



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4182/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: Iron Ore (Hamersley Range) Agreement Act 1963, Mineral Lease 4SA (AML 70/4); Section 91 Licence 00331-2009_1_87 under the Land Administration Act 1997; Iron Ore (Hamersley Range) Agreement Act 1963, Special Lease for Mining Operations 3116/11808 (Document G 848898L), Lot 96 on Deposited Plan 243145

Local Government Area: Shire of Ashburton

Colloquial name: Nammuldi-Silvergrass Expansion Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
105		Mechanical Removal	Geotechnical Investigations

1.5. Decision on application

Decision on Permit Application: Granted
Decision Date: 21 April 2011

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. Four Beard vegetation associations have been mapped within the application area (GIS Database).

29: Sparse low woodland; mulga, discontinuous in scattered groups.

82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*.

175: Short bunch grassland – savanna/grass plain (Pilbara).

567: Hummock grasslands, shrub steppe; mulga and kanji over soft spinifex and *Triodia basedowii*.

Biota Environmental Services (Biota), Halpern Glick Maunsell (HGM) and Rio Tinto Iron Ore (Rio Tinto) have conducted flora and vegetation surveys over the application area between 1998 and 2010. A total of 94 vegetation units have been described from nine surveys that provided vegetation mapping for the application area. From these, Biota (2010a) has derived 14 broad vegetation units and these are described below.

Vegetation of the Creeklines and Drainage Areas

ExAsppCHfEUaTpTe: *Eucalyptus xerothermica* (*Corymbia hamersleyana*) scattered low trees to low woodland over mixed *Acacia* spp. (including *A. ancistrocarpa*, *A. bivenosa*, *A. monticola*, *A. citrinoviridis*, *A. maitlandii*) tall open scrub to low open shrubland over *Chrysopogon fallax*, *Eulalia aurea* tussock grassland or *Triodia pungens*, *T. epactia* (*T. wiseana*) hummock grassland.

EcTeTpEUaTHtERibCYspp: *Eucalyptus camaldulensis* (*E. victrix* or *E. xerothermica*) tall woodland to open forest over mixed shrubs (including *Acacia citrinoviridis*, *Melaleuca glomerata*, *Gossypium robinsonii*) tall to low shrubland over *Triodia epactia*, *T. pungens* open hummock grassland and/or *Eulalia aurea*, *Themeda triandra*, *Eriachne benthamii*, *Cymbopogon* spp. very open to closed tussock grassland.

ElChAsppTeTp: *Eucalyptus leucophloia*, *Corymbia hamersleyana* (*E. victrix*, *C. deserticola*) scattered low trees over *Acacia* spp. (including *A. maitlandii*, *A. atkinsiana*, *A. exilis*, *A. monticola*, *A. tumida*, *A. citrinoviridis*, *A. ancistrocarpa*) tall closed scrub over *Triodia epactia*, *T. pungens* (*T. wiseana*) open hummock grassland.

AanTpTeTw: *Acacia aneura* (*A. ayersiana*) tall open shrubland to low open forest over *Triodia pungens*, *T. epactia* or *T. wiseana* hummock grassland (occasionally with *Chrysopogon fallax* or *Setaria dielsii* open tussock grassland to tussock grassland).

AbMgTa: *Acacia bivenosa*, *Melaleuca glomerata* tall shrubland over *Triodia angusta* hummock grassland.

EfApAmGORERImTe: *Eucalyptus ferritcola* low open woodland over *Acacia pruinocarpa*, *A. monticola*, *Gossypium robinsonii* tall to low open shrubland over *Eriachne mucronata* (*Themeda triandra*, *Cymbopogon ambiguus*, *Aristida burbridgeae*) open tussock grassland over *Triodia epactia* very open hummock grassland.

Vegetation of the Hills, Crests and Slopes

EIAspTwTeERIm: *Eucalyptus leucophloia* (occasional *Corymbia ferritcola*) scattered low trees over mixed *Acacia* spp. (including *A. maitlandii*, *A. atkinsiana*, *A. exilis*, *A. pruinocarpa*) shrubland over *Triodia wiseana*, *T. epactia* (*T. brizoides*, *T. melvillei*) open hummock grassland to hummock grassland and occasional *Eriachne mucronata* scattered tussock grasses.

EITwTpTe: *Eucalyptus leucophloia* (occasional stands of *Acacia aneura*) low open woodland over *Triodia wiseana*, *T. pungens*, *T. epactia* hummock grassland.

AanTwTe: *Acacia aneura* low open woodland over *Triodia wiseana*, *T. epactia* hummock grassland.

Vegetation of the Plains and Foothills

CdChEgEIAspTsp: *Corymbia deserticola*, *C. hamersleyana*, *Eucalyptus gamophylla*, *E. leucophloia* scattered low trees over mixed *Acacia* spp. (including *Acacia exilis*, *A. inaequilatera*, *A. ancistrocarpa*, *A. atkinsiana*, *A. bivenosa*, *A. tenuissima*) tall open shrubland over *Triodia* spp. (predominately *T. wiseana* occasionally *T. pungens*, *T. epactia*, *T. angusta*) hummock grassland to closed hummock grassland.

EIAspTw: *Eucalyptus leucophloia* (occasionally *E. socialis*, *E. trivalva*) scattered low trees over *Acacia* spp. (*A. inaequilatera*, *A. bivenosa*, *A. exilis*, *A. synchronicia*, occasional stands of *A. xiphophylla*) scattered shrubs to open shrubland over *Triodia wiseana* (*T. longiceps*, *T. epactia*, *T. angusta*, *T. brizoides*) open hummock grassland to hummock grassland.

AxTwTeTa: *Acacia xiphophylla* open woodland (occasionally over *A. aneura* shrubland) over *Triodia wiseana*, *T. epactia* or *T. angusta* very open hummock grassland.

Vegetation of the Disturbed Areas

Dist: Cleared or disturbed.

Rehab: Rehabilitation area.

Clearing Description

Hamersley Iron Pty Ltd has applied to clear up to 105 hectares of native vegetation within an application area of approximately 10,805.5 hectares for the purpose of geotechnical investigations. The clearing is for preliminary investigatory works associated with the Nammuldi-Silvergrass Expansion Project to investigate the viability of infrastructure locations for the project. Geotechnical investigations will comprise of drill pads, test pits, access tracks and minor associated works e.g. laydown areas.

The application area is part of Hamersley Iron's Nammuldi-Silvergrass Iron Ore Project, located 40 kilometres north-west of Tom Price.

Vegetation will be cleared by mechanical means.

Vegetation Condition

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

To

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

Comment

The vegetation condition is derived from vegetation and flora surveys undertaken by botanists from Biota, HGM and Rio Tinto.

3. Assessment of application against clearing principles

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

Comments

Proposal may be at variance to this Principle

The application area occurs within the Hamersley (PIL3) Interim Biogeographic Regionalisation of Australia (IBRA) subregion (GIS Database). This subregion is generally described as 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).

The vegetation within the application area is broadly mapped as Beard vegetation associations 29, 82, 175 and 567, all of which have approximately 100% of their Pre-European vegetation extent remaining in the bioregion (Shepherd, 2009; GIS Database). Nine surveys have provided vegetation mapping for the Nammuldi-Silvergrass area and Biota (2010a) have consolidated the 94 described vegetation types into 14 broad vegetation types. The vegetation types described are generally typical of the local area and the Hamersley

subregion (Biota, 2010a). While none of the vegetation types are restricted to the application area, the vegetation of Duck Creek is of local significance (HGM, 1999b). Duck Creek is the largest drainage channel that runs through the application area and this major creekline represents a refuge for flora and fauna during times of drought (HGM, 1999b). Watercourses within the application area that contain Red River Gum (*Eucalyptus camaldulensis*) have been mapped as vegetation of conservation significance and should be avoided where possible (Biota, 2010a). One of the management measures for the Nammuldi Project is to minimise disturbance in creeklines and gorges (Lycopodium, 2011).

The largest flora and vegetation survey in the Nammuldi-Silvergrass area was undertaken by HGM in July, August and September 1998 over an area of approximately 9,628 hectares that overlaps approximately half the current application area (HGM, 1999a). A total of 358 species of vascular flora, belonging to 161 genera from 56 families, were recorded from the survey area (HGM, 1999a).

No Declared Rare Flora have been recorded in the application area but a large number of Priority Flora species have been recorded (Biota, 2010a; GIS Database). Nineteen Priority Flora species have been recorded from the application area and the surrounding Nammuldi-Silvergrass area, with large clusters of Priority Flora recorded in the creeks in the west and the lower rocky gully slopes along the southern boundary (Biota, 2010a). The large clusters of Priority Flora are mainly recorded from within habitats that are unlikely to be extensively cleared as part of the current proposed clearing (Biota, 2010a). Hamersley Iron have committed to avoiding Priority flora where practicable (Lycopodium, 2011). Potential impacts to Priority Flora as a result of the proposed clearing may be minimised by the implementation of a flora management condition.

The application area currently has a low abundance of weeds (Biota, 2010a), although several weed species have been recorded. The weed species that have been recorded are Bipinnate Beggartick (*Bidens bipinnata*), Buffel Grass (*Cenchrus ciliaris*), Purslane (*Portulaca oleracea*), Spiked Malvastrum (*Malvastrum americanum*) and Whorled Pigeon Grass (*Setaria verticillata*) (HGM, 1999b; Biota, 2010d). Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

There are several occurrences of Threatened Ecological Communities (TECs) within a 5 kilometre radius of the application area (Biota, 2010a; GIS Database). The nearest TEC is 2.5 kilometres north-west of the application area (Biota, 2010a). The Department of Environment and Conservation (DEC) consider that Rio Tinto's environmental management measures are able to adequately manage the level of risk to the 'Themeda grasslands' TEC outside a 200 m wide buffer for general exploration activities (DEC, 2011a). DEC have also advised that no other TECs or Priority Ecological Communities (PECs) occur close enough to the application area to warrant any concerns (DEC, 2011a).

A vertebrate fauna survey was conducted by Hamersley Iron in November 1998 and May 1999 over the vast majority of the application area and an adjacent area to the north (Hamersley Iron, 1999). Trapping resulted in 66 reptiles, 21 mammals and 76 bird species being recorded (Hamersley Iron, 1999). This high species richness is consistent with other Pilbara surveys (Hamersley Iron, 1999). The high diversity of reptile species in particular is typical of the Australian arid zone (Hamersley Iron, 1999).

The application area does comprise a relatively high level of biological diversity. However, the application area is much larger than the area proposed to be cleared, 10,805.5 hectares compared to 105 hectares. The landforms and vegetation types that support a higher species richness, such as around major creeklines and habitats supporting Priority flora, are unlikely to be extensively cleared during the proposed clearing activities (Biota, 2010a).

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

Methodology Biota (2010a)
Biota (2010d)
CALM (2002)
DEC (2011a)
Hamersley Iron (1999)
HGM (1999a)
HGM (1999b)
Lycopodium (2011)
Shepherd (2009)
GIS Database:
- Declared Rare and Priority Flora List
- IBRA WA (Regions - Sub Regions)
- Pre-European Vegetation
- Threatened Ecological Sites Buffered

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

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

Several fauna surveys have been undertaken over the application area and its surrounds between 1998 and

2010 as part of the Nammuldi-Silvergrass Project. These surveys have included a vertebrate fauna trapping survey over the large Nammuldi-Silvergrass tenements in 1998 and 1999 (Hamersley Iron, 1999), targeted fauna surveys for conservation significant species (Biota, 2009a; Biota, 2010b) and smaller surveys for expansion areas (Biota, 2010c).

The dominant fauna habitats within the Nammuldi-Silvergrass leases are alluvial plains and outwash areas; areas associated with cracking and non-cracking clay soils; hill tops and slopes of the Marra Mamba ridges; and sites dominated by Spinifex that are often associated with minor creeklines (Hamersley Iron, 1999). The primary habitats present within the application area are widespread and well represented in the locality (Biota, 2010a). Other fauna habitats within the leases are riverine sites, Mulga woodlands and a deep alluvial soil site. These other fauna habitat sites are generally small in their extent and are poorly represented on a local scale (Hamersley Iron, 1999).

A vertebrate fauna survey was conducted by Hamersley Iron in November 1998 and May 1999 over the vast majority of the application area and an adjacent area to the north (Hamersley Iron, 1999). Trapping resulted in 66 reptiles, 21 mammals and 76 bird species being recorded (Hamersley Iron, 1999). A high fauna richness is not unusual for the Pilbara region as it is a transitional zone between bioclimatic regions and a major centre for biodiversity (Biota, 2010a; Department of Sustainability, Environment, Water, Population and Communities, 2011).

Eleven vertebrate fauna species listed as Threatened Species under the *Environmental Protection and Biodiversity Act 1999* or specially protected under Western Australian legislation have been recorded in the application area or the adjacent Nammuldi-Silvergrass area, with a further two having the potential to occur (Hamersley Iron, 1999; Biota, 2009a; Biota, 2009b; Biota, 2010a; Biota, 2010b; Biota, 2010c).

The conservation significant species that have been recorded are listed below, along with their conservation status:

- Northern Quoll (*Dasyurus hallucatus*) Schedule 1;
- Pilbara Orange Leaf-nosed Bat (*Rhinonictoris aurantius*) Schedule 1;
- Rainbow Bee-eater (*Merops ornatus*) Schedule 3;
- Peregrine Falcon (*Falco peregrinus*) Schedule 4;
- Australian Bustard (*Ardeotis australis*) Priority 4;
- Bush Stone-curlew (*Burhinus grallarius*) Priority 4;
- Ghost Bat (*Macroderma gigas*) Priority 4;
- Long-tailed Dunnart (*Sminthopsis longicaudata*) Priority 4;
- Skink (*Notoscincus butleri*) Priority 4;
- Short-tailed Mouse (*Leggadina lakedownensis*) Priority 4; and
- Western Pebble-mound Mouse (*Pseudomys chapmani*) Priority 4 (Hamersley Iron, 1999; Biota, 2009a; Biota, 2009b; Biota, 2010a; Biota, 2010b; Biota, 2010c).

Many of these species are highly mobile and/or widespread and the proposed clearing is not expected to impact on them (Biota, 2010a). The Northern Quoll was recorded in the original fauna survey for the application area by Hamersley Iron (1999). Subsequent targeted fauna surveys for this species within the application area and its surrounds have not detected any animals (Biota, 2009a). It is a highly mobile species with individual animals occupying large territories and utilising multiple dens (Van Dyck and Strahan, 2008). The migratory Rainbow Bee-eater would not be reliant on the habitats within the application area (Biota, 2010c). The Peregrine Falcon is widespread and inhabits mainly cliffs along coasts, rivers and ranges, and wooded watercourses and lakes (Johnstone and Storr, 1998). The Australian Bustard is widespread in the Pilbara, mobile and has a large foraging range (Biota, 2010c).

While the proposed clearing may impact on individual animals, the application area is not considered core habitat for the Bush Stone-curlew, Long-tailed Dunnart, *Notoscincus butleri* or Short-tailed Mouse and is unlikely to significantly impact on these species (Biota, 2010a).

Caves to the north and south of the application area, near the Marra Mamba ridgelines, provide suitable roost habitat for bats (Biota, 2009b). There is a known maternity roost for the Ghost Bat in the Marra Mamba formation in the Silvergrass area (Hamersley Iron, 1999; Biota, 2009b), north of the application area. The Pilbara Orange Leaf-nosed Bat was detected in the Silvergrass West area (Biota, 2009b), also north of the application area. The Pilbara Orange Leaf-nosed Bat has not been detected within the application area despite several fauna surveys including a targeted survey (Biota, 2009a; Biota, 2010b). Given the survey work conducted by Biota and the fact that the Pilbara Orange Leaf-nosed Bat is broadly distributed throughout the region, DEC have advised that the risks associated with the proposed clearing are low for this species (DEC, 2011a). While the application area provides potential foraging habitat for both conservation significant bat species, neither species is restricted to the application area and the proposed clearing is not likely to impact on either species (Biota, 2010a).

The Western Pebble-mound Mouse has been recorded both within and adjacent to the application area in several surveys (Hamersley Iron, 1999; Biota, 2009a; Biota, 2009b; Biota, 2010b; Biota, 2010c). Western Pebble-mound Mouse was the most common mammal species in a targeted conservation significant fauna survey in April and May 2010 (Biota, 2010b). The survey area included the south-west corner of the application area, the adjacent area to the south-west and two other separate nearby locations (Biota, 2010b).

The survey recorded 90 active mounds and 22 inactive mounds, some of which were in the application area, and the population is considered locally significant (Biota, 2010b). Adverse impacts on this species on a local scale are likely if extensive areas in the south-west corner are cleared. However, the proposed clearing for geotechnical investigations is 105 hectares spread over the 10,805.5 hectare application area. Also, this species is common to very common in suitable habitat within the Pilbara, including within conservation estate, and the proposed clearing is unlikely to affect the conservation status of this species on a bioregional scale (Biota, 2010b).

Targeted surveys were undertaken for short range endemic invertebrates (SREs) within parts of the application area and several specimens belonging to potential SRE groups were recorded (Biota, 2009a; Biota, 2010b; Biota, 2010c). The conservation significance of many potential SRE taxa is currently uncertain and difficult to determine so a common practical approach is to adopt a risk based assessment based on available habitat types (Biota, 2010b). The habitats found within the study areas are not restricted to the study areas so it is likely that the terrestrial invertebrates would be found elsewhere in the Pilbara bioregion (Biota, 2010b). The collected specimens have been lodged with the WA Museum to assist with future taxonomic studies (Biota, 2010c).

The impact on subterranean fauna was considered to be one of the key environmental factors by the Environmental Protection Authority (EPA) in its assessment report on the original Nammuldi-Silvergrass Project (EPA, 2000). However, the impacts on subterranean fauna are from the mine dewatering and not from the clearing of native vegetation (EPA, 2000). The clearing of 105 hectares of native vegetation within the large application area is unlikely to impact on the subterranean habitat of the stygofauna.

The application area provides habitat to many native fauna species, including conservation significant species. While some habitat types may have local importance, most of the the habitat types are common both locally and regionally.

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

Methodology Biota (2009a)
Biota (2009b)
Biota (2010a)
Biota (2010b)
Biota (2010c)
DEC (2011a)
Department of Sustainability, Environment, Water, Population and Communities (2011)
EPA (2000)
Hamersley Iron (1999)
Johnstone and Storr (1998)
Van Dyck and Strahan (2008)

(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

According to available databases there are no known records of Declared Rare Flora (DRF) within the application area (DEC, 2011b; GIS Database). The nearest record of DRF, *Lepidium catapycnon*, is located approximately 40 kilometres south-east of the application area (GIS Database).

The application area has been extensively surveyed with the vast majority (approximately 99%) of the area covered by existing vegetation mapping and biological surveys that were undertaken between 1998 and 2010 by several botanical consultants. No DRF have been recorded in the application area (Biota, 2010a).

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

Methodology Biota (2010a)
DEC (2011b)
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

According to available databases there are several occurrences of the Threatened Ecological Community (TEC) 'Themeda grasslands on cracking clays' in the vicinity of the application area (GIS Database).

Vegetation mapping has been conducted over the vast majority (approximately 99%) of the application area and no vegetation types occurring within the application area resemble this TEC (Biota, 2010a). The closest TEC is approximately 2.5 kilometres north-west of the application area and two additional stands of the TEC occur 10 and 15 kilometres to the east (Biota, 2010a). The Department of Environment and Conservation

(DEC) consider that Rio Tinto's environmental management measures are able to adequately manage the level of risk to the 'Themeda grasslands' TEC outside a 200 m wide buffer for general exploration activities (DEC, 2011a). Given the distance of the proposed clearing from the TEC, it is likely that the risks to the TEC will be negligible (DEC, 2011a).

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

Methodology Biota (2010a)
DEC (2011a)
GIS Database:
- Threatened Ecological Sites Buffered

(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 area falls within the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion in which approximately 99.9% of the pre-European vegetation remains (see table) (Shepherd, 2009; GIS Database). This gives it a conservation status of "Least Concern" according to the Bioregional Conservation Status of Ecological Vegetation Classes (Department of Natural Resources and Environment, 2002).

The vegetation of the clearing application area has been mapped as Beard vegetation associations:

- 29:** Sparse low woodland; mulga, discontinuous in scattered groups;
- 82:** Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*;
- 175:** Short bunch grassland - savannah/grass plain (Pilbara); and
- 567:** Hummock grasslands, shrub steppe; mulga and kanji over soft spinifex and *Triodia basedowii* (Shepherd, 2009; GIS Database).

According to Shepherd (2009), over 99% of each of these vegetation associations remain at a state level and 100% of vegetation remains at a bioregional level (see table). These vegetation associations would be given a conservation status of "Least Concern" at both a state and bioregional level (Department of Natural Resources and Environment, 2002).

The vegetation under application is not a remnant of vegetation in an area that has been extensively cleared.

	Pre-European Area (ha)*	Current Extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,193	17,785,001	~99.9	Least Concern	6.3
Beard Veg Assoc. – State					
29	7,903,991	7,903,991	~100	Least Concern	0.3
82	2,565,901	2,565,901	~100	Least Concern	10.2
175	526,206	524,861	~99.7	Least Concern	4.2
567	777,507	777,507	~100	Least Concern	22.3
Beard Veg Assoc. – Bioregion					
29	1,133,220	1,133,220	~100	Least Concern	1.9
82	2,563,583	2,563,583	~100	Least Concern	10.2
175	507,036	507,006	~100	Least Concern	4.4
567	776,824	776,824	~100	Least Concern	22.3

* Shepherd (2009)

** 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 (2009)
GIS Database
- IBRA WA (Regions - Sub Regions)
- 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 contains the creekline Duck Creek, a multitude of minor non-perennial watercourses and tributaries of Duck Creek, and an area subject to inundation (Biota, 2010a; GIS Database). The minor non-perennial watercourses, and their associated vegetation, are widespread in the Pilbara region (GIS Database).

Biota (2010a) derived 14 broad vegetation types based on previous vegetation mapping of the application area and six of these are associated with creeklines or drainage areas. These vegetation types are:

ExAsppCHfEUaTpTe: *Eucalyptus xerothermica* (*Corymbia hamersleyana*) scattered low trees to low woodland over mixed *Acacia* spp. (including *A. ancistrocarpa*, *A. bivenosa*, *A. monticola*, *A. citrinoviridis*, *A. maitlandii*) tall open scrub to low open shrubland over *Chrysopogon fallax*, *Eulalia aurea* tussock grassland or *Triodia pungens*, *T. epactia* (*T. wiseana*) hummock grassland;

EcTeTpEUaTHtERlbCYspp: *Eucalyptus camaldulensis* (*E. victrix* or *E. xerothermica*) tall woodland to open forest over mixed shrubs (including *Acacia citrinoviridis*, *Melaleuca glomerata*, *Gossypium robinsonii*) tall to low shrubland over *Triodia epactia*, *T. pungens* open hummock grassland and/or *Eulalia aurea*, *Themeda triandra*, *Eriachne benthamii*, *Cymbopogon* spp. very open to closed tussock grassland;

EIChAsppTeTp: *Eucalyptus leucophloia*, *Corymbia hamersleyana* (*E. victrix*, *C. deserticola*) scattered low trees over *Acacia* spp. (including *A. maitlandii*, *A. atkinsiana*, *A. exilis*, *A. monticola*, *A. tumida*, *A. citrinoviridis*, *A. ancistrocarpa*) tall closed scrub over *Triodia epactia*, *T. pungens* (*T. wiseana*) open hummock grassland;

AanTpTeTw: *Acacia aneura* (*A. ayersiana*) tall open shrubland to low open forest over *Triodia pungens*, *T. epactia* or *T. wiseana* hummock grassland (occasionally with *Chrysopogon fallax* or *Setaria dielsii* open tussock grassland to tussock grassland);

AbMgTa: *Acacia bivenosa*, *Melaleuca glomerata* tall shrubland over *Triodia angusta* hummock grassland; and

EfApAmGORERImTe: *Eucalyptus ferritcola* low open woodland over *Acacia pruinocarpa*, *A. monticola*, *Gossypium robinsonii* tall to low open shrubland over *Eriachne mucronata* (*Themeda triandra*, *Cymbopogon ambiguus*, *Aristida burbridgeae*) open tussock grassland over *Triodia epactia* very open hummock grassland (Biota, 2010a).

Hamersley Iron have committed to protecting riparian vegetation and vegetation along drainage lines, gullies, gorges and creek crossings where practicable (Lycopodium, 2011). This is detailed as part of the environmental procedures in Hamersley Iron's 'Construction Environmental Management Plan' for the overall project.

Based on the above, the proposed clearing is at variance to this Principle. However, vegetation associated with minor drainage lines is widespread in the region and due to the minor nature of the proposed clearing for geotechnical investigations there is unlikely to be significant impacts on any watercourse or wetland.

Methodology Biota (2010a)
Lycopodium (2011)
GIS Database:
- Hydrography, Linear
- 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

According to available datasets the application area intersects the Boolgeeda, Newman, Robe, Rocklea, Table and Wannamunna Land Systems (GIS Database).

The Boolgeeda Land System is characterised by stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands (Van Vreeswyk et al., 2004). The vegetation is generally not prone to degradation and the system is not susceptible to erosion (Van Vreeswyk et al, 2004).

The Newman Land System is characterised by rugged jaspilite plateaux, ridges and mountains supporting hard

spinifex grasslands (Van Vreeswyk et al, 2004). Each of the landforms in the land system have a mantle of abundant pebbles of ironstone and other rocks, which translates to a low soil erosion risk (Van Vreeswyk et al., 2004).

The Robe Land System is characterised by low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands (Van Vreeswyk et al., 2004). The system is not generally susceptible to vegetation degradation or erosion (Van Vreeswyk et al., 2004).

The Rocklea Land System is characterised by basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands (Van Vreeswyk et al., 2004). Van Vreeswyk et al. (2004) report that this system has a very low erosion risk.

The Table Land System is characterised by low calcrete plateaux, mesas and lower plains supporting mulga and cassia shrublands and minor spinifex grasslands (Van Vreeswyk et al., 2004). The system is generally not susceptible to erosion (Van Vreeswyk et al., 2004).

The Wannamunna Land System is characterised by hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasionally eucalypt woodlands) (Van Vreeswyk et al., 2004). Generally the system has low susceptibility to erosion but disturbances to overland flow processes by inappropriate positioning or construction of infrastructure such as roads can have adverse effects on vegetation (Van Vreeswyk et al., 2004).

The soils of the Nammuldi and Silvergrass areas were sampled and mapped in August and September 1998 (HGM, 1999a). Eleven soil types were described for the application area and its surrounds and none of these were unique to the survey area (HGM, 1999a). The duplex soils are particularly susceptible to disturbance and the clay soils are also typically subject to erosion (HGM, 1999a). These two soil types combined made up only 5.8% of the 9,628 hectare soil survey area (HGM, 1999a), so while they should be avoided where possible they only represent a small portion of the application area.

Hamersley Iron have environmental procedures in place to manage erosion (Lycopodium, 2011). The proposed clearing of 105 hectares scattered over a total application area of approximately 10,805.5 hectares is unlikely to result in appreciable land degradation.

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

Methodology HGM (1999a)
Lycopodium (2011)
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 proposed clearing is not located within a conservation reserve (GIS Database). The nearest conservation area is Karijini National Park, which is located approximately 44 kilometres south-east of the application area (GIS Database). A large proportion of the vegetation in the Pilbara bioregion remains uncleared, approximately 99.9% (Shepherd, 2009), so it is unlikely the application area provides an important buffer or ecological linkage to Karijini National Park.

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

Methodology Shepherd (2009)
GIS Database:
- DEC Tenure

(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**
According to available databases the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database). The nearest PDWSA is Millstream Water Reserve, which is approximately 9 kilometres north-east of the application area (GIS Database). At this distance the proposed clearing is unlikely to deteriorate the quality of surface or underground water within the reserve.

The groundwater salinity within the application area is approximately 500 - 1,000 milligrams/Litre Total Dissolved Solids (TDS) (GIS Database). Given the size of the area to be cleared (105 hectares) compared to the size of the Hamersley Groundwater Province (10,166,833 hectares) (GIS Database), the proposed clearing is not likely to cause salinity levels to alter significantly.

There are no permanent watercourses or wetlands within the application area but there is one major creekline

and a multitude of minor ephemeral watercourses (Biota, 2010a; GIS Database). The major drainage system of the application area is Duck Creek with the numerous ephemeral drainage lines in the application area flowing to either Duck Creek or Cave Creek, to the north of the application area, following significant rainfall (Hamersley Iron, 1999; Biota, 2010a). Clearing of riparian vegetation around the major drainage lines may pose problems to surface water from increased sedimentation and runoff. However, Hamersley Iron have committed to protecting riparian vegetation and vegetation along drainage lines, gullies, gorges and creek crossings where practicable (Lycopodium, 2011) and this greatly reduces the risk of deterioration to surface water. Hamersley Iron also have surface water and drainage management procedures to reduce erosion and sedimentation to protect the quality of surface water within the application area (Lycopodium, 2011).

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

Methodology Biota (2010a)
Hamersley Iron (1999)
Lycopodium (2011)
GIS Database:
- Groundwater Provinces
- Groundwater Salinity, Statewide
- Hydrography, Linear
- Public Drinking Water Source Areas

(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 application area is located within the Ashburton River catchment area (GIS Database). Given the size of the area to be cleared (105 hectares) in relation to the size of the catchment area (7,877,743 hectares) (GIS Database), the proposed clearing is not likely to increase the potential of flooding on a local or catchment scale.

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

Methodology GIS Database:
- Hydrographic Catchments - Catchments

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

Comments

There is one Native Title Claim (WC97/89) over the area under application (GIS Database). This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the mining tenure 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 numerous registered Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of 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.

This application is related to the Nammuldi-Silvergrass Expansion Project, which is currently being formally assessed by the Environmental Protection Authority (EPA). Under section 41A(3) of the *Environmental Protection Act 1986* approval is required to undertake minor or preliminary site works related to the proposal. The EPA has granted consent to Hamersley Iron Pty Ltd to conduct the proposed geotechnical investigations, subject to other relevant legislative requirements including a permit to clear native vegetation (EPA, 2011).

The clearing permit application was advertised on 7 February 2011 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received.

Methodology EPA (2011)
GIS Database:
- Aboriginal Sites of Significance
- Native Title Claims - Determined by the Federal Court

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5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
CALM	Department of Conservation and Land Management (now DEC), Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DEC), 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 (now DEC), Western Australia
DoIR	Department of Industry and Resources (now DMP), Western Australia
DOLA	Department of Land Administration, Western Australia
DoW	Department of Water

EP Act	Environmental Protection Act 1986, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
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 Act	Rights in Water and Irrigation Act 1914, Western Australia
s.17	Section 17 of the Environment Protection Act 1986, Western Australia
TEC	Threatened Ecological Community

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.