia Pty Ltd, 2008a; 2008c). The rocky substrate in these areas limits fauna diversity as it is unsuitable for burrowing species (ENV Australia Pty Ltd, 2008a; 2008c).

Major/Minor Drainage Line: the Major and Minor Drainage Line habitat types are characterised by three well defined layers of vegetation; a tree layer or tall shrub layer; a low shrub layer; and a grass layer. Furthermore, these habitat types have a well-developed leaf litter layer, wooded debris and the soils are suitable for burrowing fauna (ENV Australia Pty Ltd, 2008a; 2008c; 2008e). Tree hollows and hollowed-out logs are also present in some of these areas. In addition, well vegetated drainage lines can serve as important corridors for fauna movement, by connecting fragmented landscapes (ENV Australia Pty Ltd, 2008a; 2008c; 2008e). The Major and Minor Drainage Line habitat types are considered of high importance to vertebrates because of the range of microhabitats present and the linkages made between habitat types (ENV Australia Pty Ltd, 2008a; 2008c; 2008e).

Floodplain: the Floodplain habitat type is characterised by a hummock grassland with open *Corymbia* woodland and *Acacia* shrubs. This habitat type is considered to be of slightly lower importance to fauna when compared to the drainage line habitats as a result of lower habitat complexity and lack of microhabitats (ENV Australia Pty Ltd, 2008a; 2008e). Some areas of the Floodplain habitat have leaf litter and debris for fauna to utilise for shelter. In addition, such habitats have soft soil suitable for burrowing. Similar animals that utilise the drainage lines would also inhabit the surrounding floodplains (ENV Australia Pty Ltd, 2008a; 2008e).

Plain; The Plain habitat type has limited leaf litter and debris with little understorey. This habitat type offers little shelter to ground-dwelling species. In addition, some areas of the plain habitat have rocky surface coverage making it unsuitable for burrowing species (ENV Australia Pty Ltd, 2008a; 2008c; 2008e).

One conservation significant fauna species was recorded during the reconnaissance surveys. This species is discussed below.

The Pilbara subspecies (*Liasis olivaceus barroni*) of the Olive Python only occurs in the ranges of the Pilbara region of Western Australia, inhabiting watercourses and areas of permanent water in rocky gorges and gullies (ENV Australia Pty Ltd, 2008a). The Pilbara form discussed here is listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*, and as 'Schedule 1 - Fauna that is rare or likely to become extinct' in the *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*. The recorded specimen was sighted freshly-killed in the mouth of a Perentie (*Varanus giganteus*), and is thought to have been dug up by the Perentie from beneath a signal control box on the railway corridor (ENV Australia Pty Ltd, 2008a). Hummock grassland and floodplains are generally not considered optimal habitat for the Pilbara Olive Python, and it is possible the individual in the application area was residing in sub-optimal habitat or was moving from a patch of preferred habitat to another. It is also possible that the railway corridor provides a linkage or linear patch of habitat, providing potential places for pythons to shelter or forage, such as culverts and concrete slabs (ENV Australia Pty Ltd, 2008a).

ENV Australia Pty Ltd (2008a) concluded that the application area was largely comprised of land systems and vegetation types that are well represented both locally and regionally. None of the fauna species identified are likely to be specifically dependant on habitats found within the application area, although they may use the application area as part of a foraging ground (ENV Australia Pty Ltd, 2008a). The fauna habitats occurring within the application area are well represented within several conservation reserves, and in the Pilbara region generally (ENV Australia Pty Ltd, 2008a). The application area contains historic disturbance from the installation of road and rail infrastructure, earth works and quarries. While these disturbances involve land clearing, they also provide some habitat for fauna, such as under bridges, piles of debris, concrete blocks, culverts etc. Some of the surrounding *Acacia* scrub and hummock grassland appears to be degraded by grazing, and in some places (such as near creek lines and other water sources) the level of vegetation and soil disturbance is high (ENV Australia Pty Ltd, 2008a).

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

Methodology ENV Australia Pty Ltd (2008a)
ENV Australia Pty Ltd (2008c)

(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

ENV Australia Pty Ltd (2008b; 2008d; 2008f; and 2008g) conducted four separate Level 2 flora and vegetation surveys over the application area. These are listed below:

- ENV Australia Pty Ltd (2008b) undertook a flora and vegetation survey of the Yandi Junction (chainage 281 kilometres) to Jimblebar Junction (chainage 401 kilometres) section of the Railway Lease in April 2008;
- ENV Australia Pty Ltd (2008d) undertook a flora and vegetation survey of a 488 hectare area of Mining Lease 270SA in May 2008;
- ENV Australia Pty Ltd (2008f) undertook a Level 2 flora and vegetation survey of the Quarry Six lease area (part of the application area) in May 2008; and
- ENV Australia Pty Ltd (2008g) undertook a flora and vegetation survey of Rail Repeater Stations Six, Seven and Eight, and their associated access roads in April 2008.

According to available databases, there are no known records of Declared Rare Flora (DRF) or Priority Flora within the application area (ENV Australia Pty Ltd 2008b; 2008d; 2008f; 2008g; GIS Database).

No Declared Rare Flora (DRF) listed under the *Wildlife Conservation (Rare Flora) Notice 2008* were recorded in the application area (ENV Australia Pty Ltd 2008b; 2008d; 2008f; 2008g), however, four species of Priority Flora listed with the Department of Environment and Conservation were recorded. All Priority Flora was recorded during the Yandi Junction to Jimblebar Junction Mainline Railway Lease flora and vegetation survey. These species are discussed below.

Eremophila sp. Ophthalmia Range is listed as Priority 1 with the Department of Environment and Conservation. Two plants of this species were recorded in the application area, however, they occur outside of the proposed disturbance footprint (ENV Australia Pty Ltd, 2008b; BHP Billiton, 2008b).

Bulbostylis burbidgeae is listed as Priority 3 with the Department of Environment and Conservation. One plant of this species was recorded in the application area. This plant does occur in close proximity to the proposed disturbance footprint of the signalling cable and may be impacted by this proposal (ENV Australia Pty Ltd, 2008b; BHP Billiton, 2008b).

Goodenia nuda is listed as Priority 3 with the Department of Environment and Conservation. Eight plant of this species were recorded in the application area. Six plants of this species may be impacted by this proposal as they are growing in close proximity to the proposed disturbance footprint (ENV Australia Pty Ltd, 2008b; BHP Billiton, 2008b).

Rostellularia adscendens subsp. *adscendens* var. *latifolia* is listed as Priority 3 with the Department of Environment and Conservation. Three plants of this species were recorded in the application area. These plants occur outside of the proposed disturbance footprint (ENV Australia Pty Ltd, 2008b).

BHP Billiton have committed to avoiding Priority Flora taxa where possible, by shifting the installation of signalling cable and infrastructure, however, where this is not practical to do so Priority Flora plants may be impacted (BHP Billiton, 2008b).

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

ENV Australia Pty Ltd (2008a) concluded that the application area was largely comprised of land systems and vegetation types that are well represented both locally and regionally. None of the flora species identified are likely to be specifically dependant on the native vegetation found within the application area, although there may be limited numbers of conservation significant flora species present (ENV Australia Pty Ltd, 2008a).

The native vegetation occurring within the application area is well represented within several conservation reserves, and in the Pilbara region generally (ENV Australia Pty Ltd, 2008a). The application area contains historic disturbance from the installation of road and rail infrastructure, earth works and quarries. Some of the surrounding Acacia scrub and hummock grassland appears to be degraded by grazing, and in some places (such as near creek lines and other water sources) the level of vegetation and soil disturbance is high (ENV Australia Pty Ltd, 2008a).

Methodology BHP Billiton (2008b)
ENV Australia Pty Ltd (2008b)
ENV Australia Pty Ltd (2008d)
ENV Australia Pty Ltd (2008f)
ENV Australia Pty Ltd (2008g)

(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 is not likely to be at variance to this Principle

According to available databases there are no Threatened Ecological Communities (TEC's) within the application area (GIS Database). The nearest known TEC's are located approximately 2.7 kilometres to the south-west (GIS Database).

The vegetation units described by ENV Australia Pty Ltd (2008b; 2008d; 2008f; 2008g) within the application area were not considered to be TEC's or an ecological community at risk.

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

Methodology ENV Australia Pty Ltd (2008b)
 ENV Australia Pty Ltd (2008d)
 ENV Australia Pty Ltd (2008f)
 ENV Australia Pty Ltd (2008g)
 GIS Database:
 -Threatened Ecological Communities

(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 application area is within the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara bioregion (GIS Database). According to Shepherd et al. (2001) there is approximately 99.9% of the pre-European vegetation remaining in the Pilbara bioregion. The vegetation of the application area is classified as Beard vegetation association 29 - sparse low woodland; mulga, discontinuous in scattered groups, Beard vegetation association 82 - hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* and Beard vegetation association 111 - hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex (GIS Database).

There is approximately 100% of the pre-European vegetation remaining of Beard Vegetation Associations 29, 82 and 111 in the Pilbara bioregion (Shepherd et al., 2001). These vegetation types are represented within conservation reserves at both the state and bioregional level (see table below). The application area does not represent a significant remnant of vegetation in the wider regional area. The proposed clearing will not reduce the extent of Beard Vegetation Associations 29, 82 and 111 below current recognised threshold levels, below which species loss increases significantly.

It is acknowledged that iron ore mining activities in the Pilbara have resulted in an increase of native vegetation clearing at the bioregional scale in recent years. This trend is expected to continue with proposed BHP Billiton and Rio Tinto expansion projects. It will therefore become increasingly important in the future to consider the cumulative impacts of native vegetation clearing both locally and regionally.

	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					
29	7,904,064	7,904,064	~ 100	Least Concern	0.3 (0.3)
82	2,565,930	2,565,930	~100	Least Concern	10.5 (10.5)
111	762,966	762,966	~ 100	Least Concern	5.5 (5.5)
Beard veg assoc. – Bioregion					
29	1,133,228	1,133,228	~ 100	Least Concern	1.9 (1.9)
82	2,563,610	2,563,610	~100	Least Concern	10.3 (10.3)
111	550,289	550,289	~ 100	Least Concern	1.3 (1.3)

* Shepherd et al. (2001) updated 2005

** 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 et al. (2001)
GIS Databases:
- Interim Biogeographic Regionalisation of Australia
- Pre-European Vegetation

(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

According to available databases, there are no Ramsar wetlands or wetlands listed in "A Directory of Important Wetlands" within the application area (Environment Australia, 2001; and GIS Database).

The application area intersects six major ephemeral drainage lines (GIS Database). ENV Australia Pty Ltd (2008b; 2008d; 2008f; 2008g) identified nine different vegetation types which were growing in association with watercourses. Approximately 23 hectares of these vegetation types in total are proposed to be impacted by the Project. These are described in the table below, along with the proposed disturbance of each vegetation type.

Project Area	vegetation Community Code	Vegetation Description	Proposed area to be cleared (hectares)
Yandi Junction to Jimblebar Junction flora and vegetation survey (ENV Australia Pty Ltd, 2008b)	ExAa*Cc	<i>Eucalyptus xerothermica</i> low open woodland over mixed <i>Acacia citrinoviridis</i> and other <i>Acacia</i> species shrubland over <i>Triodia pungens</i> open hummock grassland over * <i>Cenchrus ciliaris</i> open tussock grassland.	2.5
	AcAs*Cc	<i>Acacia citrinoviridis</i> and mixed <i>Acacia</i> species high shrubland over * <i>Cenchrus ciliaris</i> tussock grassland.	0.4
	CaAn*Cc	<i>Corymbia aspera</i> low open woodland over mixed <i>Acacia</i> species shrubland over <i>Triodia pungens</i> open hummock grassland over * <i>Cenchrus ciliaris</i> open tussock grassland.	7.9
	EvAc*Cc	<i>Eucalyptus victrix</i> low woodland over mixed <i>Acacia</i> species shrubland over <i>Triodia pungens</i> very open hummock grassland over * <i>Cenchrus ciliaris</i> tussock grassland.	8.8
	AdTp	<i>Acacia dictyophleba</i> , <i>Acacia marramamba</i> and <i>Acacia ancistrocarpa</i> high shrubland over <i>Triodia pungens</i> very open hummock grassland over * <i>Cenchrus ciliaris</i> , <i>Chrysopogon fallax</i> tussock grassland.	0.5
Rail Repeater Station Eight (ENV Australia Pty Ltd, 2008g)	EIAAts	<i>Eucalyptus leucophloia</i> low open woodland over <i>Acacia tumida</i> var. <i>pilbarensis</i> open scrub over <i>Acacia</i> spp., <i>Grevillea wickhamii</i> , <i>Rulingia luteiflora</i> and <i>Gossypium robinsonii</i> open heath over <i>Gompholobium karjini</i> , <i>Senna</i> spp. and <i>Corchorus</i> spp. low shrubland over <i>Triodia</i> sp. Shovelanna Hill hummock grassland over <i>Themeda triandra</i> open tussock grassland.	0.1
Mining Lease 270SA (ENV Pty Ltd, 2008d)	EgTdTp	Low open <i>Eucalyptus gamophylla</i> mallee and <i>Corymbia</i> aff. <i>opaca</i> woodland over <i>Hakea lorea</i> over low open shrubland of <i>Tephrosia</i> / <i>Sida</i> / <i>Corchorus</i> spp. over <i>Triodia basedowii</i> hummock grassland.	3.0
Quarry Six (ENV Australia Pty Ltd, 2008f)	CcGwTb	<i>Corymbia candida</i> subsp. <i>dipsodes</i> , <i>C. hamersleyana</i> and <i>Eucalyptus gamophylla</i> low open woodland over <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> , <i>Acacia dictyophleba</i> and <i>Eremophila longifolia</i> open shrubland over <i>Keraudrenia velutina</i> subsp. <i>elliptica</i> over <i>Triodia basedowii</i> open hummock grassland.	0.04
	EcAa*Cc	<i>Eucalyptus camaldulensis</i> var. <i>obtusa</i> , <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia aneura</i> var. <i>pilbarana</i> scattered shrubs over * <i>Cenchrus ciliaris</i>	0

* Means introduced species

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

The majority of vegetation associated with watercourses within the application area occurs within the Yandi Junction to Jimblebar Junction flora and vegetation survey area (20 hectares), and was generally described as being in poor condition, with a high level of disturbance from cattle (e.g. trampling and grazing), introduced flora species (e.g. *Vachellia farnesiana*) and anthropogenic drainage systems (e.g. artificial banks and river beds) (ENV Australia Pty Ltd, 2008b).

As there is an existing rail line which transverses the vegetation associated with the water courses, additional small disturbances associated with this proposal are not expected to have a large environmental impact on riparian vegetation.

Methodology BHP Billiton (2008b)
ENV Australia Pty Ltd (2008b)
ENV Australia Pty Ltd (2008d)
ENV Australia Pty Ltd (2008f)
ENV Australia Pty Ltd (2008g)
Environment Australia (2001)
Van Vreeswyk et al. (2004)
GIS Database:
-ANCA wetlands
-RAMSAR wetlands

(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

Land system mapping by the Department of Agriculture Western Australia has mapped a variety of land systems for the Pilbara bioregion. Land systems are mapped based on biophysical features such as soil and landform type, geology, geomorphology and vegetation type (Van Vreeswyk et al., 2004). The proposed clearing areas include ten different land systems (GIS Database). A broad description of each land system is given below.

1. Boolgeeda - The Boolgeeda land system is characterised by stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands. Vegetation is generally not prone to degradation and the system is not susceptible to erosion (Van Vreeswyk et al., 2004).
2. Divide - The Divide land system is characterised by level to gently undulating plain with occasional linear dunes and plains with thin sand cover. Some susceptibility to wind erosion immediately following burning but stabilisation occurs rapidly after rain (Van Vreeswyk et al., 2004).
3. Fan - The Fan land system is characterised by level wash plain subject to overland sheet flow and with numerous groves of dense vegetation. Moderately susceptible to soil erosion if vegetative cover is depleted (Van Vreeswyk et al., 2004).
4. Fortescue - The Fortescue land system is characterised by alluvial plains, active flood plains and depressions with minor levees and major river channels. Alluvial plains and levees are highly susceptible to erosion if vegetative cover is lost (Van Vreeswyk et al., 2004).
5. Marillana - The Marillana land system is characterised by level plains with dense surface mantles of ironstone gravel, subject to sheet flow. This land system is moderately susceptible to erosion (Van Vreeswyk et al., 2004).
6. Newman - The Newman land system is characterised by hills and ranges, supporting hard spinifex grasslands. Relief can be up to 450 metres. The Newman land system is generally not prone to erosion (Van Vreeswyk et al., 2004).
7. River - The River land system is characterised by active flood plains and major rivers supporting grassy Eucalypt woodlands, tussock grasslands and soft spinifex grasslands. This land system is largely stabilised by Buffel Grass and spinifex, therefore accelerated erosion is uncommon. However, susceptibility to erosion is high or very high if vegetative cover is removed (Van Vreeswyk et al., 2004).
8. Rocklea - The Rocklea land system is characterised by basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands. Relief can be up to 110 metres. This land system has a very low erosion hazard (Van Vreeswyk et al., 2004).
9. Urandy - The Urandy land system is characterised by level stony plains and fans of sandy alluvium. Most of the system is not susceptible to erosion or vegetation degradation (Van Vreeswyk et al., 2004).

10. Washplain - The Washplain land system is characterised by alluvial hardplains subject to overland sheet flow. Some parts of the alluvial plains, groves and tract receiving more concentrated flow are moderately susceptible to erosion (Van Vreeswyk et al., 2004).

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

The proponent will implement the following strategies to minimise land degradation risks associated with vegetation clearing (BHP Billiton, 2008b):

- All cleared vegetation will be stockpiled for later use in rehabilitation. To minimise disturbance, stockpiles will be located on previously cleared or disturbed areas where practicable;
- Topsoil will be stripped to a depth of 50 - 100 millimetres and stockpiled to a height no greater than 1.5 metres for later use in rehabilitation. To minimise disturbance, stockpiles will be located on previously cleared or disturbed areas where practicable;
- Borrow pits will be progressively rehabilitated, whilst laydown areas will be rehabilitated post construction;
- Surface water run-off from work areas shall be contained in sumps to prevent pollution and erosion. Sumps shall be filled and rehabilitated upon completion of works. Bunding will also be used where necessary to prevent sediment releases off site;
- A total of 11 culverts will be installed where the rail formation crosses minor drainage lines and areas of concentrated surface runoff. Culverts have been engineered to have sufficient capacity to accommodate flow along existing drainage lines from one in 50 year flood events (BHP Billiton, 2008b). Rock protection is provided as a general specification in culvert design, and will be used in all culverts installed during construction; and
- Where the potential for erosion is high, appropriate methods for erosion control will be used (such as gabions, rip rap rock protection and reno mattresses). Post construction quality assurance monitoring will identify any additional erosion control which may be required (BHP Billiton, 2008b).

Methodology BHP Billiton (2008b)
Van Vreeswyk et al. (2004)
GIS Database
- Rangeland land system mapping

(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

According to available databases there are no conservation reserves located within the application area (GIS Database).

The Fortescue Marshes listed in; "*A Directory of Important Wetlands in Australia*", is an Environmentally Sensitive Area located approximately 10 kilometres north of the application area. The Fortescue Marshes are an extensive, periodically inundated samphire marsh totalling approximately 100,000 hectares (Environment Australia, 2001). The distance between the Fortescue Marshes and the application area is considered adequate for separation of these activities and it is unlikely that the proposed clearing will impact on the environmental values of the Fortescue Marshes.

File Notation Area (FNA) 532 for the Conservation of Mulga, vested with the Department of Environment and Conservation, is located approximately 1.5 kilometres to the north and west of the application area (BHP Billiton, 2008b). Given there is an existing rail line and disturbance associated with this within 1.5 kilometres of the FNA, it is unlikely that the proposed additional clearing will impact on the environmental values of this area.

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

Methodology BHP Billiton (2008b)
Environment Australia (2001)
GIS Database:
- CALM Managed Lands and Waters

Officer Chris HEARY

(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 southern extent of the application area occurs within the Newman Water Reserve, a Public Drinking Water Source Area (PDWSA) (BHP Billiton, 2008b; GIS Database). Advice received from the Department of Water on 19 January 2009 states: "BHP Billiton is both the water service provider utilising this water sources and the applicant for the clearing permit. If the clearing associated activities lead to contamination of the water source then there is an expectation that BHP [Billiton] would be responsible for remediation of any potential water contamination" (DoW, 2009). "All activities associated with the clearing include infrastructure, laydown area, refuelling, and topsoil storage should be compatible with the Department's [Department of Water] Land Use Compatibility Tables" (DoW, 2009). "The DoW [Department of Water] is satisfied that the proposed clearing of 243ha [hectares] is unlikely to have a significant impact on the quality of groundwater" (DoW, 2009).

A number of ephemeral drainage lines dissect the application area. Currently there are 11 culverts which maintain natural surface water flow beneath the rail line. These will be extended beneath the proposed rail duplication area (BHP Billiton, 2008a). These engineering structures will ensure natural surface water flow regimes are reinstated following duplication of the railway line.

During clearing, there is a potential for surface water quality to be impacted by sedimentation should adequate management measures not be put in place. BHP Billiton (2008b) will implement the following strategies to avoid, minimise and mitigate impacts to surface water quality:

- Surface water run-off from work areas shall be contained in sumps. Bunding will also be used where necessary to prevent sediment releases off site;
- Where the potential for erosion is high, appropriate methods for erosion control will be used (such as gabions, rip rap rock protection and reno mattresses). Designers for the civil works will determine erosion potential based on floodway reports and standard engineering experience. Rock protection is provided as a general specification in culvert design, and will be used in all culverts installed during construction. Post construction quality assurance monitoring will identify any additional erosion control which may be required; and
- Topsoil and cleared vegetation shall be stockpiled away from watercourses.

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

Methodology BHP Billiton (2008b)
DoW (2009)
GIS Database:
-Public Drinking Water Source Area

(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

Geoscience Australia (2008) attributes four major factors which influence inland flooding. These include:

- Intensity and duration of rainfall over a catchment area;
- The capacity of the watercourses to network and convey runoff;
- The percentage of vegetation cover; and
- The topography.

Based on the four factors listed above, clearing within the application area is unlikely to exacerbate the incidence or intensity of flooding for the following reasons:

- The application area has a climate with a summer predominant rainfall pattern averaging approximately 300 millimetres per annum ENV Australia Pty Ltd (2008a), and a high average annual evaporation rate exceeding the average annual rainfall by more than ten times (approximately 3,500 millimetres) (GIS Database);
- The application area stretches over the Fortescue River, Upper Catchment. This catchment totals approximately 2,975,192 hectares (GIS Database). Although the area of proposed clearing is relatively large (243 hectares), when compared in relation to the large size of the Fortescue River, Upper Catchment, it is unlikely to result in an appreciable increase in runoff. Furthermore, where the rail corridor crosses drainages lines, culverts will be installed and engineered to withstand a one in 50 year rainfall event (BHP Billiton, 2008b);

- Vegetation cover immediately surrounding the application area is high, with nearly 100 percent of the pre-European vegetation remaining (Shepherd et al., 2001), slowing water movements to lower lying areas and increasing water infiltration and absorption; and
- The topography of the application area slowly descends from 510 metres above sea level in the south to 490 metres in the north (20 metre drop over 120 kilometres) (GIS Database). Water movements across the application area during significant rainfall events are expected to be slow allowing infiltration and reducing rapid mass transition of water to lower areas.

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

Methodology BHP Billiton (2008b)
 ENV Australia Pty Ltd (2008a)
 Geoscience Australia (2008)
 Shepherd et al. (2001)
 GIS Database:
 - Evaporation Isopleths
 - Hydrographic Catchments
 - Rainfall, Mean Annual
 - Topography Contours, Statewide

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Comments

There are two native title claims over the application area (GIS Database). These claims (WC99-004 and WC99-062) have been registered with the National Native Title Tribunal on behalf of the claimant groups (GIS Database). However, the mining tenements have 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 numerous registered Sites of Aboriginal Significance within two kilometres of the application area (GIS Database). The proposed clearing intersects the buffer zone of one of these sites (Site ID 6344) (BHP Billiton, 2008b). Recent heritage surveys have been undertaken by the traditional owners of the land, confirming that there are no registered Sites within the proposed clearing areas (BHP Billiton, 2008b). 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.

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 (2008b)
 GIS Databases:
 - Aboriginal Sites of Significance
 - Native Title Claims

4. Assessor's comments

Comment

The proposal has been assessed against the clearing principles and is at variance to Principle (f), may be at variance to Principles (a), (c) and (g), is not likely to be at variance to Principles (b), (d), (h), (i) and (j) and is not at variance to Principle (e).

Should a clearing permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed management, record keeping and permit reporting.

5. References

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- ENV Australia Pty Ltd (2008c) Rapid Growth Project 5: M270SA Fauna Assessment Report, prepared for BHP Billiton, Perth, Western Australia.
- ENV Australia Pty Ltd (2008d) Rapid Growth Project 5: M270SA Flora and Vegetation Assessment Report, prepared for BHP Billiton, Perth, Western Australia.
- ENV Australia Pty Ltd (2008e) Rapid Growth Project 5: Quarry Six Fauna Assessment Report, prepared for BHP Billiton, Perth, Western Australia.
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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.