



1. Application details

1.1. Permit application details

Permit application No.: 2104/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: Iron Ore (Mt Goldsworthy) Agreement Act 1964, Mining Lease 249SA (AML 70/249)
Local Government Area: Town of Port Hedland
Colloquial name: Ord Ridley exploration project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
50		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 The area applied to clear has been broadly mapped at a scale of 1:250,000 as:

Corresponding with the plateaux - Beard Vegetation Association 93: Hummock grasslands, shrub steppe; Kanji over soft Spinifex;

Corresponding with floodplain surrounding the plateaux - Beard Vegetation Association 589: Mosaic: Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex; and

Corresponding with main drainage lines - Beard Vegetation Association 619: Medium woodland; river gum (*Eucalyptus camaldulensis*) (GIS Database, Shepherd et al., 2001).

A flora and vegetation survey of the project area was conducted by ENV Australia between the 28 March and 3 April 2007 (ENV Australia, 2007a). Data was collected from 90 quadrats, selected as being representative of the flora and vegetation within the Ord and Ridley Prospects. The vegetation of the project area was delineated into a number of broad major habitats, based predominantly on landforms.

The following vegetation types were present within the Ord Prospect:

* Upper Hill Crests (rocky) - *Acacia acradenia*, with or without *A inaequilatera* scattered shrubs over *Triodia epactia* hummock grassland;

* Undulating Hill Crests - *Acacia acradenia*, with or without *A inaequilatera* scattered shrubs over *Triodia epactia* hummock grassland OR *Triodia epactia*, with or without *Triodia schinzii* hummock grassland;

* Upper Rocky Plateau - *Acacia tumida* var. *pilbarensis* open shrubland over *Triodia epactia* hummock grassland;

* Cliff Faces - *Terminalia canescens*, *Ehretia saligna* var. *saligna* scattered low trees over *Sida subarticulata*, *Corchorus tectus* low scattered shrubs over *Triodia epactia* open hummock grassland over *Eriachne mucronata* very open grassland;

* Gullies and Vertical Rock Faces - *Terminalia canescens*, *Ehretia saligna* var. *saligna*, *Atalaya hemiglauca*, *Ficus brachypoda*, *Ficus opposita* var. *indecora* low woodland over *Carissa lanceolata*, *Acacia pyrifolia* open shrubland over *Triumfetta clementii*, *Corchorus tectus*, *Hybanthus aurantiacus* low open shrubland over *Triodia epactia* hummock grassland;

* Minor Drainage Lines - *Corymbia hamersleyana* scattered low trees over *Acacia tumida* var. *pilbarensis* high shrubland over *Sida subarticulata* low open shrubland over *Triodia epactia* hummock grassland OR *Eucalyptus odontocarpa* low open woodland (mallee) over *Acacia acradenia* open shrubland over *Triodia epactia* hummock grassland;

* Major Drainage Lines - *Terminalia canescens* scattered low trees over *Triodia epactia* very open hummock grassland over *Cyperus pulchellus*, *Fimbristylis dichotoma*, *Bulbostylis barbata* open sedgeland;

* Foothills - *Triodia epactia* hummock grassland; and

* Broad U-shaped Valley - *Corymbia hamersleyana* scattered low trees over *Triodia epactia* hummock grassland.

The following vegetation types were present within the Ridley Prospect:

* Major Drainage Line - *Eucalyptus camaldulensis* var. *obtusa*, *E victrix* woodland over *Melaleuca argentea*, *Acacia ampliceps* low open forest over *Eriachne obtusa*, *Cynodon dactylon* open grassland over *Cyperus bifax*, *Cyperus iria*, *Cyperus bulbosus*, *Cyperus vaginatus* sedgeland;

*Levee Banks of Major Drainage Line - *Eucalyptus victrix* scattered low trees over *Acacia pyridifolia* scattered shrubs over *Vigna lanceolata* var. *lanceolata*, *Ipomoea muelleri*, *Dentella asperata* low scattered shrubs over *Triodia longiceps* hummock grassland OR *Bauhinia cunninghamii*, *Acacia pyrifolia* scattered shrubs over *Pluchea tetranthera*, *Bonamia media* var. *villosa* low scattered shrubs over *Triodia epactia* open hummock grassland over *Cenchrus ciliaris* grassland over *Bulbostylis barbata* scattered sedges;

* Low Hill - *Triodia epactia* hummock grassland;

* Floodplain - *Cenchrus ciliaris* grassland;

* Foothills - *Acacia inaequilatera* scattered shrubs over *Indigofera trita*, *Triumfetta clementii*, *Mullugo molluginis*, *Boerhavia gardneri*, *Hybanthus aurantiacus* low open shrubland over *Triodia epactia* hummock grassland;

* Hill slopes - *Triumfetta clementii*, *Boerhavia gardneri*, *Tephrosia aff supine*, *Hybanthus aurantiacus* low scattered shrubs over *Triodia epactia* hummock grassland;

* Gullies - *Corymbia hamersleyana*, *Ficus brachypoda*, *Ficus opposita* var. *indecora*, *Atalaya hemiglauca*, *Ehretia saligna* var. *saligna* low woodland over *Acacia tumida* var. *pilbarensis*, *Acacia pyrifolia*, *Carissa lanceolata* open shrubland over *Rynchosia minima* var. *australis*, *Hybanthus aurantiacus* low shrubland over *Triodia epactia* hummock grassland over *Eriachne mucronata*, *Cymbopogon ambiguous* open grassland; and

* Hill Crest - *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

Clearing Description

BHP Billiton Iron Ore (BHP Billiton) propose to clear 50 hectares of native vegetation within a total application area of approximately 182 hectares for the development of tracks and drill pads for exploration purposes within the Ord Ridley Exploration Area on Mineral Lease 249SA (AML 70/249), *Iron Ore (Mt Goldsworthy) Agreement Act 1964*. The clearing will be undertaken by bulldozer, using a raised blade wherever possible, and topsoil will be stockpiled for future use.

The BHP Billiton Iron Ore Pty Ltd (BHP Billiton) Ord Ridley project area is located approximately 65 km east of Port Hedland and approximately 4 km north of the Great Northern Highway near the De Grey River (BHP Billiton, 2007a; GIS Database). Geographically, the Ord Ridley project area consists of a flat top plateau ridgeline with gullies trending to a flat, weakly incised floodplain (BHP Billiton, 2007a).

The application area consists of two main ore bodies, these being the Ridley Prospect and the Ord Prospect (BHP Billiton, 2007a). The application is comprised of six disparate areas. The two areas in the north are part of the Ridley prospect, while the four to the south are part of the Ord Prospect (BHP Billiton, 2007a).

Vegetation Condition

Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).
to
Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).

Comment

The vegetation of the project area was described by ENV Australia (2007a) as good to excellent, with a majority of the sites rated as very good or excellent. Some disturbance was evident within sites, with the main disturbances being historical drill pads and tracks, grazing by cattle, and weed invasion.

Eight introduced weed species were recorded within the project area (ENV Australia, 2007a). These were *Aerva javanica* (Kapok Bush), *Cenchrus ciliaris* (Buffel Grass), *Chloris barbata* (Purpletop Chloris), *Cucumis melo* subsp. *agretis* (Ulcardo Melon), *Cynodon dactylon* (Couch), *Indigofera oblongifolia*, *Parkinsonia aculeata* (Parkinsonia) and *Passiflora foetida* var. *hispida*. The most common of these species were *Cucumis melo* subsp. *agretis* (Ulcardo Melon) and *Cenchrus ciliaris* (Buffel Grass).

All of the introduced species were recorded with low percentage covers, typically 1% or less, with the exception of *Cenchrus ciliaris* (ENV Australia, 2007a), which had a percentage cover of between 10 and 40 % at five sites where it was recorded.

Parkinsonia aculeata (Parkinsonia), which was recorded at one riverine site, is listed as a Declared Plant with a P2 control code by the Department of Agriculture and Food (2008).

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 is not likely to be at variance to this Principle

The proposed clearing is located within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, and the Roebourne IBRA subregion (GIS database).

Kendrick and Stanley (2001) assessed the biodiversity of the Roebourne IBRA subregion in relation to landscape, ecosystem, species and genetic values. High species and ecosystem diversity as well as a centre of endemism are cited for the Burrup Peninsula, which is located approximately 240 kilometres west of the application area. The basalt rock piles in the region are listed as fire refuges.

A flora and vegetation survey of the project area was conducted by ENV Australia between the 28 March and 3 April 2007 (ENV Australia, 2007a). A total of 153 taxa were recorded from 38 families from within the project area. No Priority Flora or Declared Rare Flora were located within the project area during the survey.

Of the 153 taxa recorded in the vegetation survey, eight were introduced flora species (ENV Australia, 2007a). These were *Aerva javanica* (Kapok Bush), *Cenchrus ciliaris* (Buffel Grass), *Chloris barbata* (Purpletop Chloris), *Cucumis melo* subsp. *agretis* (Ulcardo Melon), *Cynodon dactylon* (Couch), *Indigofera oblongifolia*, *Parkinsonia aculeata* (Parkinsonia) and *Passiflora foetida* var. *hispida*. The most common of these species were *Cucumis melo* subsp. *agretis* (Ulcardo Melon), which was recorded at 29 of the 90 quadrats, and *Cenchrus ciliaris* (Buffel Grass), which was recorded at 20 of the 90 quadrats.

All of the introduced species were recorded with low percentage covers, typically 1% or less, with the exception of *Cenchrus ciliaris* (ENV Australia, 2007a), which had a percentage cover of between 10 and 40 % at five sites where it was recorded. This species has a High rating under the Department of Environment and Conservation's (DEC) Environmental Weed Strategy (CALM, 1999) as it is highly invasive, has a wide distribution and has the ability to change the structure, composition and function of native ecosystems.

Parkinsonia aculeata (Parkinsonia), which was recorded at a riverine site with flowing water and loamy banks within the project area, is listed as a Declared Plant by the Department of Agriculture and Food (2008). This plant has a P2 control code within the Town of Port Hedland, which requires eradication of the infestation.

Control measures to prevent the introduction and spread of noxious weeds within the project area have been identified and included in the BHP Billiton Iron Ore Exploration Environmental Management Plan (EEMP) (BHP Billiton, 2007b) under weed management. Weed management will be carried out (but not be limited to) that outlined in the EEMP.

Eleven broad habitats were identified within the Ord Prospect and nine within the Ridley Prospect within the project area. The majority of the sites surveyed were considered to be in Very Good to Excellent condition, with no sites having a rating of less than Good. The main disturbances recorded were clearing associated with past drill pads and tracks, grazing by cattle, and weed invasion (ENV Australia, 2007a).

Up to 43 mammals, 137 reptiles, nine amphibians and 154 birds potentially occur within the project area. The Fauna Assessment of the Ord Ridley Exploration Lease area conducted by ENV Australia (2007b) recorded a total of 111 species, comprising 12 mammals, 19 reptiles, 7 amphibians and 73 birds. In addition, one mammal, one reptile, and ten bird species were observed outside of the project area.

The project area is comprised of a number of different landforms including rocky hills and slopes, low dolerite hills, plains and floodplains. ENV Australia (2007a) states that the landforms within the project area are generally well represented elsewhere within the Pilbara region. The range at Ord Ridley was barren and generally species depauperate in comparison to other areas within the region. One landform, the sandstone cliffs, was very distinctive however, the vegetation present was typical of breakaways and rocky habitats within the area (ENV Australia, 2007a).

The proposed disturbances to the project area are confined to exploratory drilling access tracks and drill pads (BHP Billiton, 2007a). Pre-existing tracks will be used where possible for site access to minimise impact on the region's flora and vegetation.

Based on the above, the proposed clearing is not likely to be at variance to this principle. It is recommended that appropriate weed hygiene measures are implemented and rehabilitation conducted.

Methodology

BHP Billiton (2007a)
BHP Billiton (2007b)
CALM (1999)
Department of Agriculture and Food (2008)
ENV Australia (2007a)
ENV Australia (2007b)
Kendrick and Stanley (2001)

GIS databases:

- Interim Biogeographic Regionalisation of Australia
- Interim Biogeographic Regionalisation of 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 may be at variance to this Principle

ENV Australia (2007b) conducted a Fauna survey of the project area which comprised the Ord, Ridley and F3 Prospects (with a total area of approximately 1830 ha) between the 6 and 16 March 2007. This project area incorporates the area proposed to be cleared. The survey corresponded to a Level One survey as delineated in EPA Guidance for the Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia No. 56 (EPA, 2004a).

The project area is situated adjacent to a major drainage line that extends south through the easternmost portion of the project area. Undulating dolerite hills dominate the project area with their associated rocky breakaways and gullies. Floodplains and plains form the remainder of the area. The proposed drill pad areas for the two orebodies are located within seven major landform units/habitat types (ENV Australia, 2007b) (see table below).

Prospect	Landform Type
Ridley Prospect	Major Drainage Line / Riverine Floodplain / Alluvial Plain Low Rocky Hills
Ord Prospect	Rocky Hills Scree Slopes Sandstone Cliff Minor Drainage Lines

The survey comprised a search for fauna across all habitats using opportunistic searching and collection techniques, with a particular emphasis on habitats targeted for exploration drilling (ENV Australia, 2007b). Bat acoustic recordings, using ANABAT recording units, were also undertaken in areas where bat species were likely to be found. The methodology of this Level One survey was considered adequate due to the limited impact of the proposed exploration drilling program.

In the three months preceding the survey, the area had received 232.6 mm of rainfall with a large amount of this resulting from tropical cyclone George which impacted on the area in early March (ENV Australia, 2007b). The day temperatures were in the high 30's to low 40's, with night temperatures in the low to mid 20's. These weather conditions were not likely to limit the activity of any faunal group.

The floodplain and drainage lines are considered to have the highest habitat value due to the abundance of microhabitats which they provide to fauna. The scree slope habitats are also of high value as they provide suitable habitat for the Priority 4 listed species, Western Pebble-mound Mouse (*Pseudomys chapmani*). The sandstone cliff habitats present within the Ord Prospect are also considered of high value, as this habitat offers potential breeding sites for the Schedule 4 species, Peregrine Falcon (*Falco peregrinus*). The breakaways and minor gorges offer a medium level of habitat value to fauna whilst the low rocky hills are considered to be the lowest value in terms of the fauna that they may support as they provide a limited number of microhabitats.

The survey recorded a total of 123 species, of which 111 species of vertebrate fauna were recorded within the project area, including 12 mammals, 19 reptiles, 7 amphibians and 73 birds (ENV Australia, 2007b). In addition, 1 mammal, 1 reptile, and 10 bird species were observed outside the lease boundary. As the Ord Ridley area, specifically, had not previously been surveyed, records from the Goldsworthy Expansion Project (100km east of the project area) were used for comparison purposes and to provide a regional perspective. The knowledge of fauna located within the vicinity of the Ord Ridley project area was increased by this survey through the detection of 1 additional mammal species, 1 species of reptile, 4 amphibians, and 20 species of bird that were not recorded in these previous surveys. These recordings were most likely a consequence of the favourable weather conditions (increased rainfall) prior to and during the survey.

Of the 123 species recorded during ENV Australia's survey (2007b), 104 fauna are of conservation significance, including 13 mammals, 1 reptile, 7 amphibians, and 83 birds. Twenty-six of those recorded were of the Conservation Importance 4 (CI 4) category (migratory and marine species) and 73 are listed as CI 5 (species listed with the IUCN as Near Threatened, Least Concern or Data Deficient).

Two CI 1 species (Declared Threatened Fauna as per International publications, or Commonwealth and State Acts), the Northern Quoll (*Dasyurus hallucatus*) and the Peregrine Falcon (*Falco peregrinus*), were observed during the survey (ENV Australia, 2007b). While the habitat of the Northern Quoll is well represented within the Pilbara, this species is in decline and therefore, the habitat could be considered to be potentially significant. This species has been recorded from numerous past surveys of the Goldsworthy area. Due to the diffuse nature of the proposed exploration activities, it is not expected that the clearing will significantly impact upon populations of this species within the locality. The Peregrine Falcon was observed outside the project area at a

small creek west of the F3 Prospect. Although this species may utilise the project area, with the Ord Prospect offering potential breeding sites, the proposed clearing is unlikely to significantly affect this species due to its high mobility.

No CI 2 (Priority Fauna as listed by the Department of Environment and Conservation) species were recorded during the survey by ENV Australia (2007b).

Three species classified as CI 3 (species endemic to the region) were recorded during the survey, these being the Common Rock-rat (*Zyzyms argurus*), the Pilbara Death Adder (*Acanthopis wellsii*) and the Glandular Toadlet (*Uperoleia glandulosa*) (ENV Australia, 2007b). The Common Rock-rat occurs in restricted and disjunct populations across northern Australia. The Pilbara Death Adder, although widespread through the Pilbara, is endemic to this region. The Glandular Toadlet is endemic to the Pilbara with a restricted distribution within the vicinity of Port Hedland. The habitats of these species are well represented elsewhere in the Pilbara, with these species not specifically depending upon habitats within the project area, therefore, reducing the potential impacts upon these species.

A total of 219 fauna of conservation significance potentially occur within the project area. Of these, 42 are of the CI 4 category and 106 are listed as CI 5 (ENV Australia, 2007b).

Potentially occurring fauna of conservation significance may include but are not limited to the Mulgara (*Dasycercus cristicauda*), the Western Pebble-mound Mouse (*Pseudomys chapmani*), the Pilbara Olive Python (*Liasis olivaceus barroni*), the Blind Snake (*Ramphotyphlops ganei*), the Australian Bustard (*Ardeotis australis*) and the Bush Stone-curlew (*Burhinus grallarius*). These species have previously been recorded from within the vicinity of the project area and their preferred habitats occur within the project area. For these reasons, these species may occur within the project area and potentially be affected by impacts associated with the area. However, these species generally occupy habitats that are broadly located across the Pilbara. Impacts from the clearing are to be confined to the construction of drill pads and tracks which represent only small portions of the total habitat area available within the lease boundary and vicinity of the mining lease.

The habitats present within the project area are generally well represented within the Pilbara region, reducing the potential impacts upon the species of conservation significance recorded and potentially occurring within the project area.

Based on the above, the proposed clearing may be at variance to this principle. The fauna survey (ENV Australia, 2007b) recorded a high species diversity, with the habitat potentially being significant to a number of species. Due to the diffuse nature of the proposed exploration activities, it is not expected that the clearing will significantly impact upon populations of these species within the locality of the proposed clearing.

Methodology ENV Australia (2007b)
EPA (2004a)

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

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

A flora and vegetation survey of the project area was conducted by ENV Australia between the 28 March and 3 April 2007 (ENV Australia, 2007a). This survey corresponded to a Level Two survey as delineated in EPA Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia No. 51 (EPA, 2004b).

Data was collected from 90 quadrats, selected as being representative of the flora and vegetation within the Ord and Ridley Prospects (ENV Australia, 2007a). In the three months preceding the survey, the Pardoo area had received 592.4 mm of rainfall and 388.8 mm was recorded from the Port Hedland area, with most of this resulting from two tropical cyclones which impacted the region in early March. As a result, ephemeral and annual species were present and many species were in flower during the survey.

A total of eight Priority species were identified as potentially occurring in the project area (ENV Australia, 2007a). However no Declared Rare or Priority Flora species were recorded within the Ord Ridley project area. In addition, no flora species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* were recorded within the Ord Ridley project area. No species recorded from within the area were of special interest or required further work.

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

Methodology ENV Australia (2007a)
EPA (2004b)

(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

A search of the DEC's Threatened Ecological Communities (TECs) database revealed there are no known occurrences of Threatened or Priority Ecological Communities within the project area (ENV Australia, 2007a). In addition, no TECs were identified during the biological survey conducted by ENV Australia.

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

Methodology ENV Australia (2007a)

(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 under application falls within the Pilbara IBRA bioregion, and the Roebourne IBRA subregion (GIS Database). The proposed clearing is not located within the Intensive Land Use Zone (GIS database; Shepherd et al., 2001). The project areas are broadly mapped as Beard Vegetation Associations:

- 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;
- 589: Mosaic: Short bunch grassland - savannah / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex; and
- 619: Medium woodland; river gum (*Eucalyptus camaldulensis*). (GIS Database; Shepherd et al., 2001).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	% of Pre-European area in IUCN Class I-IV Reserves
IBRA Bioregion - Pilbara	17,804,164	17,794,164	~99.9	Least Concern	6.3
Beard vegetation associations - WA					
93	3,044,326	3,044,267	~100	Least Concern	0.4
589	809,764	809,647	~100	Least Concern	0.6
619	119,159	119,038	~99.9	Least Concern	0.2
Beard vegetation associations - Pilbara Bioregion					
93	3,042,131	3,042,082	~100	Least Concern	0.4
589	730,274	730,690	~100	Least Concern	1.9
619	118,706	118,706	~100	Least Concern	0.2

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

Although the percentage of land vested in conservation reserves is low for the Pilbara IBRA bioregion and Beard vegetation associations 93, 589 and 619, the regional extent is approximately 100% uncleared, and therefore the proposed clearing does not pose a threat to the conservation of these vegetation associations.

The area proposed to be cleared does not form a significant remnant of native vegetation in an area that has been extensively cleared.

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

Methodology BHP Billiton (2007a)

Department of Natural Resources and Environment (2002)

Shepherd et al. (2001)

GIS Database:

- Interim Biogeographic Regionalisation of Australia
- Interim Biogeographic Regionalisation of Australia (subregions)
- 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 may be at variance to this Principle

The De Grey River is situated east of the areas applied to clear (BHP Billiton, 2007a). The De Grey River is listed as a Wetland of National Significance and is defined as an Environmentally Sensitive Area (ESA) by the Department of Environment and Conservation (DEC). It is one of the major rivers of the Pilbara region, rising at the confluence of the Oakover and Nullagine Rivers, and flowing generally westwards and north westwards for about 193km into Breaker Inlet on the Indian Ocean. The De Grey River contains the longest permanent river pools in northwest Australia which provide a significant drought refuge for freshwater fish and 20 species of waterbirds (mostly darters, cormorants, and herons) (Water and Rivers Commission, 2004). No clearing will occur within the area defined as an ESA or within vegetation associated with the De Grey River.

The Ridley River runs through the eastern end of the Ridley Prospect project area (BHP Billiton, 2007a). BHP Billiton will not drill in major drainage channels, or within a 20 m buffer from the boundary of riparian vegetation. There are also a number of minor drainage channels within the project areas (GIS Database). Wherever practicable, BHP Billiton will not encroach within 10 m of minor drainage lines that may be considered significant in relation to local and/or regional surface water flow (BHP Billiton, 2007b).

BHP Billiton have recently developed an Exploration Environmental Management Plan (EEMP) to address specifically the impacts associated with exploration (BHP Billiton, 2007b). The EEMP states that a preference will be given for the selection of drill sites where there is a low level of vegetation and is a suitable distance from any natural drainage course.

Based on the above, the proposed clearing may be at variance to this principle. However, given the management measures outlined above, the impacts of the proposed clearing on any watercourses is likely to be minimal. In addition, DoW has advised that they have no concerns about the proposed clearing as the areas proposed to be cleared are not in close proximity to any significant water courses, wetlands or wild river catchments (DoW, 2007a). Should a clearing permit be granted, it is recommended that a condition be imposed to prevent clearing within 50m of a watercourse if it is flowing.

Methodology BHP Billiton (2007a)
BHP Billiton (2007b)
DoW (2007a)
Water and Rivers Commission (2004)
GIS Database:
- Hydrography, linear

(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 Ord Ridley Project area falls across three main land systems (GIS database) as described by van Vreeswyk et al. (2004):

Capricorn land system: This is the main land system of the project area and comprises hills and ridges of sandstone and dolomite, supporting Spinifex grasslands. The stoniness of this land system confers resistance to erosion;

Boolgeeda land system: Smaller pockets of this land system are present in the project area which comprise more of the stony lower slopes and plains located at the base of hill systems. This land system typically supports Hard and Soft Spinifex and Mulga Shrubland. This land system is generally not susceptible to erosion; and

River land system: This land system intersects the eastern clearing area in the Ridley Prospect adjacent to the Ridley River and is described as active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft Spinifex grasslands. This system is largely stabilised by Buffel grass and Spinifex and accelerated erosion is uncommon. However, susceptibility to erosion is high or very high if vegetative cover is removed.

The primary source of land degradation will be the clearing of vegetation for access tracks and drill pads (BHP Billiton, 2007a). Secondary sources of land degradation that have potential to occur within the project area include compaction and erosion. In line with the terrain typical of the project area, it is not envisaged that impacts associated with subsoil compaction will be encountered throughout the project. Any compaction that may occur will be confined to the tracks developed for the project and will be remedied upon completion in accordance with the rehabilitation practices stated within the BHP Billiton Iron Ore Exploration Environmental Management Plan (BHP Billiton, 2007b).

Based on the above, the proposed clearing may be at variance to this principle. Clearing within the River land system could lead to erosion, particularly if the clearing occurs on land which experiences surface water flows before rehabilitation is successfully established. It is recommended that appropriate measures are implemented for rehabilitation and avoidance of watercourses during periods of water flow.

Methodology BHP Billiton (2007a)
BHP Billiton (2007b)
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

There are no conservation areas in the vicinity of the project area (GIS database; BHP Billiton, 2007a). The nearest DEC managed lands are the Mungaroo Range Nature Reserve and the Millstream - Chichester National Park, which lie approximately 160 km and 190 km southwest of the project area, respectively.

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

Methodology BHP Billiton (2007a)
GIS database:
- CALM Managed Lands and Waters

(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 is located within the De Grey Water Reserve, a Public Drinking Water Resource Area (PDWSA) (GIS Database). DoW (2007a) has advised that this area is currently designated 'Priority 1 (P1)' under the Priority Source Classification System. Mineral exploration is compatible with conditions in a P1 Public Drinking Water Source Area. All activities associated with the clearing including infrastructure, laydown areas, refuelling, and topsoil storage should be compatible with the DoW's Land Use Compatibility Tables. Acceptable activities should be managed using current best practices (DoW, 2007a).

The subject property is located within the Pilbara Groundwater Area as proclaimed under the *Rights in Water and Irrigation Act 1914* (DoW, 2007a). Any groundwater abstraction in this proclaimed area is subject to licensing by the Department of Water. The DoW is satisfied that the proposed clearing of 50 ha is unlikely to have a significant impact on the quality or quantity of groundwater.

BHP Billiton (2007a) recognise that exploration is a conditional activity within P1 Source Protection Areas. It is DoW's policy position that a Wellhead Protection Zone (WHPZ) should be established around all water supply bores to protect the water source from contamination. In P1 areas WHPZs extend to a 500m radius around the wellhead. BHP Billiton are committed to not clearing any vegetation within a 500m radius of a wellhead within the project area.

The groundwater in the area is marginal to brackish, whilst the surface water of the De Grey River and associated tributaries is fresh (BHP Billiton, 2007a). The regional groundwater flow is generally north to northwest. The De Grey River aquifer is unconfined and is recharged directly by rainfall and river flow.

The hydrological features of the Ord Ridley lease are typical of those found throughout the Pilbara (BHP Billiton, 2007a). There are a number of drainage channels that run through the project area. Drilling within close proximity to these may result in increased erosion and pollution feeding into the De Grey River Catchment. Drilling activities will be avoided on or near the major drainage channels within the project area. BHP Billiton will not encroach within 10 m of drainage lines that may be considered significant in relation to local and/or regional surface water flow.

BHP Billiton (2007a) understand that the Ord Ridley project area is within the De Grey River catchment, and therefore erosion control will be a requirement of this proposal. In that regard, it is proposed that sediment traps/sumps will be constructed in areas assessed as high risk in relation to firstly erosion, and secondly sedimentation release to the environment beyond disturbed areas.

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

Methodology BHP Billiton (2007a)
DoW (2007a)
DoW (2007b)
GIS Database:
- Public Drinking Water Source Areas (PDWSAs)

(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

The project area is located within the Pilbara region of Western Australia (BHP Billiton, 2007a). This region has an arid-tropical climate with two distinct seasons, a hot summer (October - April) and a mild winter (May - September).

The nearby Pardoo Station has an average annual rainfall of 317 mm per year (Bureau of Meteorology, 2007). Intense rainfall events are known to occur in the area, generally associated with cyclonic activity, which often result in localised flooding. As the clearing proposed is for exploration purposes and will be dispersed across the application area, the severity of flooding is not likely to be affected.

The DoW (2007a) advised that considering the size and location of the area under application, it is not likely that clearing of native vegetation will cause or exacerbate the incidence or intensity of flooding.

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

Methodology BHP Billiton (2007a)
Bureau of Meteorology (2007)
DoW (2007a)

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

Comments

The clearing permit application was advertised by DoIR, inviting submissions from the public and direct interest parties. There were no public comments received during the public comments period. Two direct interest submissions were received:

Submission 1: This submission raised no objection to the application.

Submission 2: This submission raised concerns regarding potential impacts of the proposed clearing on Aboriginal Heritage sites and native vegetation used for bush tucker and medicine within the application area.

Aboriginal Sites of Significance are protected under the *Aboriginal Heritage Act 1972*. The proponent is committed to the management and protection of Aboriginal heritage sites within the vicinity of the proposed exploration activity areas (BHP Billiton, 2007c). There are two registered Sites of Aboriginal Significance within the area applied to clear, (Site ID: 7405, 7404) (GIS Database). BHP Billiton (2007c) has stated that these sites will be avoided during the proposed Ord Ridley Exploration activities and adequate buffer zones will be established around these sites to ensure their protection. Furthermore, no activity (drill lines, pads and associated access tracks) will proceed until,

1. All proposed disturbance areas have been subject to prior consultation and ethnographic and archaeological assessment with appropriate Ngarla representatives, and
2. Adequate heritage management or protection protocols are in place (BHP Billiton 2007c).

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.

The Department of Industry and Resources have guidelines which provide best practice for the rehabilitation of areas subject to exploration. Rehabilitation of areas disturbed by exploration ensures the return of the environment to a natural setting and should ensure bush tucker and medicinal plants return post-exploration. A condition to rehabilitate can be considered on any permit that may be granted.

There is one native title claim over the area under application (GIS Database). This claim (WC99/026) has been registered with the National Native Title Tribunal on behalf of the claimant group (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*.

The Department of Water (DoW) were invited to comment on the application to clear. DoW (2007a) noted that :

1. The area is within the De Grey Water Reserve, which is a Public Drinking Water Source Area (PDWSA). This area is currently designated 'Priority 1 (P1)' and mineral exploration is compatible with conditions in a P1 PDWSA. All activities associated with the clearing including infrastructure, laydown areas, refuelling and topsoil storage should be compatible with DoW's Land Use Compatibility Tables. Acceptable activities should be managed using current best practices.
2. A desktop survey found that the areas proposed to be cleared are not in close proximity to any significant water courses, wetlands or wild river catchments. Considering the size and location of the area under the application, it is not likely that clearing of native vegetation will cause or exacerbate flooding.
3. The subject property is located within the Pilbara Groundwater Area as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any groundwater abstraction in this proclaimed area is subject to licensing by the Department of Water.
4. The DoW is satisfied that the proposed clearing of 50 ha is unlikely to have a significant impact on the quality or quantity of groundwater.

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 (2007c)
DoW (2007a)
GIS Databases:
- Aboriginal Sites of Significance
- Native Title Claims

4. Assessor's comments

Comment

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

Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed management, management of land degradation and watercourses, rehabilitation, record keeping and permit reporting.

5. References

- BHP Billiton Iron Ore (2007a). EXPLORATION. Ord Ridley. Purpose permit vegetation clearing permit application. Supporting documentation. BHP Billiton Iron Ore.
- BHP Billiton Iron Ore (2007b). Exploration Environmental Management Plan. Revision 1. BHP Billiton Iron Ore.
- BHP Billiton Iron Ore (2007c). Aboriginal Heritage Management - Ord Ridley. Unpublished report. BHP Billiton Iron Ore.
- Bureau of Meteorology (2007). Climate Statistics for Australian Locations: 'Newman'. [online] Available at: http://www.bom.wa.gov.au/climate/averages/tables/cw_007151.shtml, accessed 24/09/2007.
- CALM (1999). Environmental Weed Strategy for Western Australia, Department of Conservation and Land Management, Perth.
- Department of Agriculture and Food (2008). Declared Plant in Western Australia: Parkinsonia (Parkinsonia aculeata). [online] Available at: http://agspsrv95.agric.wa.gov.au/dps/version02/01_plantview.asp?page=1&contentID=46&p1=parkinsonia, accessed 14/05/08.
- Department of Conservation and Land Management (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions.
- Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.
- DoW (2007a). Advice for land clearing application 2104/1. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR), received 23/11/07. Department of Water, Western Australia.
- DoW (2007b). Geographic Data Atlas. [online] Available at: <http://portal.water.wa.gov.au/portal/page/portal/MapsDataAtlases/GeographicDataAtlas>, accessed 24/09/2007.
- ENV Australia (2007a). Ord Ridley Exploration Lease Flora and Vegetation Assessment. Report prepared for BHP Billiton Iron Ore Pty Ltd (Job No 07.037, Report No RP 001).
- ENV Australia (2007b). Ord Ridley Exploration Lease Fauna Assessment. Report prepared for BHP Billiton Iron Ore Pty Ltd (Job No 07.037, Report No RP 002).
- EPA (2004a) Guidance for the Assessment of Environmental Factors - Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Report by the EPA under the Environmental Protection Act 1986. No 51 WA.
- EPA (2004b) Guidance for the Assessment of Environmental Factors - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. Report by the EPA under the Environmental Protection Act 1986. No 51 WA.
- Hopkins, A.J.M., Beeston, G.R. and Harvey J.M. (2001) A database on the vegetation of Western Australia. Stage 1. CALMScience after J. S. Beard, late 1960's to early 1980's Vegetation Survey of Western Australia, UWA Press.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Kendrick, P. and Stanley, F. (2001) Pilbara 4 (PIL4 - Roebourne synopsis) in Bioregional summary of the 2002 Biodiversity Audit for Western Australia, Department of Conservation and Land Management, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A. & Hennig, P., (2004). Technical Bulletin No. 92: An inventory and condition survey of the Pilbara region, Western Australia. Department of Agriculture, Western Australia.
- Water and Rivers Commission (2004). The Importance of Western Australia's Waterways [online] Available at: http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE_ADMIN/OTHER_REPOSITORY/TAB1185076/WA_WATERWAYS_IMP.PDF, accessed 26/09/2007.

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.