Government of Western Australia
Department of Mines and Petroleum

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2952/1

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

Local Government Area: Shire Of Ashburton

Colloquial name: Hesta Siding to Cowra Siding

1.4. Application

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

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; Low woodland; *Allocasuarina huegeliana* & York gum;

157; Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*; and

676; Succulent steppe; samphire.

Ecologia Environment Pty Ltd (2008a) conducted a Level 1 flora and vegetation survey of the application area in October 2007. The survey involved systematic flora sampling in quadrats approximately 50 metres x 50 metres or, of an equivalent area within the narrow corridor of the mainline lease. The following five vegetation types were identified during the Ecologia Environment Pty Ltd (2008a) survey.

1. Mixed *Halosarcia* spp. low open to closed heath;

2. Triodia longiceps hummock grassland;

3. *Acacia xiphophylla* medium to tall scrubland;

4. Acacia aneura var. *aneura* low woodland; and

5. Scattered *Corymbia* spp. low trees, over *Acacia maitlandii* shrubland.

Clearing Description

BHP Billiton Iron Ore Pty Ltd (BHP Billiton) have applied to clear up to 75 hectares of native vegetation within a purpose permit boundary of approximately 97 hectares. The proposed clearing involves duplicating a 12 kilometre section of the Newman to Port Hedland rail line from Hesta Siding to Cowra Siding, located approximately 150 kilometres north-west of Newman (BHP Billiton, 2008). Associated works will include installation of communications cabling, upgrading of signalling infrastructure and the establishment of borrow pits (BHP Billiton, 2008a).

Vegetation Condition

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

To

Very good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).

Comment

BHP Billiton commissioned Ecologia Environment Pty Ltd (2008a) to conduct a flora and vegetation survey of the application area in October 2007. Factors taken into consideration when determining the vegetation condition were; weeds, grazing, litter and ground disturbance (tracks and other cleared areas). Based on this survey 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 is not likely to 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, 2001).

Ecologia Environment Pty Ltd (2008a) recorded 127 flora taxa from 27 families and 59 genera during the Hesta Siding to Cowra Siding flora and vegetation survey. No Declared Rare Flora (DRF) or Threatened Ecological Communities (TEC's) were recorded during floristic surveys of the application area (Ecologia Environment Pty Ltd, 2008a). Ecologia Environment Pty Ltd (2008a) state that the floristic richness for the survey area is slightly higher than that recorded at other areas surveyed along the mainline. This is most likely due to the linear nature of the application area transversing a number of different habitats (Ecologia Environment Pty Ltd, 2008a).

The most species rich plant families were Mimosaceae (22 taxa), Poaceae (20 taxa) and Chenopodiaceae (19), while the most species rich genera were Acacia (21 taxa), Senna (eight taxa) and Eremophila (five taxa) (Ecologia Environment Pty Ltd, 2008a). These groups are typical of the flora of the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008a).

Based on current species distributions, combined with information from database searches and previous survey records, a total of 288 vertebrate species comprising 35 native mammal species, 139 bird species, 100 reptile species and six amphibian species could potentially occur in the application area. Eleven of these were recorded during the Ecologia Environment Pty Ltd (2008b) fauna survey comprising eight birds and three reptile species. Similar levels of vertebrate fauna species have been recorded during other surveys of the Newman to Port Hedland railway line.

No flora species listed as Declared weeds under the *Agriculture and Related Resources Protection Act 1976* were recorded during the Hesta Siding to Cowra Siding flora survey, while five general environmental weeds were recorded: Kapok bush (*Aerva javanica*), Bipinnate Beggartick (*Bidens bipinnata*), Buffel Grass (*Cenchrus ciliaris),* Birdwood grass (*Cenchrus setiger*) and Spiked Malvastrum (*Malvastrum americanum*) (Ecologia Environment Pty Ltd, 2008a).

The presence of introduced weed species diminishes the biodiversity value of an area (CALM, 1999). Care needs to be taken to ensure that vehicles and machinery brought onto the application area 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.

Cattle grazing was evident along the rail corridor, as was, dust build up, and scattered patches of rail infrastructure (Ecologia Environment Pty Ltd, 2008b). Additionally approximately 50 – 60% of the vegetation within the mainline lease in the application area has already been cleared for the existing rail line, associated tracks and additional infrastructure, reducing the biodiversity of the application area (Ecologia Environment Pty Ltd, 2008b).

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

Methodology

CALM (1999)
Ecologia Environment Pty Ltd (2008a)
Ecologia Environment Pty Ltd (2008b)
Kendrick and McKenzie (2001)
GIS Database:
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 is not likely to be at variance to this Principle

Ecologia Environment Pty Ltd (2008b) conducted a Level 1 fauna survey over the application area in October 2007. From this survey the following fauna habitats were identified:

- Moderately dense mulga woodland over small shrubs over mixed spinifex / buffel grass on red clay / rocky soils;
- Thick mulga woodland over mixed grasses on stony soil;

- Moderately dense mulga woodland over open shrubs over open buffel grass on red clay / rocky soils;
- Open mulga woodland over scattered shrubs over buffel grass on red clay / rocky soils;
- Moderately dense / open mulga woodland over very sparse mixed shrubs over grassy patches on stony soil;
- Open mulga woodland over scattered shrubs over dense buffel grass on red clay soils;
- Very open mulga woodland over mixed grass / spinifex on red sand / clay soils;
- Mixed Acacia shrubs over patchy grasses. Large areas of bare soil with patches of stony ground;
- Chenopod shrubland on heavy rocky clay soils; and
- Open shrubland over Chenopod shrubs and grasses on floodplain – loose soils.

Ecologia Environment Pty Ltd (2008b) have stated that the fauna habitat types recorded in the survey area have been identified as being well represented in surrounding areas. Furthermore, the development of the rail duplication between Hesta Siding and Cowra Siding is not expected to significantly impact any conservation significant species due to the following reasons:

- the relatively small width of the proposed disturbance;
- the linear nature of the proposed disturbance; and
- the existing degraded nature of much of the application area i.e. cattle grazing was evident along the corridor, as were weeds, dust build up, and scattered patches of rail infrastructure (Ecologia Environment Pty Ltd, 2008b).

Additionally approximately 50 – 60% of the vegetation within the mainline lease in the application area has already been cleared for the existing rail line, associated tracks and additional infrastructure (Ecologia Environment Pty Ltd, 2008b). Hence the habitat values are expected to be lower than the surrounding undisturbed areas.

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

Methodology Ecologia Environment Pty Ltd (2008b)

(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

Ecologia Environment Pty Ltd (2008a) conducted a Level 1 flora and vegetation survey of the application area in October 2007. In addition, ENV Australia Pty Ltd (2008) conducted a targeted flora survey for *Eremophila spongiocarpa*, a Priority One Flora species, along two kilometres of the proposed rail duplication corridor within the application area.

One Priority Flora taxa, *Eremophila spongiocarpa*, was recorded in the application area during the ENV Australia Pty Ltd (2008) and Ecologia Environment Pty Ltd (2008a) flora surveys. No other Priority Flora or Declared Rare Flora was recorded in the application area.

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

In total 441 *Eremophila spongiocarpa* individuals were recorded within the application area (ENV Australia Pty Ltd, 2008). The taxon was predominantly found growing in Halosarcia heath on the Fortescue Marsh, and along disturbed ground adjacent to the Newman to Port Hedland railway (ENV Australia Pty Ltd, 2008). There are 23 records of *Eremophila spongiocarpa* from on or within close proximity to the Fortescue Marsh, in the Pilbara bioregion of Western Australia. These appear to be from fourteen geographically separated locations around the Fortescue Marsh. Many of the records describe the species as being common or locally abundant (ENV Australia Pty Ltd, 2008). As much of the application area is of a degraded nature from cattle grazing, weeds, dust build up, and scattered patches of rail infrastructure (Ecologia Environment Pty Ltd, 2008b) it is not expected that the vegetation would be necessary for the continued existence of this species. Especially given the abundance of native vegetation in better condition growing outside of the application area (ENV Australia Pty Ltd, 2008). Additionally approximately 50 – 60% of the vegetation within the mainline lease within the application area has already been cleared for the existing rail line, associated tracks and additional infrastructure (Ecologia Environment Pty Ltd, 2008b).

BHP Billiton met with the Department of Environment and Conservation's (DEC's) Environmental Management Branch on 12 September 2008 to discuss the potential impact of the Project on *Eremophila spongiocarpa* (BHP Billiton, 2008c). The DEC advised that this species is common on the margins of the Fortescue Marsh to the east of the railway line and recommended that a targeted survey be carried out to identify individuals within the Project area. This survey was conducted by ENV Australia Pty Ltd (2008) as discussed above.

BHP Billiton (2008a) will implement the following measures to minimise impacts to *Eremophila spongiocarpa*:

- The proposed rail duplication will be constructed on the western side of the existing railway on the opposite side from where most of the *Eremophila spongiocarpa* individuals were found;
- The existing access track on the eastern side of the existing railway will be maintained to avoid additional clearing. The access track may need to be widened to accommodate heavy machinery during construction, however, any widening will be kept to a minimum;
- The communications fibre optic cable will be installed along the existing access track between chainages 247.5 kilometres and 249.5 kilometres to minimise disturbance to individual plants; and
- The construction contractor will be made aware of the location of the *Eremophila spongiocarpa* individuals and will be restricted, as far as possible, to disturbed areas within this portion of the project area.

Advice received from the DEC (2009c) on 20 February 2009 did not raise any major concerns regarding Rare flora or other flora of conservation significance. Points raised were that the impacts to the species *Eremophila spongicarpa* should be minimised where possible and where plants of this species will be impacted, that BHP Billiton should report the impacts to the DEC. This will allow for cumulative impacts to be assessed in relation to the conservation status of this species. Should a clearing permit be granted it is recommended that Conditions be placed on the permit for the purpose of recording the impacts to *Eremophila spongiocarpa*.

Methodology BHP Billiton (2008a)
BHP Billiton (2008c)
DEC (2009c)
Ecologia Environment Pty Ltd (2008a)
ENV Australia Pty Ltd (2008)

(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 70 kilometres to the south-west (GIS Database).

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

Methodology 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 located 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; low woodland; *Allocasuarina huegeliana* & York gum; 157; hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*; and 676; succulent steppe; samphire (GIS Database).

There is approximately 99.9% of the pre-European vegetation remaining of Beard Vegetation Associations 29 157 and 676 in the Pilbara bioregion (Shepherd et al., 2001). Beard Vegetation Association 29, 157 and 676 are represented within conservation reserves at the state level, however, only Beard Vegetation Association 157 is represented within conservation reserves at the 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, 157 and 676 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**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,164	17,794,651	~99.9	least concern	6.3
Beard veg assoc. – State					
29	7,904,064	7,904,064	~100	least concern	0.3
157	502,737	501,522	~99.8	least concern	17.2
676	2,063,402	1,958,202	~94.9	least concern	3.6
Beard veg assoc. – Bioregion					
29	18,324	18,324	~100	least concern	0
157	198,636	198,522	~99.9	least concern	5.7
676	92,354	92,290	~99.9	least concern	0

* 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

The application area transverses the Directory of Important Wetlands - Fortescue Marsh wetlands (GIS Database), which totals approximately 100,000 hectares (Environment Australia, 2001). Two vegetation types that were identified by the Ecologia Environment Pty Ltd (2008a) flora survey are associated with the marsh. A maximum of 15 hectares of these vegetation types are proposed to be cleared. These vegetation types are described below:

- Mixed *Halosarcia spp*. low open to closed heath; *Acacia stenophylla* and *Acacia sclerosperma subsp. sclerosperma* scattered shrubs, over *Halosarcia halocnemoides subsp. tenuis*, *Halosarcia indica subsp. bidens*, *Tecticornia auriculata* and *Frankenia ambita* low open to closed heath. Approximately six hectares of this vegetation type occurs in the application area (Ecologia Environment Pty Ltd, 2008b).

- *Triodia longiceps* hummock grassland; *Acacia sclerosperma subsp*. *sclerosperma* open shrubland, over *Maireana triptera*, *Maireana carnosa*, *Solanum sturtianum*, *Pterocaulon sphaeranthoides* and *Corchorus sidoides* low open shrubland, over *Triodia longiceps* hummock grassland, with scattered patches of *Cenchrus ciliaris* tussock grass (weed). Approximately nine hectares of this vegetation type occurs in the application area (Ecologia Environment Pty Ltd, 2008b).

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

There is an existing road and rail line which transverses the vegetation associated with the Fortescue Marsh wetland area. The construction of the additional rail formation is unlikely to have a significant impact on the vegetation associated with the Fortescue Marsh that is significantly different to effects of the existing infrastructure. Cattle grazing was evident along the corridor, as was, dust build up, and scattered patches of rail infrastructure (Ecologia Environment Pty Ltd, 2008b). Additionally approximately 50 – 60% of the vegetation within the mainline lease in the application area has already been cleared for the existing rail line, associated tracks and additional infrastructure, degrading the vegetation of the application area (Ecologia Environment Pty Ltd, 2008b).

BHP Billiton (2008) have stated that no borrow pits will be constructed within the Fortescue Marsh area, with the nearest proposed borrow pit approximately 400 metres north of the wetlands. BHP Billiton (2008) have stated that following construction, disturbed areas that are no longer required will be progressively rehabilitated. Should a clearing permit be granted it is recommended that conditions be placed on the permit for the purposes of regeneration.

Methodology BHP Billiton (2008)
Ecologia Environment Pty Ltd (2008a)
Ecologia Environment Pty Ltd (2008b)
Environment Australia (2001)

GIS Database:
- ANCA 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

There is a small potential for Acid Sulphate Soils to be encountered where the application area intersects the Fortescue Marsh (chainage 248.5 kilometres) (BHP Billiton, 2008a). Acid Sulfate Soils are naturally occurring soils and sediments containing iron sulfides, most commonly pyrite (DEC, 2009c). When Acid Sulphate Soils are exposed to air the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulfuric acid. Initially a chemical reaction, the process is accelerated by soil bacteria. The resulting acid can release other substances, including heavy metals, from the soil and into the surrounding environment (DEC, 2009c).

Typically, excavating or otherwise removing soil or sediment, lowering of groundwater levels or filling or surcharging of low-lying land causes disturbance of Acid Sulphate Soils (DEC, 2009b). Given that the soil profile within the application area is not subject to permanent water logging, it is likely that any iron sulphide containing material would have been previously oxidised (BHP Billiton, 2008c). In addition BHP Billiton (2008c) have stated that no borrow pits will be constructed within the Fortescue Marsh. Should a clearing permit be granted it is recommended a condition be placed on the permit to restrict clearing for the purposes of borrow pit construction to areas outside of the Fortescue Marsh.

Based on the above, the proposed clearing 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 application area includes three different land systems (GIS Database). A broad description of each land system is given below.

Adrian Land System
The Adrian Land System is characterised by erosional surfaces; low round hills and rises, gently undulating to almost level stony planes. Relief up to 40 metres but usually much less. The vegetation of the Adrian Land System is generally not prone to degradation. The system has a low risk of erosion (Van Vreeswyk et al., 2004).

Marsh Land System
The Marsh Land System is characterised by depositional surfaces; lake beds and saline peripheral flood plains forming a termination basin for the upper reaches of the Fortescue River. The system has a low susceptibility to degradation and erosion except for some alluvial fans and drainage floors and some outer margins of flood plains which are moderately susceptible (Van Vreeswyk et al., 2004).

Christmas Land System
The Christmas Land System is characterised by depositional surfaces; level to gently inclined stony plains subject to sheet flows with numerous small, diffuse drainage foci and groves and stony clay pans with Gilgai microrelief. Drainage tracts are moderately to highly susceptible to erosion (Van Vreeswyk et al., 2004).

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

- 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 (BHP Billiton, 2008b);
- Borrow pits will be progressively rehabilitated (BHP Billiton, 2008b);
- 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 (BHP Billiton, 2008b);
- A total of 20 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 1 in 50 year flood event (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

Aquaterra (2008)
BHP Billiton (2008b)
BHP Billiton (2008c)
DEC (2009a)
DEC (2009b)
Ecologia Environment Pty Ltd (2008c)
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 may be at variance to this Principle

The application area transverses the Fortescue Marshes (GIS Database), an Environmentally Sensitive Area listed in; "*A Directory of Important Wetlands in Australia"* (Environment Australia, 2001). The Fortescue Marshes are an extensive, periodically inundated samphire marsh totalling approximately 100,000 hectares (Environment Australia, 2001). Approximately 6.25 hectares of the application area intersects this wetland.

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

There is an existing road and rail line which transverses the wetland area. BHP Billiton (2008c) have stated that no borrow pits will be constructed within the Fortescue Marsh area, with the nearest proposed borrow pit approximately 400 metres north of the wetlands. The construction of the additional rail formation is unlikely to have a significant impact on the environmental values associated with the Fortescue Marsh that is significantly different to effects of the existing infrastructure. Should a clearing permit be granted it is recommended a condition be placed on the permit to restrict clearing for the purposes of borrow pit construction to areas outside of the Fortescue Marsh.

Methodology

BHP Billiton (2008c)
Environment Australia (2001)
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 application area intersects the Fortescue Marshes wetland. Currently there are 20 culverts which maintain natural surface water flow beneath the rail line. These will be extended beneath the proposed rail duplication (BHP Billiton, 2008). These engineering structures will ensure natural surface water flow regimes are reinstated following the duplication of the railway line (Aquaterra, 2008).

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 (BHP Billiton, 2008b);
- 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 (BHP Billiton, 2008b); and
- Topsoil and cleared vegetation shall be stockpiled away from watercourses (BHP Billiton, 2008b).

The proposed clearing area is not located within a Public Drinking Water Source Area (GIS Database). The proposed vegetation clearing is within a linear, 80 metre wide rail corridor spanning some 12 kilometres. It is unlikely that vegetation clearing would result in any significant changes to local groundwater levels or quality.

Aquaterra (2008) have stated that the Installation of the railway duplication across the Fortescue Marsh is unlikely to alter any existing surface water flow characteristics along the existing railway route if current practice of culvert installation is maintained.

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

Methodology Aquaterra (2008)
BHP Billiton (2008b)
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 an arid climate with a summer predominant rainfall pattern averaging approximately 300 millimetres per annum (Ecologia Australia Pty Ltd, 2008a), and has 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 runs along the boarder of the Fortescue River, and Fortescue River Upper Catchments. These catchments total approximately 1,860,784 and 2,975,192 hectares respectively (GIS Database). Given the size of the proposed clearing (75 hectares) in relation to the large size of the Fortescue River and Fortescue River Upper Catchments, 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 (Aquaterra, 2008); and
- The topography of the application area slowly descends from 430 metres above sea level in the north to 410 metres in the south (20 metre drop over 12 kilometres) (GIS Database). Runoff from rainfall initially drains down gradient as overland flow before concentrating in defined flow channels. In this process surface detention, vegetation, seepage and other mechanisms absorb water from the runoff stream (Aquaterra, 2008). As the proposal is for clearing of 75 hectares along a 12 kilometre section of the existing Newman to Port Hedland railway line, the clearing will be linear and as such unlikely to cause or exacerbate flooding.

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

The clearing permit application was advertised on 29 January 2009 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received in relation to this application.

There is one native title claim over the application area (GIS Database). This claim (WC98/062) has 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 no registered sites of Aboriginal Significance in the application area. 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

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 (c), (g) and (h), is not likely to be at variance to Principles (a), (b), (d), (i) and (j), and is not at variance to Principle (e).

Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of record keeping, permit reporting, weed management, regeneration and borrow pit construction.

5. References

Aquaterra Consulting Pty Ltd (2008) BHPBIO – RPG5 Chichester Deviation & Mainline Rail Duplication Surface Water Management, unpublished report for BHP Billiton, Perth, Western Australia.

BHP Billiton (2008a) Hesta Siding to Cowra Siding Rail Duplication Project, Application to Clear Native Vegetation (Purpose Permit) under the *Environmental Protection Act 1986*, Environmental Management Plan, Perth, Western Australia.

BHP Billiton (2008b) Hesta Siding to Cowra Siding Rail Duplication Project, Application to Clear Native Vegetation (Purpose Permit) under the *Environmental Protection Act 1986*, Perth, Western Australia.

BHP Billiton (2008c) NVCP, Hesta to Cowra Siding – Acid Sulfate Soils, Perth Western Australia.

CALM (1999) Environmental Weed Strategy for Western Australia, Department of Conservation and Land Management, Perth, western Australia.

DEC (2008) Minutes of Meeting between the Department of Environment and Conservation and BHP Billiton, held on 12 September 2008.

DEC (2009a) Advice to assessing officer, received 31 March 2009, from the Environmental Management Branch at the Department of Environment and Conservation.

DEC (2009b) Acid Sulfate Soils Fact Sheet 1; What are acid sulphate soils? Electronic source of information, viewed on 28 April 2009, at http://www.dec.wa.gov.au/management-and-protection/acid-sulfate-soils/fact-sheets.html

DEC (2009c) Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes, prepared by Contaminated Sites Branch Environmental division of the Department of Environment and Conservation, Perth, Western Australia.

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.

Ecologia Environment Pty Ltd (2008a) BHP Billiton Iron Ore Rapid Growth Project 5 (RPG5) Hesta Siding to Cowra Siding Vegetation and Flora Report, unpublished report, Perth, Western Australia.

Ecologia Environment Pty Ltd (2008b) RPG5 Fauna Survey - Hesta Siding to Cowra Siding, unpublished report, Perth, Western Australia.

ENV Australia (2008) Rapid Growth Project 5: Eremophila Spongiocarpa Search, unpublished report for Calibre Engenium Joint Venture Pty Ltd, Perth, Western Australia.

Environment Australia (2001) *A Directory of Important Wetlands in Australia, Third Edition*. Environment Australia, Canberra.

Geoscience Australia (2008) What Causes Floods, Electronic source of information, viewed 15 September 2008, http://www.ga.gov.au/hazards/flood/causes.jsp.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status.

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
DMP	Department of Mines and Petroleum
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.