



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3164/1
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

Local Government Area: Shire Of East Pilbara

Colloquial name: Paroo, Sandhill and Ethel Sidings Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
308		Mechanical Removal	Railway construction and 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 useful to look at vegetation extent in a regional context. The following two Beard Vegetation Associations are located within the application areas (GIS Database):

- 29: Sparse low woodland; mulga, discontinuous in scattered groups; and
- 111: Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex (Shepherd, 2007).

ENV Australia Pty Ltd (ENV Australia) (2008a) undertook flora and vegetation surveys that covered the railway reserve between Jimblebar Junction and Yandi Junction, encompassing the locations of the Paroo, Sandhill and Ethel railway sidings. ENV Australia (2008a) identified 13 vegetation communities within the application areas:

AdAnTp*CC (Acacia dictyophleba shrubland):

Acacia dictyophleba high open shrubland over mixed *Acacia* shrubland over *Triodia pungens* open hummock grassland over *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Very Poor'.

AaAnTp*Cc (Acacia aneura open woodland):

Acacia aneura (mixed subspecies) low open woodland over *Acacia ancistrocarpa* shrubland over *Triodia pungens* open hummock grassland over *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Very Poor' and one survey site was determined to be 'Completely Degraded'.

AaAsCf*Cc (Acacia aneura shrubland):

Acacia aneura (mixed subspecies), *Acacia ancistrocarpa*, *Acacia pruinocarpa* and *Acacia synchronicia* shrubland over *Triodia pungens* very open hummock grassland over *Chrysopogon fallax* and *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Very Good' to 'Very Poor'.

EgApTp*Cc (Eucalyptus gamophylla low open mallee woodland):

Eucalyptus xerothermica low open woodland over *Eucalyptus gamophylla* low open mallee woodland over mixed *Acacia* shrubland over *Triodia pungens* open hummock grassland over *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Poor'.

ChAp*Cc (Corymbia hamersleyana woodland - plains):

Corymbia hamersleyana, *Corymbia semiclara* and *Corymbia* aff. *opaca* scattered low trees over mixed *Acacia* shrubland over *Triodia basedowii* and *Triodia pungens* very open hummock grassland over *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Very Poor'.

ApAsCf*Cc (Acacia pruinocarpa low woodland):

Acacia pruinocarpa low woodland over mixed *Acacia* shrubland over *Chrysopogon fallax* and *Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Very Poor'.

ExAa*Cc (Eucalyptus xerothermica low open woodland - riparian):

Eucalyptus xerothermica low open woodland over mixed *Acacia citrinoviridis* and other *Acacia* species shrubland over *Triodia pungens* open hummock grassland over *Cenchrus ciliaris* open tussock grassland. Vegetation condition ranges from 'Good' to 'Poor'.

AcAs*Cc (Acacia citrinoviridis woodland/shrubland - drain / riparian):

Acacia citrinoviridis and mixed *Acacia* species high shrubland over **Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Poor' to 'Very Poor'.

CaAn*Cc (Corymbia aspera low open woodland):

Corymbia aspera low open woodland over mixed *Acacia* species shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* open tussock grassland. Vegetation condition ranges from 'Good' to 'Very Poor'.

EvAc*Cc (Eucalyptus victrix low woodland - drain / riparian):

Eucalyptus victrix low woodland over mixed *Acacia* species shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Good' to 'Poor'.

ApSaCf (Acacia pruinocarpa shrubland over Senna artemisioides scrub):

Acacia pruinocarpa and mixed *Acacia* species shrubland over *Senna artemisioides* (mixed subspecies) low shrubland over *Chrysopogon fallax* and **Cenchrus ciliaris* tussock grassland. Vegetation condition ranges from 'Poor' to 'Very Poor'.

AsTp/*Cc (Acacia synchronicia shrubland):

Acacia synchronicia and mixed *Acacia* species shrubland over *Triodia pungens* hummock grassland over **Cenchrus ciliaris* and *Chrysopogon fallax* tussock grassland. Vegetation condition ranges from 'Very Good' to 'Very Poor'.

AdTp (Acacia dictyophleba and Acacia ancistrocarpa high shrubland - drain / riparian):

Acacia dictyophleba, *Acacia marramamba* and *Acacia ancistrocarpa* high shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris*, *Chrysopogon fallax* tussock grassland. Vegetation condition was determined to be 'Poor'.

The majority of vegetation communities at the survey sites were described to be in 'Poor' to 'Very Poor' condition due to the previous disturbance from the establishment of the Port Hedland to Newman Railway (ENV Australia, 2008a).

Clearing Description

BHP Billiton Iron Ore Pty Ltd (hereafter referred to as BHPBIO) have applied for a Purpose Permit to clear up to 308 hectares within a 491 hectare area (BHPBIO, 2009a). The proposed clearing would allow the proponent to carry out the construction of three railway sidings, and associated works (BHPBIO, 2009a). The application areas are located approximately 27 kilometres northeast of Newman at the closest point (GIS Database).

Vegetation clearing will be undertaken using mechanical means (BHPBIO, 2009a). The majority of the proposed clearing will be rehabilitated following the completion of the proposed activities (approximately 280 hectares or approximately 91% of the total proposed clearing) (BHPBIO, 2009a).

Vegetation Condition

Very Good: Vegetation structure altered; obvious signs of disturbance;

to

Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).

Comment

The vegetation condition rating is derived from information provided by ENV Australia (2008a).

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

BHPBIO (2009a) propose to clear 308 hectares of native vegetation within a 491 hectare area as part of the Paroo, Sandhill and Ethel Sidings Project for the purposes of constructing three railway sidings and associated works. The application areas are located within the Fortescue Plains (PIL2) subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion; however, the application areas are within 2 kilometres of the Hamersley (PIL3) subregion of the Pilbara IBRA bioregion (GIS Database). Additionally, the application areas are located adjacent to the Gascoyne IBRA bioregion (approximately 17 kilometres south of the application areas at the closest point) (GIS Database).

The Fortescue Plains subregion is characterised by an extensive calcrete aquifer (originating within a palaeo-drainage valley) that feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput *Melaleuca* woodlands (CALM, 2002). The Hamersley subregion is characterised by mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002).

ENV Australia Pty Ltd (ENV Australia) (2008a) undertook flora and vegetation surveys that covered the railway reserve between Jimblebar Junction and Yandi Junction, encompassing the application areas containing the Paroo, Sandhill and Ethel railway sidings. A total of 353 taxa (including 11 introduced flora taxa) were recorded within the survey area (ENV Australia, 2008a). No Declared Rare Flora (DRF) were discovered within the survey area; however, four Priority Flora species were discovered within the survey area and one species of Priority Flora (*Goodenia nuda* (P3)) was discovered within the application areas (ENV Australia, 2008a).

Fourteen vegetation associations were discovered within the survey area and the condition of the vegetation was defined as ranging between 'Completely Degraded' to 'Very Good' (ENV Australia, 2008a). The majority of

vegetation communities at the survey sites were described to be in 'Poor' to 'Very Poor' condition due to the previous disturbance from the establishment of the Port Hedland to Newman Railway (ENV Australia, 2008a). Five vegetation communities that occur within drainage lines and/or were riparian in nature were present within the application areas; these included AcAs*Cc, AdTp, EvAc*Cc, AcAs*Cc, and ExAa*Cc (ENV Australia, 2008a). Despite the poor condition of the vegetation communities, the level of species richness within the survey area was high compared to the results of other flora surveys conducted within adjacent areas; however, the high level of species richness was attributed to the linear nature of the survey area, resulting in a relatively large number of vegetation communities being traversed compared to other surveys located nearby (ENV Australia, 2008a).

Overall, all of the vegetation associations within the application areas are deemed to be widespread with regular occurrence in the regional context (ENV Australia, 2008a). Due to the highly disturbed nature of the application areas and considering the availability of similar vegetation communities in equal or better condition in the local and regional area, the proposed clearing is not likely to impact on an area of high floristic diversity (ENV Australia, 2008a).

The ENV Australia (2008a) survey discovered eleven introduced species of flora within the survey area. These included:

- 1) *Aerva javanica* (Kapok Bush);
- 2) *Bidens bipinnata* (Bipinnate Beggartick);
- 3) *Cenchrus ciliaris* (Buffel Grass);
- 4) *Cenchrus setiger* (Birdwood Grass);
- 5) *Chloris virgata* (Feathertop Rhodes Grass);
- 6) *Cucumis melo* subsp. *agrestis* (Ulicardo Melon);
- 7) *Cynodon dactylon* (Couch);
- 8) *Malvastrum americanum* (Spiked Malvastrum);
- 9) *Portulaca oleraceae* (Purslane);
- 10) *Setaria verticillata* (Whorled Pigeon Grass); and
- 11) *Vachellia farnesiana* (Mimosa Bush).

Cenchrus ciliaris and *Aerva javanica* were observed growing along almost the entire length of the rail line, forming dense low shrubland in places (ENV Australia, 2008a). In order to minimise the spread of weed species and the risk of introducing additional weed species into the application areas, it is recommended that, should the permit be granted, a condition be imposed on the permit for the purposes of weed management.

A fauna survey of the Jiblebar Junction to Yandi Junction Railway Reserve (including the application areas) was conducted by ENV Australia in May 2008 (ENV Australia, 2008b). Seven broad fauna habitats were identified within the survey area (ENV Australia, 2008b). This survey identified four species of mammal (three introduced), 51 species of bird and 15 species of reptiles within the survey area and one species of reptile and two species of bird located outside of the survey area (ENV Australia, 2008b). Overall, the fauna habitats within the survey area were well represented in the Pilbara bioregion and the proposed disturbance is unlikely to significantly affect the representation of the habitats in the region and the fauna they support (ENV Australia, 2008b). Additionally, none of the habitats appear to be critical in supporting fauna of conservation significance (ENV Australia, 2008b).

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

Methodology BHPBIO (2009a).
 BHPBIO (2009b).
 CALM (2002).
 ENV Australia (2008a).
 ENV Australia (2008b).
 GIS Database:
 - Interim Biogeographic Regionalisation for Australia.
 - Interim Biogeographic Regionalisation for Australia (subregions).

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

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

ENV Australia (2008b) surveyed the Jiblebar Junction to Yandi Junction Railway Reserve (including the application areas). Seven broad habitat types were identified within the survey area (ENV Australia, 2008b). These included:

- 1) **Low Rise:** *Eucalyptus gamophylla* low open mallee woodland over mixed *Acacia* shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* tussock grassland.
- 2) **Rocky Hills:** *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia aneura* var. *aneura*, *Acacia bivenosa*, *Senna glutinosa* subsp. *glutinosa* shrubland over *Triodia wiseana*, *Triodia pungens* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) hummock grassland over **Cenchrus ciliaris* open tussock grassland.
- 3) **Valley:** *Acacia synchronicia* and mixed *Acacia* species shrubland over *Triodia pungens* hummock grassland over **Cenchrus ciliaris* and *Chrysopogon fallax* tussock grassland.
- 4) **Major Drainage Line:** *Eucalyptus victrix*, *Acacia citrinoviridis* low woodland over mixed *Acacia* species

shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* tussock grassland.

- 5) **Minor Drainage Line:** *Acacia dictyophleba*, *Acacia ancistrocarpa*, *Acacia marramamba* high shrubland over *Triodia pungens* very open hummock grassland over **Cenchrus ciliaris* and *Chrysopogon fallax* tussock grassland.
- 6) **Floodplain:** *Corymbia aspera* low open woodland over mixed *Acacia* species shrubland over *Triodia pungens* open hummock grassland over **Cenchrus ciliaris* open tussock grassland.
- 7) **Plain:** *Corymbia hamersleyana*, *C. semiclara*, *C. opaca* scattered / *Acacia aneura* (mixed sub-species) low open woodland (or scattered trees) over *Acacia dictyophleba*, *A. ancistrocarpa*, *A. pruinocarpa*, *A. synchronica* shrubland over *Triodia pungens*, *T. basedowii* hummock grassland over *Chrysopogon fallax* and **Cenchrus ciliaris* tussock grassland.

The application areas contain the 'Low Rise', 'Major Drainage Line', 'Minor Drainage Line', 'Floodplain' and 'Plain' fauna habitat types. These fauna habitats may include well-developed leaf litter layer, wooded debris, soils suitable for burrowing fauna, tree hollows and hollowed-out logs (ENV Australia, 2008b). In addition, the nearby 'Rocky Hills' habitat (outside of the application areas) offers rocky crevasses and rocky substrate (ENV Australia, 2008b). The 'Major Drainage Line' and 'Minor Drainage Line' habitats are considered to be of high importance because of the range of microhabitats present and the linkages made between habitat types (ENV Australia, 2008b).

During the survey, ENV Australia (2008b) reported sighting the conservation significant Pilbara Olive Python (*Liasis olivaceus barroni*) (listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) and nine bird species listed as 'Migratory' under the EPBC Act. The Pilbara Olive Python was sighted in the 'Plain' fauna habitat; however, the preferred habitat of this species is within gorges and escarpments rather than hummock grasslands and floodplains (ENV Australia, 2008b). As such, ENV Australia (2008b) determined that the recorded species was a transient individual and it is unlikely that other individuals are present within the survey area. Additionally, the migratory birds were determined to either be largely aerial or have an extensive home range (ENV Australia, 2008b). As such, ENV Australia (2008b) determined that it is unlikely that these species depend exclusively on the habitats within the application areas and the potential impact upon these species is deemed to be minimal.

Overall, the fauna habitats within the survey area (and therefore the application areas) are well represented within the Pilbara bioregion and the proposed disturbance is unlikely to significantly affect the representation of the habitats in the region and the fauna they support (ENV Australia, 2008b). None of the habitats appear to be critical in supporting conservation significant fauna (ENV Australia, 2008b).

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

Methodology ENV Australia (2008b).

(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**

No species of Declared Rare Flora (DRF) were recorded within the application areas (ENV Australia, 2008a). The closest location of DRF was *Lepidium catapycnon*, located approximately 11 kilometres southwest of the application areas (GIS Database). Two species of Priority Flora were recorded within the application areas; *Bulbostylis burbidgeae* (P3) (associated with vegetation community ApAsCf/*Cc) and *Goodenia nuda* (P3) (associated with vegetation communities ApSaCf and AaAsCf/*Cc) (ENV Australia, 2008a). Two additional Priority Flora species were recorded within the survey areas (ENV Australia, 2008a).

ENV Australia (2008a) determined that the location of *Bulbostylis burbidgeae* was not initially identified as potentially occurring within the survey area and surveys of adjacent areas did not record this species. FloraBase depicted that the species occurs within the mideastern and northeastern sections of the Pilbara bioregion (rather than the southern end of the Pilbara bioregion) and that it grows in association with granitic outcropping (Western Australian Herbarium, 2009). The vegetation community associated with the location of *Bulbostylis burbidgeae* within the application areas contains *Acacia* species of small trees and shrubs, *Chrysopogon fallax* grass and *Cenchrus ciliaris* buffel grass (ENV Australia, 2008a). As such, the vegetation community and location of this Priority Flora species seems unusual.

Additional advice was requested from BHPBIO (2009b) regarding the status of the Priority Flora and the numbers of individual plants that would be taken as part of the proposed clearing. ENV Australia further investigated the identification of the P3 species *Bulbostylis burbidgeae* and determined, with the assistance of the Western Australian Herbarium, that the vouchered specimen from the survey was *Bulbostylis turbinata* (BHPBIO, 2009b). *Bulbostylis turbinata* is not listed as a DRF or Priority Flora species (BHPBIO, 2009b).

Additionally, advice received from ENV Australia indicated that the P3 species *Goodenia nuda* has recently been downgraded to P4, however this is yet to be updated on FloraBase (BHPBIO, 2009b). P4 taxa are considered to have been adequately surveyed and, whilst being rare, are not currently threatened by any identifiable factors (BHPBIO, 2009b). Approximately 115 individuals of *Goodenia nuda* were estimated as being present within the survey area (BHPBIO, 2009b).

ENV Australia stated that if all the individuals of *Goodenia nuda* within the Jimblebar Junction to Yandi Junction

Railway Reserve are impacted by the proposed clearing, the removal of these individuals is unlikely to have an adverse effect on the conservation listing of the species (BHPBIO, 2009b). In addition, BHPBIO (2009b) have reviewed the project footprint and will only be disturbing 10 individuals of *Goodenia nuda*. Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology BHPBIO (2009b).
 ENV Australia (2008a).
 Western Australian Herbarium (2009).
 GIS Database:
 - Declared Rare and Priority Flora List.

(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

There are no records of Threatened Ecological Communities (TECs) within the application areas (GIS Database). The closest TEC is TEC 78: Ethel Gorge aquifer stygobiont community, located approximately 16 kilometres to the south of the application areas (GIS Database). The proposed clearing is not likely to impact on any known TEC.

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

Methodology ENV Australia (2008a).
 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 clearing application areas fall within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 99.95% of the pre-European vegetation remains (Shepherd, 2007; GIS Database).

The vegetation within the application areas is classified as:

- **Beard Vegetation Association 29:** Sparse low woodland; mulga, discontinuous in scattered groups; and
- **Beard Vegetation Association 111:** Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex (Shepherd, 2007; GIS Database).

As depicted within the table below, the application areas do not represent a significant remnant of vegetation in an area that has been extensively cleared (Shepherd, 2007). The proposed clearing will not reduce the extent of Beard Vegetation Associations 29 and 111 below the recognised threshold level, below which species loss accelerates exponentially at an ecosystem level (EPA, 2000). Therefore the bioregional conservation status for the Pilbara bioregion and for the Beard Vegetation Associations 29 and 111 is of 'Least Concern' (Department of Natural Resources and Environment, 2002).

While a relatively small percentage of the vegetation types within the Pilbara bioregion are protected within conservation reserves, the bioregion remains largely uncleared. The proposed clearing is unlikely to impact on the conservation status for Beard Vegetation Associations 29 and 111 within the Pilbara bioregion.

	Pre-European area (hectares)*	Current extent (hectares)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,188	17,794,647	~99.95	Least Concern	~6.32
Beard veg assoc. – State					
29	7,903,991	762,964	~100	Least Concern	~5.5
111	762,964	2,565,901	~100	Least Concern	~10.2
Beard veg assoc. – Bioregion					
29	1,113,219	1,113,219	~100	Least Concern	~1.9
111	550,287	550,287	~100	Least Concern	~1.3

* Shepherd (2007).

** Department of Natural Resources and Environment (2002).

Methodology Based on the above, the proposed clearing is not at variance to this Principle.
 Department of Natural Resources and Environment (2002).
 EPA (2000).
 Shepherd (2007).
 GIS Database:
 - 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

No permanent wetlands and watercourses occur within the application areas (GIS Database). However, the application areas contain numerous minor non-perennial watercourses (GIS Database).

The application areas traverse many minor non-perennial watercourses in addition to traversing Weeli Wolli Creek (a major non-perennial watercourse) and a significant non-perennial stream which flows northwards into the Fortescue Marsh (GIS Database). These watercourses correspond with the following riparian and floodplain vegetation communities:

Vegetation Community Code [#]	Description	Vegetation Type	Total area to be cleared (hectares)
AcAs*Cc	<i>Acacia citrinoviridis</i> and mixed <i>Acacia</i> species high shrubland over * <i>Cenchrus ciliaris</i> tussock grassland.	Riparian	6.0
AdTp	<i>Acacia dictyophleba</i> , <i>Acacia marramamba</i> and <i>Acacia ancistrocarpa</i> high shrubland over <i>Triodia pungens</i> very open hummock grassland over * <i>Cenchrus ciliaris</i> , <i>Chrysopogon fallax</i> tussock grassland.	Riparian	2.8
CaAn*CC	<i>Corymbia aspera</i> low open woodland over mixed <i>Acacia</i> species shrubland over <i>Triodia pungens</i> open hummock grassland over * <i>Cenchrus ciliaris</i> open tussock grassland.	Floodplain	16.4
EvAc*Cc	<i>Eucalyptus victrix</i> low woodland over mixed <i>Acacia</i> species shrubland over <i>Triodia pungens</i> very open hummock grassland over * <i>Cenchrus ciliaris</i> tussock grassland.	Riparian	9.1
ExAa*Cc	<i>Eucalyptus xerothermica</i> low open woodland over mixed <i>Acacia citrinoviridis</i> and other <i>Acacia</i> species shrubland over <i>Triodia pungens</i> open hummock grassland over * <i>Cenchrus ciliaris</i> open tussock grassland.	Riparian	2.5

* Introduced species of flora.

Source: ENV Australia (2008a).

Based on the above, the proposal is at variance to this Proposal.

However, the riparian vegetation community types described above were generally described as being in 'Poor' condition with a high level of disturbance from cattle (e.g., grazing and trampling), introduced flora species (e.g., *Cenchrus ciliaris*) and anthropogenically-altered drainage systems (e.g., artificial river beds and banks) (ENV Australia, 2008a). Additionally, ENV Australia (2008a) determined that the regional representation of the Beard Vegetation Community 29 (represents the vegetation communities associated with riparian vegetation and floodplains) is unlikely to be significantly impacted by the proposed development.

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

Methodology ENV Australia (2008a).
 GIS Database:
 - Hydrographic Catchments - Catchments.
 - Hydrographic Catchments - Subcatchments.
 - Hydrography, linear.
 - RIWI Act, Rivers.

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

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

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

Adrian:

The Adrian land system is characterised by low rounded hills and rises, gently undulating to almost level stony plains, and short drainage lines with radial patterns away from hills. Relief can be up to 40 metres but usually much less. The Adrian land system has a low risk of erosion (Van Vreeswyk et al., 2004). A minute proportion of the proposed clearing areas have been mapped as the Adrian land system (GIS Database).

Divide:

The Divide land system is characterised by level to gently undulating plain with occasional linear dunes and plains with thin sand cover. Relief can be up to 20 metres. The Divide land system has some susceptibility to wind erosion immediately following burning but stabilisation occurs rapidly after rain (Van Vreeswyk et al., 2004). A moderate proportion of the proposed clearing areas have been mapped as the Divide land system (GIS Database).

Fan:

The Fan land system is characterised by level washplains subject to overland sheet flow and with numerous groves of dense vegetation. Relief is less than 10 metres. The Fan land system is moderately susceptible to soil erosion if vegetative cover is depleted (Van Vreeswyk et al., 2004). The majority of the proposed clearing areas have been mapped as the Fan land system (GIS Database).

Fortescue:

The Fortescue land system is characterised by alluvial plains, active flood plains and depressions with minor levees and major river channels. This land system supports patchy grassy woodlands and shrublands and tussock grasslands. Alluvial plains and levees of the Fortescue land system are highly susceptible to erosion if vegetative cover is lost (Van Vreeswyk et al., 2004). A small proportion of the proposed clearing areas have been mapped as the Fortescue land system (GIS Database).

Marillana:

The Marillana land system is characterised by level plains with dense surface mantles of ironstone gravel, subject to sheet flow. The Marillana land system is moderately susceptible to erosion (Van Vreeswyk et al., 2004). A small proportion of the proposed clearing areas have been mapped as the Marillana land system (GIS Database).

Urandy:

The Urandy land system is characterised by level stony plains and fans of sandy alluvium with distributary creeklines and channels. This system is subject to sheet flow and overbank flooding. Relief is less than 10 metres. Most of the Urandy land system is not susceptible to erosion or vegetation degradation (Van Vreeswyk et al., 2004). A moderate proportion of the proposed clearing areas have been mapped as the Urandy land system (GIS Database).

Given that the majority of the areas applied to clear for the construction of the Paroo, Sandhill and Ethel railway sidings will be rehabilitated following the completion of the proposed works (approximately 280 hectares or approximately 91% of the total proposed clearing), only a relatively small proportion of the rangeland land systems mentioned above will form part of the permanent disturbance.

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

Methodology 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

The application areas are not located within a conservation area (GIS Database). The nearest conservation area is the 'A'-class Karijini National Park which is located approximately 52 kilometres west of the application areas (GIS Database). Given the distance separating the application areas and the nearest conservation area, the proposed clearing is unlikely to impact on the conservation values of the Karijini National Park.

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

Methodology 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 for the Paroo, Sandhill and Ethel railway sidings for the duplicate of the Newman to Port Hedland railway line (BHPBIO, 2009a). The depth of groundwater within the application areas varies from just below ground level to 20 metres below ground level (BHPBIO, 2009a). Groundwater within the application areas will not be intersected during the railway duplication; as a result, impacts to groundwater are likely to be minimal.

The southern section of the application areas is located within a Public Drinking Water Source Area (PDWSA); the Newman Water Reserve (GIS Database). Advice from the Department of Water (2009) determined that the proposed clearing of 308 hectares for the purpose of railway sidings is unlikely to have a significant impact on the quality or quantity of groundwater within the PDWSA. Therefore, the clearing associated with the construction of rail sidings is unlikely to have an adverse effect on groundwater quality.

The application areas contain a number of minor non-perennial watercourses (including Mindy Mindy Creek), a major non-perennial watercourse (Weeli Wollie Creek) and significant non-perennial stream which all flow northwards towards the Fortescue Marshes (located approximately 12 kilometres to the north of the application areas) (GIS Database). The Fortescue Marshes are listed as an Environmentally Sensitive Area and are listed in A Directory of Important Wetlands in Australia (formerly known as ANCA Wetlands) (GIS Database). Additionally, the application areas are within 2 kilometres (at the closest point) from the Fortescue River (GIS Database). As the creeks and watercourses flow to the north of the proposed clearing areas, care must be taken when clearing to prevent large volumes of sediment entering into the perennial watercourses and finally into the Fortescue Marshes.

Rainfall in the Pilbara bioregion tends to be unpredictable and erratic, and the rocky-sloping topography of much of the upper catchments often produces considerable runoff (Van Vreeswyk et al., 2004). As such, the non-perennial watercourses tend to have high levels of sedimentation and turbidity following rainfall events (Van Vreeswyk et al., 2004). Given this information, the clearing of 308 hectares for the proposed railway sidings is unlikely to impact on surface water quality. Additionally, given that the majority of the proposed clearing (approximately 91% of the total proposed clearing) will be rehabilitated after the works are completed it is unlikely that the proposed clearing will have long term effects on surface water quality.

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

Methodology BHPBIO (2009a).
Department of Water (2009).
Van Vreeswyk et al. (2004).
GIS Database:
- ANCA, Wetlands.
- Clearing Regulations - Environmentally Sensitive Areas.
- Geodata, Lakes.
- Hydrography, linear.
- Public Drinking Water Source Areas (PDWSAs).
- RIWI Act, Rivers.

(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 proposed clearing areas are located within land systems which feature low levels of topographic relief (up to 40 metres) on soils that are generally not prone to degradation or susceptible to soil erosion (Van Vreeswyk et al., 2004). According to the isopleths and isohyets within the GIS Database, the application areas receive between approximately 200 millimetres and 300 millimetres of rainfall per annum and have an average evaporation rate of between approximately 3,400 and 3,600 millimetres per annum. The watercourses in the vicinity of the proposed clearing areas are non-perennial in nature and flow as a result of heavy rainfall (GIS Database).

Rainfall in the Pilbara bioregion is unpredictable and erratic; it depends on cyclonic activity and thunderstorms that occur mainly during the wet season/summer months (Van Vreeswyk et al., 2004). The rocky-sloping topography of much of the upper catchments often produces considerable runoff, and widespread flooding naturally occurs in the major river systems (Van Vreeswyk et al., 2004).

The application areas are located within the Fortescue River - Upper catchment (covering an area of 2,975,192 hectares) and are located approximately 12 kilometres south of the Fortescue Marshes (GIS Database). This catchment experiences natural flooding occasionally and, as such, the clearing of approximately 308 hectares of native vegetation is unlikely to cause or exacerbate flooding within the greater catchment area.

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

- Methodology** Van Vreeswyk et al. (2004).
GIS Database:
- ANCA, Wetlands.
 - Clearing Regulations - Environmentally Sensitive Areas.
 - Evaporation Isoleths (Evaporation).
 - Geodata, Lakes.
 - Hydrographic Catchments - Catchments.
 - Hydrography, linear.
 - Isohyets (Rainfall).
 - RIWI Act, Rivers.

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

Comments There are two native title claims over the areas under application; WC99_004 and WC98_062 (GIS Database). These claims have been registered with the National Native Title Tribunal on behalf of the claimant groups. However, the special lease has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process; therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are no known Aboriginal Sites of Significance within the application areas, two known Aboriginal Sites of Significance listed on the permanent register are located within 2 kilometres of the application areas and an additional two known Aboriginal Sites of Significance listed on the interim register are located within 2 kilometres of the application areas (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

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.

No submissions were received by the Department of Mines and Petroleum for this application.

- Methodology** GIS Database:
- Aboriginal Sites of Significance.
 - Native Title Claims.

4. Assessor's comments

Comment

The clearing principles have been addressed and the proposed clearing is at variance to Principle (f), is not likely to be at variance to Principle (a), (b), (c), (d), (g), (h), (i) or (j) and is not at variance to Principle (e).

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

5. References

- BHPBIO (2009a) Application to clear native vegetation (purpose permit) under the Environmental Protection Act 1986: Paroo, Sandhill and Ethel Sidings. BHP Billiton Iron Ore Pty Ltd, Western Australia.
- BHPBIO (2009b) Advice to the assessing officer, received on 18 August 2009, BHP Billiton Iron Ore Pty Ltd.
- CALM (2002) A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002. Department of Conservation and Land Management, 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.
- Department of Water (2009) Advice to the assessing officer, received on 10 July 2009, Department of Water.
- ENV Australia (2008a) Rapid Growth Project 5: Jimblebar Junction to Yandi Junction Railway Reserve. Flora and vegetation assessment. ENV Australia Pty Ltd, Western Australia.
- ENV Australia (2008b) Rapid Growth Project 5: Jimblebar Junction to Yandi Junction Railway Reserve and Repeaters 6, 7 and 8. Fauna assessment. ENV Australia Pty Ltd, Western Australia.
- EPA (2000) Environmental protection of native vegetation in Western Australia. Clearing of native vegetation, with particular reference to the agricultural area. Position Statement No. 2. December 2000. Environmental Protection Authority, Western Australia.
- 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. (2007). Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.
- Van Vreeswyk, A.M., 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, South Perth, Western Australia.
- Western Australian Herbarium (2009) FloraBase: The Western Australian Flora. *Bulbostylis burbridgeae* K.L. Wilson. Department of Environment and Conservation. <http://florabase.calm.wa.gov.au/browse/profile/751>. Accessed 23/07/2009.

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.
DMP	Department of Mines and Petroleum, 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	<i>Environment Protection Act 1986</i> , Western Australia.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia.
s.17	Section 17 of the <i>Environment Protection Act 1986</i> , 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.