



1. Application details

1.1. Permit application details

Permit application No.: 1979/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: State Agreement Act, Mineral Lease 4SA (AML 70/4)
Local Government Area: Shire of Ashburton
Colloquial name: Marra Mamba Project

1.4. Application

| Clearing Area (ha) | No. Trees | Method of Clearing | For the purpose of: |
|--------------------|-----------|--------------------|---------------------|
| 260 | | Mechanical Removal | Mineral Production |

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description The area applied to clear has been broadly mapped at a scale of 1:250000 as: Beard Vegetation Association 162: Shrublands; snakewood scrub and Beard Vegetation Association 567: Hummock grasslands, shrub steppe; mulga & kanji over soft spinifex & *Triodia basedowii* (GIS Database).

Keith Lindbeck and Associates (2007) conducted a flora and vegetation survey at the Tom Price Iron Ore Mine (including the proposed clearing area) between 6 and 10 November 2006, 30 November and 1 December 2006, 29 January and 2 February 2007, 27 February and 2 March 2007 and an opportunistic visit on 22 June 2007. The following vegetation communities were mapped from the proposed clearing area:

Marra Mamba West Ridge:

Ranges and Hills Landscape Unit (H):

H1.1 - Hilltops with gently rounded slopes: *Eucalyptus leucophloia* and *E. gamophylla* scattered low trees over *Acacia hamersleyensis* and *A. bivenosa* open shrubland over *Triodia wiseana* hummock grassland;

H4 - Moderately inclined colluvial mid and lower slopes: *Corymbia hamersleyana* scattered low trees over high shrubland over *Triodia wiseana* hummock grassland;

H7.5 - Low rocky slopes: *Corymbia hamersleyana* and *Eucalyptus leucophloia* scattered low trees over *Acacia marramamba* and *Codonocarpus cotinifolius* high shrubland over *Triodia spp.* hummock grassland;

H8.1 - Undulating rocky hillocks: *Acacia aneura* and *A. pruinocarpa* low open woodland over open shrubland over *Triodia wiseana* hummock grassland;

H9.3 - Undulating upland platform: *Acacia aneura* low closed forest over *Eremophila spp.* shrubland over *Triodia wiseana* and *T. angusta* hummock grassland (small Mulga patch);

H13 - Moderately sized sub-valley: *Acacia aneura* and *A. pruinocarpa* low woodland (with patches of *A. aneura* low closed forest) over shrubland over *Triodia epactia* and *T. wiseana* hummock grassland or *Themeda sp. Mt Barricade* (M.E. Trudgen 2471) tussock grassland;

H14 - Minor sub-valley: *Eucalyptus leucophloia* and *Acacia pruinocarpa* low open woodland over shrubland over *Triodia wiseana* hummock grassland or *Themeda sp. Mt Barricade* tussock grassland;

H15 - Narrow incised shallow gorge: *Acacia aneura var. pilbarana*, *A. citrinoviridis* and *A. pruinocarpa* low closed forest with open scrub and mixed spp. grassland;

H16 - Minor shallow sub-valley: *Acacia bivenosa* open scrub over *Triodia wiseana* hummock grassland;

H17.1 - Colluvial upland slopes: *Acacia pruinocarpa* low open forest over *Triodia wiseana* hummock grassland;

H17.2 - Colluvial upland slopes: *Eucalyptus leucophloia* low open woodland over *Triodia wiseana* hummock grassland;

Plains Landscape Unit (P):

P4.3 - Undulating plains: *Eucalyptus leucophloia* and *Acacia aneura* low open woodland over scattered high open scrubland over *Triodia wiseana* hummock grassland;

Watercourses Landscape Unit (W):

W2.1 - Broad ephemeral creek: *Acacia aneura*, *A. pruinocarpa* and *A. citrinoviridis* low open forest over low open shrubland over *Triodia epactia* hummock grassland;

W3.2 - Incised ephemeral creekbed: *Acacia citrinoviridis*, *A. aneura* and *A. pruinocarpa* low open woodland over mixed species shrubland over tussock grassland;

W4.3 - Alluvial meadow: *Acacia aneura* and *A. pruinocarpa* low woodland over *Cenchrus ciliaris* and *Themeda triandra* tussock grassland.

Marra Mamba Central and East Ridges:

Three vegetation associations described within the proposed clearing area on the west ridge were also recorded on the central and east ridges. These associations were: H1.1, H8.1 and H9.3. The following vegetation associations were found within the proposed clearing area on the central and east ridges (but were not recorded on the west ridge):

Ranges and Hills Landscape Unit (H):

H8.2 - Undulating rocky hillocks: *Eucalyptus leucophloia*, *Acacia aneura* and *A. pruinocarpa* low open woodland (low open forest in parts) over *A. hamersleyensis* and other *Acacia spp.* open scrubland over *Triodia wiseana* hummock grassland;

H9.1 - Undulating upland platform: *Eucalyptus leucophloia* and *Acacia pruinocarpa* low woodland over open scrub over *Triodia wiseana* closed hummock grassland;

H9.2 - Undulating upland platform: *Eucalyptus pilbarensis* low open mallee forest over *Triodia wiseana* hummock grassland;

H9.4 - Undulating upland platform: *Petalostylis labicheoides* closed scrub over *Triodia wiseana* hummock grassland;

H9.5 - Undulating upland platform: *Acacia aneura* scattered to low open woodland over *Triodia wiseana* hummock grassland;

Watercourses Landscape Unit (W):

W2.2 - Broad ephemeral creek: *Acacia citrinoviridis*, *A. pruinocarpa* and *Eucalyptus leucophloia* low open woodland over *Triodia wiseana* hummock grassland.

Clearing Description

This clearing permit application is for a Purpose Permit to clear up to 260 hectares of native vegetation at the Tom Price Iron Ore Mine, located approximately five kilometres south of the Tom Price town site (GIS Database). The proposed clearing will allow the proponent to expand open cut iron ore mining operations, which have been undertaken at the mine site since the late 1960's (Keith Lindbeck and Associates, 2007). Two new open cut pits will be developed under this proposal, with a majority of the wasterock planned to be backfilled into the pits, thereby minimising the disturbance footprint. A haul road, waste dump and low grade ore stockpile will also be constructed as part of this proposal (Hamersley Iron Pty Ltd, 2007).

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 proposed clearing area is within an operating mine site and is adjacent to haul roads, waste dumps and exploration areas (Keith Lindbeck and Associates, 2007). Consequently, some areas within the clearing application boundary are highly disturbed.

Keith Lindbeck and Associates (2007) noted that a large proportion of the proposed clearing area had been burnt

by fire in the past 2 - 5 years. Vegetation was reported to be in a healthy regrowth stage, most likely due to the favourable climatic conditions experienced in the area during 2006 (Keith Lindbeck and Associates, 2007).

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 proposed clearing area is located approximately five kilometres south of Tom Price in the Hamersley subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). The Hamersley subregion is characterised by sedimentary ranges and plateaux, dissected by gorges (Department of Conservation and Land Management, 2001). At a broad scale, vegetation can be described as Mulga low woodlands over bunch grasses on fine textured soils in valley floors and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (Department of Conservation and Land Management, 2001). Subregional drainage flows into one of three major rivers, these being: Fortescue (to the north), Ashburton (to the south), or Robe (to the west) (Department of Conservation and Land Management, 2001). Rare features of the subregion include gorges of the Hamersley Ranges (particularly those within Karijini National Park), Palm Spring, Duck Creek and Themeda grasslands (Department of Conservation and Land Management, 2001). Permanent spring systems such as Weeli Wolli are also listed for their importance as refugia (Department of Conservation and Land Management, 2001).

The proposed clearing area forms part of the Hamersley Ranges and is located on a banded ironstone formation ridge colloquially referred to as the Marra Mamba Ridge. This is separated into three sections described as the Marra Mamba West Ridge, Marra Mamba Central Ridge and the Marra Mamba East Ridge (adjoining an upland platform in the north east) (Keith Lindbeck and Associates, 2007). The Marra Mamba Ridge is located immediately south of the existing Tom Price Iron Ore Mine (Keith Lindbeck and Associates, 2007).

As a consequence of the proximity to the Tom Price Iron Ore Mine, some areas within the clearing permit application boundary are completely degraded and contain roads, access tracks and evidence of historic mineral exploration (Keith Lindbeck and Associates, 2007). These areas should therefore be considered to have limited or no significance in terms of biological diversity. However, a large proportion of the application area has been classified as in excellent vegetation condition (Keith Lindbeck and Associates, 2007).

In a dual season vegetation and flora survey at the Tom Price Iron Ore Mine covering 9.54 square kilometres (including the proposed clearing area and a much larger area), Keith Lindbeck and Associates recorded 295 plant taxa from 121 genera and 49 families. This constitutes a high level of biological diversity in comparison to other vegetation and flora surveys undertaken in the bioregion.

| Study Area | Family | Genera | Taxa | Km ² | Reference |
|-----------------------|-----------|------------|------------|-----------------|---|
| Tom Price Mine | 49 | 121 | 295 | 9.54 | Keith Lindbeck and Associates (2007) |
| Mesa A & G | 48 | 111 | 257 | 32.75 | Biota (2005a) |
| Yandicoogina | 57 | 70 | 336 | 45 | Hamersley Iron (1995) |
| Marandoo | 69 | 174 | 347 | 48.75 | Hamersley Iron (1992) |
| Brockman Syncline 4 | 52 | 149 | 367 | 105.5 | Biota (2005b) |
| Nammuldi-Silvergrass | 58 | 166 | 373 | 132 | Hamersley Iron (2000) |

It is acknowledged that the Keith Lindbeck and Associates (2007) flora and vegetation survey was conducted over two seasons, including the unusually wet year of 2006 where more than 700 millimetres of rainfall was recorded (Keith Lindbeck and Associates, 2007). Such favourable conditions can most likely account for the high number of plant taxa recorded. Keith Lindbeck and Associates (2007) also point out that the floristic communities at Tom Price are generally different to the other studies mentioned above due to physiographic differences.

The proposed clearing area is known to contain three Priority Flora species: *Olearia mucronata* (P2), *Eremophila magnifica* subsp. *velutina* ms (P3) and *Eremophila magnifica* subsp. *magnifica* ms (P4) (Keith Lindbeck and Associates, 2007). The presence of Priority Flora within the proposed clearing area increases its biodiversity significance, however Priority Flora were found in small numbers. It is not expected that the proposed clearing will threaten the conservation status of any Priority Flora species.

Five introduced flora species were recorded within the proposed clearing area by Keith Lindbeck and Associates (2007). These were: Buffel Grass (*Cenchrus ciliaris*), Ruby Dock (*Acetosa vesicaria*), Bipinnate Beggartick (*Bidens bipinnata*), Spiked Malvastrum (*Malvastrum americanum*) and Native Thornapple (*Datura leichhardtii*). Apart from three localized alluvial areas which were infested with Buffel Grass, there were no major weed infestations (Keith Lindbeck and Associates, 2007). Care must be taken to ensure that the proposed clearing activities do not spread or introduce the above listed weed species to non infested areas. Should the permit be granted, it is recommended that appropriate conditions be imposed on the permit for the purpose of weed management.

From a faunal perspective, no detailed surveys have been undertaken to measure the species richness of the

proposed clearing area. It is acknowledged that the Pilbara bioregion is known to support a diversity of arid zone reptiles. However, based on an assessment of fauna habitat it is not likely that the area applied to clear would support a higher level of fauna species diversity than any other area in the Hamersley Ranges. Biota Environmental Sciences Pty Ltd (2007) point out that habitats within the application area are typical of those within the Central Hamersley Ranges and land systems of the bioregion. The application area is contiguous with the surrounding landscape and is not an isolated landscape feature where fauna could have become restricted over time (Biota Environmental Sciences Pty Ltd, 2007).

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

Methodology Biota Environmental Sciences Pty Ltd (2005a).
Biota Environmental Sciences Pty Ltd (2005b).
Biota Environmental Sciences Pty Ltd (2007).
Department of Conservation and Land Management (2001).
Hamersley Iron Pty Ltd (1992).
Hamersley Iron Pty Ltd (1995).
Hamersley Iron Pty Ltd (2000).
Keith Lindbeck and Associates (2007).
GIS Database:
- Interim Biogeographic Regionalisation for Australia (Subregions) - EA - 18/10/00.

(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

No detailed vertebrate or invertebrate fauna surveys have been conducted over the area applied to clear, however the proponent has conducted a desktop search of the Department of Environment and Conservation's (DEC's) Threatened and Priority Fauna Database (Keith Lindbeck and Associates, 2007). The search revealed that the following vertebrate fauna species of conservation significance have previously been recorded in the vicinity of the proposed clearing area: Peregrine Falcon (*Falco peregrinus*), Australian Bustard (*Ardeotis australis*), Lakeland Downs Mouse (*Leggadina lakedownensis*) and Western Pebble-mound Mouse (*Pseudomys chapmani*).

The Peregrine Falcon is listed under Schedule 4 - 'Other Specially Protected Fauna' of the *Wildlife Conservation Act 1950*. Whilst it is possible that the Peregrine Falcon may use habitat within the proposed clearing area, this species is wide ranging and mobile (Keith Lindbeck and Associates, 2007) and it is therefore unlikely that the proposed clearing will result in a loss of significant habitat for this species.

The Australian Bustard is listed as Priority 4 on the DEC's Priority Fauna list. This species is nomadic, typically moving in response to rainfall (Pizzey & Knight, 1997). The Australian Bustard is known to inhabit grassland and woodland habitats throughout much of Australia (Pizzey & Knight, 1997). Whilst it is possible that this species may forage within the application area, it is unlikely that the proposed clearing will result in a loss of significant habitat for the Australian Bustard given its mobility.

The Lakeland Downs Mouse is listed as Priority 4 on the DEC's Priority Fauna list. This species has a broad distribution across northern Australia, occurring from the Cape York Peninsula in Queensland to the Pilbara bioregion in Western Australia (Department of Environment and Conservation, accessed 13/12/07). With specific reference to Western Australia, this species occurs in the Pilbara and Kimberley bioregions (Department of Conservation and Land Management, accessed 13/12/07). The Lakeland Downs Mouse is a nocturnal species with a preference for sandy soils and cracking clays. Based on soil preferences, it would appear unlikely that the Lakeland Downs Mouse would occur within the proposed clearing area.

The Western Pebble-mound Mouse is listed as Priority 4 on the DEC's Priority Fauna list. Suitable habitat for this species typically consists of sloping land, between 2° and 6° (Start et al, 2000). Soils are stony, often shallow and skeletal (Start et al, 2000). *Triodia basedowii* or *Triodia wiseana* dominate the understorey vegetation (Start et al, 2000). The presence of the Western Pebble-mound Mouse within the proposed clearing area was inferred by the discovery of distinctive pebble mounds within the proposed clearing area during a vegetation and flora survey (Keith Lindbeck and Associates, 2007). Mounds were not found in dense colonies, nevertheless it is possible that a local population exists in the area. If present, the proposed clearing will most likely result in mortality of individuals of this species. However, Start et al (2000) reports that the Western Pebble-mound Mouse is much more widespread than first thought, and is in fact abundant in many areas of suitable habitat. The species is known from at least five large conservation reserves, including the Karjini, Collier Range, Millstream-Chichester and Rudall River National Parks; and the Barlee Range Nature Reserve (Start et al, 2000). Mounds can commonly be found on colluvial slopes throughout the Hamersley Ranges (Start et al, 2000). It is therefore unlikely that the proposed clearing will result in a loss of significant habitat at the subregional or bioregional level. Similarly, mortality of individuals within the proposed clearing area is not likely to threaten the conservation status of the Western Pebble-mound Mouse.

Following referral of the Marra Mamba project to the Environmental Protection Authority (EPA), in accordance with Part IV, Section 38 of the *Environmental Protection Act 1986*, Hamersley Iron Pty Ltd engaged Biota Environmental Services to undertake preliminary fauna studies over the Marra Mamba Project area. Fieldwork

was undertaken between 5 - 7 September 2007, focussing on targeted searches for short range endemic fauna (particularly land snails, pseudoscorpions, mygalomorph spiders and millipedes), subterranean fauna and an assessment of fauna habitats (Biota Environmental Sciences Pty Ltd, 2007).

Whilst the survey findings have not been finalised, preliminary results suggest that there is a relatively low risk that the proposed clearing will result in the loss of significant habitat for any short range endemic fauna (Biota Environmental Sciences Pty Ltd, 2007). The Marra Mamba project area is apart of an interconnected series of hills in a range, rather than an isolated landscape feature where fauna could have become restricted over time (Biota Environmental Sciences Pty Ltd, 2007).

Drill logs, core photographs and caliper logs suggest that the Marra Mamba ore deposit to be mined has no significant caverns or cavities where troglifauna are known to occur (Biota Environmental Sciences Pty Ltd, 2007). It is therefore unlikely that the proposed clearing (or subsequent mining) operations will result in the loss of significant habitat for troglifauna.

Biota Environmental Sciences Pty Ltd (2007) searched gorges and the southern escarpment of the project area for caves with the potential to provide roost sites for bat species of conservation significance. No caves were located on the escarpment despite a thorough inspection (Biota Environmental Sciences Pty Ltd, 2007). Some minor caves were found within the minor gorges of the study area. These caves were typically shallow overhangs which would not provide roosting opportunities for bat species (Biota Environmental Sciences Pty Ltd, 2007). One slightly deeper cave was located in a gorge on the eastern ridge, however this was small in size (less than two metres in length and width) and the rear of the cave was visible from the entry point (Biota Environmental Sciences Pty Ltd, 2007). Such a cave is unlikely to be of sufficient depth to provide roosting habitat for the Pilbara Orange Leaf-nosed Bat (*Rhinonictis aurantius*), which requires a humid microclimate for roosts of significance (Armstrong and Anstee, 2000; cited in Biota Environmental Sciences Pty Ltd, 2007).

In assessing the habitat types of the proposed clearing area, Biota Environmental Sciences Pty Ltd (2007) noted that historical mining and exploration activities had resulted in significant habitat degradation to lower elevation areas. It was also noted that the array of habitat types present within the proposed clearing area are typical of the central Hamersley Range and land systems of the Pilbara bioregion (Biota Environmental Sciences Pty Ltd, 2007).

Based on Keith Lindbeck and Associates (2007) vegetation and flora survey of the proposed clearing area, a range of fauna habitats will be lost during the proposed clearing. Such habitat types include minor caves, gorges and creeklines, rocky hillocks, shallow sub-valleys and undulating upland platforms (Keith Lindbeck and Associates, 2007). Acacia shrublands, woodlands and low forests comprise the bulk of the mid - upper storey vegetation which will be lost, whilst Triodia hummock grasslands dominate the ground layer (Keith Lindbeck and Associates, 2007). However, these habitat types are not unique or restricted in nature (Keith Lindbeck and Associates, 2007) and are typical of those described by the Department of Conservation and Land Management (2001) in the biodiversity audit of the Hamersley subregion of the Pilbara. Broad scale Beard Vegetation Association mapping (1:250,000) of Western Australia indicates that the vegetation of the application area is well represented at the bioregional level, with approximately 100 percent remaining (GIS Database; Shepherd et al, 2001). Given the above, it is expected that this clearing proposal will not result in a loss of significant habitat for any fauna species indigenous to Western Australia.

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

Methodology Biota Environmental Sciences Pty Ltd (2007).
Department of Conservation and Land Management (2001).
Department of Environment and Conservation (accessed 13/12/07).
Keith Lindbeck and Associates (2007).
Pizzey & Knight (1997).
Shepherd et al (2001).
Start et al (2000).
GIS Database:
- Pre-European Vegetation - DA 01/01.

(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

There are no known Declared Rare Flora (DRF) species within the proposed clearing area (Keith Lindbeck and Associates, 2007; GIS Database). The DRF species *Lepidium catapycnon* does occur at the Tom Price Iron Ore Mine, including one population on a steep hillside near the Tom Price Minesite Mining Operations Centre and another north of the tailings storage facility (Keith Lindbeck and Associates, 2007). No other populations of DRF have been found at the Tom Price Iron Ore Mine or its surrounds despite a massive flora survey effort by Pilbara Iron botanists over a four year period between 2003 - 2006 (Keith Lindbeck and Associates, 2007).

According to the Pilbara Iron Declared Rare and Priority Species Database, nine Priority Flora species have previously been recorded within the Tom Price Iron Ore Mine lease area. These are: *Sida sp. Pilbara* (P1), *Olearia mucronata* (P2), *Indigofera ixocarpa* (P2), *Triumfetta leptacantha* (P3), *Sida sp. Wittenoom* (P3),

Dampiera anonyma (P3), *Eremophila magnifica subsp. velutina ms* (P3), *Cynanchum sp. Hamersley* (P3) and *Eremophila magnifica subsp. magnifica ms* (P4). The total number of known Priority Flora species within the Tom Price Iron Ore Mine lease area increases from nine to 10, following the discovery of *Sida sp. Barlee Range* (P3) at four locations within the mining lease area (Keith Lindbeck and Associates, 2007).

Of the above listed Priority Flora species, the following were recorded by Keith Lindbeck and Associates (2007) within the proposed clearing area: *Olearia mucronata*, *Eremophila magnifica subsp. velutina ms* and *Eremophila magnifica subsp. magnifica ms* (Keith Lindbeck and Associates, 2007).

According to the Pilbara Iron Rare and Priority Flora Database, *Olearia mucronata* has previously been recorded from 19 sites (17 of these within the mine lease area) (Keith Lindbeck and Associates, 2007). This species shows a preference for rocky hillsides and slopes and disturbed ground (Keith Lindbeck and Associates, 2007). Approximately 100 plants of *Olearia mucronata* have previously been located within the mine lease area by Pilbara Iron (Keith Lindbeck and Associates, 2007). Based on the flora and vegetation survey conducted by Keith Lindbeck and Associates (2007), this clearing proposal will result in the removal of approximately 5 individual plants of *Olearia mucronata*. Given that this species has been found in the vicinity of Laverton, Cue, Paraburdoo, Tom Price, Wittenoom and northwest of Newman (Western Australian Herbarium, cited in Keith Lindbeck and Associates, 2007), it is unlikely the vegetation to be cleared is significant habitat for this species.

Eremophila magnifica subsp. velutina ms is known to occur over a 300 kilometre range from southeast of Newman to 80 kilometres north of Tom Price (Western Australian Herbarium, 2007, cited in Keith Lindbeck and Associates, 2007). Pilbara Iron have previously located 30 plants of *E. magnifica subsp. velutina ms* on a stony slope approximately 90 kilometres east of the proposed clearing area (Keith Lindbeck and Associates, 2007). A total of two plants of *E. magnifica subsp. velutina ms* were recorded within the proposed clearing area by Keith Lindbeck and Associates (2007). Given the current known range of this species, it is unlikely that the vegetation to be cleared is significant habitat for this species.

Eremophila magnifica subsp. magnifica ms is known to occur over a 180 kilometre range from southeast of Tom Price to northwest of Newman to the Karijini National Park (Western Australian Herbarium, 2007, cited in Keith Lindbeck and Associates, 2007). Approximately 20 plants of *E. magnifica subsp. magnifica ms* were recorded within the proposed clearing area by Keith Lindbeck and Associates (2007). More than 3,650 individual plants of this species have been recorded in the Pilbara Iron Rare and Priority Flora Database from numerous locations, with more than 600 of these from the Tom Price Iron Ore Mine lease area (Keith Lindbeck and Associates, 2007). Based on these figures, it is unlikely that this clearing proposal will significantly threaten *E. magnifica subsp. magnifica ms*.

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

Methodology Keith Lindbeck and Associates (2007).
GIS Database:
- Declared Rare and Priority Flora List - CALM 01/07/05.

(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 known Threatened Ecological Communities (TEC's) within, or in close proximity to, the proposed clearing area (GIS Database; Keith Lindbeck and Associates, 2007). The nearest known TEC to the area applied to clear is the Themeda Grasslands, located approximately 36 kilometres north-northeast (GIS Database; Keith Lindbeck and Associates, 2007).

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

Methodology Keith Lindbeck and Associates (2007).
GIS Database:
- Threatened Ecological Communities - CALM 12/04/05.

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments **Proposal is not at variance to this Principle**
The area applied to clear is within the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara bioregion (GIS Database). According to Shepherd et al (2001) there is approximately 100% of the pre-European vegetation remaining in the Pilbara bioregion. The vegetation of the application area is classified as Beard Vegetation Association 162: Shrublands; snakewood scrub and Beard Vegetation Association 567: Hummock grasslands, shrub steppe; mulga & kanji over soft spinifex & *Triodia basedowii* (GIS Database). There is approximately 100% of the pre-European vegetation remaining of both Beard Vegetation Associations 162 and 567 in the Pilbara bioregion (Shepherd et al, 2001).

Beard Vegetation Association 162 is not represented within conservation reserves in the Pilbara bioregion,

whilst approximately 22.5% of Beard Vegetation Association 567 in the Pilbara bioregion is within reserves (Shepherd et al, 2001). The areas proposed to clear do not represent significant remnants of vegetation in the wider regional area and the proposed clearing will not reduce the extent of Beard Vegetation Associations 162 or 567 below current recognised threshold levels, below which species loss increases significantly.

| | Pre-European area (ha)* | Current extent (ha)* | Remaining %* | Conservation Status** | Pre-European % in IUCN Class I-IV Reserves |
|------------------------------|-------------------------|----------------------|--------------|-----------------------|--|
| IBRA Bioregion – Pilbara | 17,804,164 | 17,794,651 | 99.9 | least concern | 6.3 |
| Beard veg assoc. – State | | | | | |
| 162 | 547,328 | 547,328 | 100 | least concern | 11.36 |
| 567 | 777,517 | 777,517 | 100 | least concern | 22.33 |
| Beard veg assoc. – Bioregion | | | | | |
| 162 | 20,006 | 20,006 | 100 | least concern | 0 |
| 567 | 776,832 | 776,832 | 100 | least concern | 22.5 |

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002).
Shepherd et al (2001).
GIS Databases:
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00.
- Pre-European Vegetation - DA 01/01.

(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

There are no perennial watercourses or wetlands within the proposed clearing area (GIS Database; Keith Lindbeck and Associates, 2007).

Vegetation mapping of the proposed clearing area by Keith Lindbeck and Associates (2007) indicates that there is a broad ephemeral creek on the eastern ridge, characterised by an *Acacia citrinoviridis*, *A. pruinocarpa* and *Eucalyptus leucophloia* low open woodland over *Triodia wiseana* hummock grassland.

On the western ridge, Keith Lindbeck and Associates (2007) described two broad ephemeral creeks within the proposed clearing area, characterised by *Acacia aneura*, *A. pruinocarpa* and *A. citrinoviridis* low open forest over low open shrubland over *Triodia epactia* hummock grassland. An incised ephemeral creekbed is associated with one of the broad ephemeral creeks and was also described by Keith Lindbeck and Associates (2007). This incised ephemeral creekbed is characterised by an *Acacia citrinoviridis*, *A. aneura* and *A. pruinocarpa* low open woodland over mixed species shrubland over tussock grassland (Keith Lindbeck and Associates, 2007). An area classified as an alluvial meadow also occurs on the western ridge and is characterised by *Acacia aneura* and *A. pruinocarpa* low woodland over *Cenchrus ciliaris* and *Themeda triandra* tussock grassland (Keith Lindbeck and Associates, 2007).

The proposed clearing will involve removal of the creekline vegetation described above, and thus is at variance to this Principle. However, the creekline vegetation assemblages described by Keith Lindbeck and Associates (2007) are not likely to be restricted to the project area. Minor creeklines of the Hardey River (located 10 kilometres to the northwest) and the Bellary Creek (5 kilometres to the south) extend into the undulating plains immediately south of the application area (Keith Lindbeck and Associates, 2007). The vegetation associations of these creeklines were mapped by Keith Lindbeck and Associates (2007) as the same as those within the proposed clearing area. It must also be acknowledged that the alluvial meadow described from the western ridge is dominated by an understorey of Buffel Grass (Keith Lindbeck and Associates, 2007). The infestation of this introduced flora species would be expected to diminish the biodiversity values associated with the alluvial meadow.

Should the permit be granted, it is not considered necessary to impose conditions on the permit which may minimise or offset the loss of the creekline vegetation.

Methodology Keith Lindbeck and Associates (2007).

GIS Database:
- Hydrography, linear - DOE 01/02/04.

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

Comments Proposal may be at variance to this Principle

Land system mapping by the Department of Agriculture Western Australia shows that the proposed clearing area falls largely within the Newman land system, with a small area being mapped as the Platform land system (GIS Database).

The Newman land system is comprised of four land units (Van Vreeswyk et al, 2004). These are:

- plateau, ridge, mountain and hill;
- lower slope;
- stony plain; and
- narrow drainage floor with channel (Van Vreeswyk et al, 2004).

Based upon the landscape units described by Keith Lindbeck and Associates (2007), the proposed clearing area consists largely of plateaus, hills and slopes. Some minor valleys and gorges are also present (Keith Lindbeck and Associates, 2007). Soils were generally described as stony and gravelly, interspersed with large ironstone rocks, boulders or outcrops (Keith Lindbeck and Associates, 2007). Soils with a surface mantle of pebbles are also present within the proposed clearing area (Keith Lindbeck and Associates, 2007). Non-erosive chert and banded ironstone formation outcrops are present within the application area, however there are colluvial talus slopes and stony plains which are susceptible to erosion (Keith Lindbeck and Associates, 2007).

The proponent has indicated that clearing will be conducted progressively over time to avoid exposing large areas of land to wind and water erosion. However, it must be acknowledged that should a clearing permit be granted, subsequent mining operations will fundamentally alter the land structure and topography of the area under application.

The proposed clearing area is elevated within the landscape at head water locations (Keith Lindbeck and Associates, 2007). The subsequent mining operations may act to reduce the flow of surface water. It is acknowledged that vegetation downstream of the creeks to be impacted by this proposal has already been heavily impacted by mining operations. The proponent has indicated that engineered drainage systems will be constructed to ensure that surface water flows are diverted around open pit voids, passed through sediment traps and discharged downstream through outflow points (Keith Lindbeck and Associates, 2007). Provided that surface water engineering dissipates energy associated with peak flows and delivers runoff to the natural drainage lines down gradient of the mined areas, serious soil erosion of the shallow red soils in drainage lines will be avoided (Department of Agriculture and Food Western Australia, 2007).

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

Methodology Department of Agriculture and Food Western Australia (2007).
Keith Lindbeck and Associates (2007).
Van Vreeswyk et al (2004).
GIS Database:
- Rangeland Land System Mapping - DA.

(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 nearest conservation reserve to the proposed clearing area is the Karijini National Park, located approximately 12 kilometres to the east (Keith Lindbeck and Associates, 2007). There are no other conservation reserves nearby (GIS Database).

The area between the Tom Price Iron Ore mine and the Karijini National Park is uncleared pastoral rangeland that acts as a buffer (Keith Lindbeck and Associates, 2007). It is therefore unlikely that the proposed clearing will have adverse impacts upon the Karijini National Park.

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

Methodology Keith Lindbeck and Associates (2007).
GIS Database:
- CALM Managed Lands and Waters - CALM 01/07/05.

(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 area under application is not within a Public Drinking Water Source Area (GIS Database). No major watercourses are present within the proposed clearing area, however a number of minor ephemeral creeks are present (GIS Database). Following clearing, these creeks will be removed during the mining operations (Hamersley Iron Pty Ltd, 2007). It is the proponent's responsibility to liaise with the Department of Water to determine whether the proposed works require a Bed and Banks Permit, in accordance with section 17 of the *Rights in Water and Irrigation Act 1914*. Engineered drainage systems will be constructed to ensure that surface water flows are diverted around the open pit voids (Keith Lindbeck and Associates, 2007). Sediment traps will be installed prior to outflow points (Keith Lindbeck and Associates, 2007). This will prevent surface water running off bare ground and depositing suspended material in downstream watercourses.

No studies have been conducted to model the impact of the proposed vegetation clearing on groundwater of the area. However, Hamersley Iron Pty Ltd undertakes groundwater monitoring, with results reported to the Department of Environment and Conservation and the Department of Water on an annual basis (Keith Lindbeck and Associates, 2007). It is unlikely that the proposed vegetation clearing will have any significant impact upon groundwater levels or quality.

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

Methodology Hamersley Iron Pty Ltd (2007).
Keith Lindbeck and Associates (2007).
GIS Database:
- Hydrography, linear - DOE 01/02/04.
- Public Drinking Water Source Areas (PDWSAs) - DOE 28/04/05.

(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

Flood events are naturally associated with the Pilbara bioregion following cyclonic downpours (Keith Lindbeck and Associates, 2007). Most of the proposed clearing area is located in an elevated environment, approximately 100 metres vertical height above the surrounding plain (Keith Lindbeck and Associates, 2007). Precipitation falling in this area naturally runs off into the surrounding valleys and plains (Keith Lindbeck and Associates, 2007). The proposed clearing (and subsequent mining) operations will alter natural surface water flow patterns, however it is not likely that the incidence or intensity of natural flood events will be increased.

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

Methodology Keith Lindbeck and Associates (2007).

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

Comments

The clearing permit application was advertised by DoIR, inviting submissions from the public. One public submission was received, raising concerns regarding the potential impacts of the proposed vegetation clearing on Sites of Aboriginal Significance and Native Title rights.

There is one native title claim over the area under application (GIS Database). This claim (WC97//089) has been registered with the National Native Title Tribunal on behalf of the claimant group (GIS Database). However, the mining tenement has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There is one registered Site of Aboriginal Significance within the area applied to clear (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.

On 19 July 2007, the proponent referred the Marra Mamba Project to the Environmental Protection Authority (EPA) in accordance with section 38 Part IV of the *Environmental Protection Act 1986*. On 5 November 2007, the level of assessment for the Marra Mamba Project was publicly advertised by the EPA as 'Not Assessed - Managed under Part V of the EP Act (Clearing)'. The EPA will not formally assess the Marra Mamba Project but expects the proponent and relevant agencies to ensure that it is environmentally acceptable.

Methodology GIS Databases:

- Aboriginal Sites of Significance - DIA 04/07/02.
- Native Title Claims - DLI 19/12/04.

4. Assessor's comments

| Purpose | Method | Applied area (ha)/ trees | Comment |
|--------------------|--------------------|--------------------------|--|
| Mineral Production | Mechanical Removal | 260 | The Clearing Principles have been addressed and the proposed clearing is at variance to Principle (f), may be at variance to Principle (a) and (g), is not likely to be at variance to Principle (b), (c), (d), (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, rehabilitation and permit reporting. |

5. References

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6. Glossary

Acronyms:

| | |
|-----------------|---|
| BoM | Bureau of Meteorology, Australian Government. |
| CALM | Department of Conservation and Land Management, Western Australia. |
| DAFWA | Department of Agriculture and Food, Western Australia. |
| DA | Department of Agriculture, Western Australia. |
| DEC | Department of Environment and Conservation |
| DEH | Department of Environment and Heritage (federal based in Canberra) previously Environment Australia |
| DEP | Department of Environment Protection (now DoE), Western Australia. |
| DIA | Department of Indigenous Affairs |
| DLI | Department of Land Information, Western Australia. |
| DoE | Department of Environment, Western Australia. |
| DoIR | Department of Industry and Resources, Western Australia. |
| DOLA | Department of Land Administration, Western Australia. |
| DoW | Department of Water |
| EP Act | Environment Protection Act 1986, Western Australia. |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 (Federal Act) |
| GIS | Geographical Information System. |
| IBRA | Interim Biogeographic Regionalisation for Australia. |
| IUCN | International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union |
| RIWI | Rights in Water and Irrigation Act 1914, Western Australia. |
| s.17 | Section 17 of the Environment Protection Act 1986, Western Australia. |
| TECs | Threatened Ecological Communities. |

Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005. Department of Conservation and Land Management, Como, Western Australia*} :-

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

- Schedule 1** **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2** **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3** **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4** **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna. Department of Conservation and Land Management, Como, Western Australia*} :-

- P1 Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2 Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3 Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4 Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5 Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)

- EX Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W) Extinct in the wild:** A native species which:
- (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
 - (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- EN Endangered:** A native species which:
- (a) is not critically endangered; and
 - (b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- VU Vulnerable:** A native species which:
- (a) is not critically endangered or endangered; and
 - (b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
- CD Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.