Government of **Western Australia**
Department of **Mines and Petroleum**

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3200/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Hamersley Iron Pty Ltd**

1.3. Property details

Property: General Purpose Lease 47/1237
Iron Ore (Hamersley Range) Agreement Act 1963, Mining Lease 272SA (AM 70/272)
Local Government Area: Shire of Ashburton
Colloquial name: Marandoo Waste Fines Storage Facility Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
1.7		Mechanical Removal	Geotechnical Drilling and Access Tracks

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. Three Beard Vegetation Associations have been mapped within the application area (GIS Database; Shepherd, 2007).

18: Low woodland; mulga (*Acacia aneura*);

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

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

The application area was surveyed by Biota Environmental Sciences Pty Ltd (Biota) staff between 6-9 March 2007, 18-26 May 2007 and 21-28 April 2008 (Biota, 2008a). The following vegetation types were identified within the application area:

Broad Drainage Areas and Basins

1a: *Acacia aneura* woodland on broad flat alluvial and colluvial areas;

1c: *Triodia melvillei* hummock grassland;

Major Creeklines and Floodplains

2a: *Acacia aneura - A. pruinocarpa* woodland in major flowlines;

2b: *Eucalyptus xerothermica - Acacia aneura* woodland in major flowlines;

2c: *Eucalyptus xerothermica - Acacia aneura* woodland over *Acacia citrinoviridis* tall shrubland in major flowlines;

Ridges and Erosional Spurs

5b: *Eucalyptus leucophloia* scattered low trees over *Acacia* spp. scattered shrubs over *Triodia wiseana* (*T. brizoides, T.* sp. Shovelanna Hill);

5f: *Acacia aneura* low woodland to woodland on rocky ledges and upper slopes of ranges; and

5h: *Triodia wiseana* hummock grassland with mixed *Acacia* spp. emergent shrubs (Biota, 2008a).

Three alien weed species was recorded within the application area: Bipinnate Beggartick (*Bidens bipinnata*), Spiked Malvastrum (*Malvastrum americanum*) and Buffel Grass (*Cenchrus ciliaris*) (Biota, 2008a).

Clearing Description Hamersley Iron is proposing to clear up to 1.7 hectares of native vegetation within a boundary of 129.8 hectares (Hamersley Iron, 2009). The proposed program covers two tenements (G 47/1237 and AM 70/272) and includes:

- Maintaining and establishing tracks,
- Clearing of drill lines and access tracks (4 kilometres x 4 metres wide);
- Creation of 4 drill pads (5 metres x 10 metres); and
- Drilling 4 holes (Hamersley Iron, 2009).

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

To

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

Comment The application area is located in the Pilbara region, approximately 31 kilometres east-north-east of Tom Price. The application area has suffered previous disturbance from historic earthworks for infrastructure including an airstrip, waste dump and various access tracks (Biota, 2008a). The vegetation condition was derived from a vegetation survey conducted by Biota (2008a).

3. Assessment of application against clearing principles

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

Comments

Proposal may be at variance to this Principle

The application area occurs within the Hamersley (PIL3) subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). This subregion is characterised by Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils on the ranges (CALM, 2001).

The application area occurs within the Hamersley Ranges National Park which is listed on the Register of National Estate for its high level of flora and fauna diversity and endemism. According to the Australian Heritage Database (2009), 8 flora species and 3 fauna species that are rare, poorly known or endemic to the Pilbara region occur within the Hamersley Range National Park. The Hamersley Range National Park is also described as being valued as a representative example of the area as most of it is relatively unmodified by pastoralism or large scale mining operations (Australian Heritage Database, 2009).

A vegetation survey of the application area and surrounding vegetation identified 537 native flora species belonging to 176 genera from 60 families from 27 vegetation communities (Biota, 2008a). This is considered to be particularly diverse for the survey area, and can most likely be attributed to the variety of habitats encompassed by the survey area, including extensive areas off Mulga vegetation on clayey substrates which are generally recognised to be species rich (Biota, 2008a). However, these vegetation communities are well represented locally and within the Pilbara region and the clearing of 1.7 hectares is unlikely to ignificantly impact on the biodiversity of the area.

Three alien weed species were recorded within the application area (Biota, 2008a). These were Bipinnate Beggartick (*Bidens bipinnata*), Spiked Malvastrum (*Malvastrum americanum*) and Buffel Grass (*Cenchrus ciliaris*) (Biota, 2008a). Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. This in turn can lead to greater rates of infestation and further loss of biodiversity if the area is subject to repeated fires. None of these species are listed as 'Declared Plant' species under the *Agriculture and Related Resources Protection Act 1976* by the Department of Agriculture and Food (DAFWA). Should the permit be granted, it is recommended that appropriate conditions be imposed on the permit for the purpose of weed management.

An area search of the Department of Environment and Conservation's online fauna database conducted by the assessing officer suggests that the application area is diverse in reptile species (DEC, 2009). The database search found 73 reptile species as potentially occurring within the application area, or within a 25 kilometre radius of the application area. The vegetation communities within the application area are not likely to be considered as rare, geographically restricted or of significant conservation value. The vegetation communities and potential fauna habitats within the application area are considered common within the Pilbara region, and are unlikely to be of higher biodiversity than the surrounding areas. The proposed clearing is unlikely to have a significant impact on the biological diversity of the region, or comprise of a high level of biological diversity.

Based on the above, the proposed clearing may be at variance to this Principle. The application area contains vegetation types and habitats which are well represented and conserved within Karijini National Park (GIS Database; Australian Heritage Database, 2009). The area under application (1.7 hectares) is highly unlikely to be acting as an important buffer for, or ecological linkage to, Karijini National Park given that the area surrounding Karijini National Park is largely uncleared.

Methodology

Australian Heritage Database (2009)
Biota (2008a)
CALM (2001)
DEC (2009)
GIS Database
- Interim Biogeographic Regionalisation of Australia

(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

The assessing officer has conducted a search of the Department of Environment and Conservation's online

fauna database between the coordinates 118.3566°E, 22.3991°S and 117.8460°E, 22.8679°S, representing a 25 kilometre radius around the application area.

This search identified 4 Amphibian, 21 Mammalian, 42 Avian and 73 Reptilian species that may occur within the application area (DEC, 2009). Of these, the following species of conservation significance has previously been recorded within the search area:
Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*: Northern Quoll (*Dasyurus hallucatus*), Pilbara Olive Python (*Liasis olivaceus* subsp. *barroni*); and
P4 - DEC Priority Fauna List: Western Pebble-mound Mouse (*Pseudomys chapmani*) and the Short-tailed Mouse (*Leggadina lakedownensis*).

Biota (2008b) conducted an initial survey of the application area between 1-11 March 2007, however this was interrupted by rainfall associated with cyclone Jacob and was subsequently recommenced and completed between 10-15 April 2007. While the seasonal fauna survey was conducted between 6-12 November 2007 (Biota, 2008b). In addition to those species listed above, the following fauna species of conservation significance were identified through this search:
P4 - DEC Priority Fauna List: Ghost Bat (*Macroderma gigas*); and
JAMBA International Agreement: Rainbow Bee-eater (*Merops ornatus*).

Previous searches have also identified the following species of conservation significance as being found in or having the potential to occur within application area:
Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008:* Night Parrot (*Pezoporus occidentalis*), Orange Leaf-nosed Bat (*Rhinonicteris aurantius*), Bilby (*Macrotis lagotis*);
Schedule 4 - Other specially protected fauna, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008)*: Peregrine Falcon (*Falco peregrinus*);
P1 - DEC Priority Fauna List: Little North-western Mastiff Bat (*Mormopterus loriae cobourgiana*);
P3- DEC Priority Fauna List: Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*);
P4 - DEC Priority Fauna List: Australian Bustard (*Ardeotis australis*), Bush Stone-curlew (*Burhinus grallarius*), Star Finch (*Neochmia ruficauda subclarescens*); and
JAMBA, CAMBA and ROKAMBA International Agreements: Fork-tailed Swift (*Apus pacificus*) (Biota, 2008b).

The Northern Quoll was recorded by Biota (2008b) from a site approximately 6.5 kilometres east of the application area during the survey. The typical habitat of the Northern Quoll consists of rocky gullies and breakaways (Biota, 2008b). This habitat type was recorded as occurring within the application area by Biota (2008a) during the flora and vegetation survey. The application area contains vegetation types and habitats which are well represented and conserved within Karijini National Park (GIS Database; Australian Heritage Database, 2009). The area under application (1.7 hectares) is highly unlikely to be significant habitat given its proximity to Karijini National Park and that the area surrounding Karijini National Park is largely uncleared.

The Western Pebble-mound Mouse was recorded approximately 6.5 kilometres east of the application area, during the initial period of the fauna survey (Biota, 2008b). Biota (2008a) recorded abundant suitable habitat for the Western Pebble-mound Mouse during the flora and vegetation survey over the application area. However, the Western Pebble-mound Mouse is recorded as being widespread and abundant within the Hamersely subregion, with the status of the species being secure (CALM, 2001).

Based on the above, the proposed clearing is not likely to be at variance to this Principle. The fauna habitats identified within the application area are not considered as necessary for the on-going maintenance of any significant fauna habitat. It is likely that equal or higher quality vegetation and fauna habitats would exist throughout the surrounding area, and Pilbara region.

Methodology
Australian Heritage Database (2009)
Biota (2008a)
Biota (2008b)
CALM (2001)
DEC (2009)

(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, no Declared Rare Flora (DRF) or Priority Flora species occur within the application area (GIS Database). The nearest record of DRF is a population of *Lepidium catapycnon* (DRF) located approximately 43 kilometres north-east of the application area (GIS Database).

A flora survey was conducted over the application area and surrounding areas by staff from Biota between 6-9 March 2007, 18-26 May 2007 and 21-28 April 2008 (Biota, 2008a).

No DRF or Priority flora were recorded during the surveys (Biota, 2008a).

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

Methodology Biota (2008a)
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**
A search of available databases reveals that there are no Threatened Ecological Communities (TEC's) within the application area (GIS Database).

The nearest (TEC) is located approximately 25 kilometres north-west of the application area (Themeda Grasslands) while the nearest Priority Ecological Community (PEC) is located approximately 10 kilometres east of the application area (Coolabah-lignum flats). At this distance there is little likelihood of any impact to the TEC or PEC from the proposed clearing.

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

Methodology GIS Database
- Threatened Ecological Communities

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

Comments **Proposal is not at variance to this Principle**
The application area falls within the IBRA Pilbara bioregion (GIS Database). Shepherd (2007) report that approximately 99.95% of the pre-European vegetation still exists in this bioregion.

The vegetation in the application area is recorded as Beard Vegetation Associations 18: Low woodland; mulga (*Acacia aneura*); 29: Sparse low woodland; mulga, discontinuous in scattered groups and 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (GIS Database; Shepherd, 2007).

According to Shepherd (2007) approximately 100% of these Beard Vegetation Associations remain within the Pilbara bioregion (see table below).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion - Pilbara	17,804,187.89	17,794,646.75	~99.95%	Least Concern	~6.32%
Beard veg assoc. - State					
18	19,892,305	19,890,195	~100%	Least Concern	~2.1%
29	7,903,991	7,903,991	~100%	Least Concern	~0.3%
82	2,565,901	2,565,901	~100%	Least Concern	~10.2%
Beard veg assoc. - Bioregion					
18	676,557	676,557	~100%	Least Concern	~16.8%
29	1,133,219	1,133,219	~100%	Least Concern	~1.9%
82	2,563,583	2,563,583	~100%	Least Concern	~10.2%

* Shepherd (2007)
** 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 (2007)

GIS Database
- Pre-European Vegetation
- Interim Biogeographic Regionalisation for Australia

(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

According to available GIS Databases, there are no permanent watercourses within the application area, however, there are numerous minor, non-perennial watercourse within the application area (GIS Database). Three of the eight vegetation associations found within the application area are associated with drainage areas (Biota, 2008a).

- *Acacia aneura - A. pruinocarpa* woodland in majpr flowlines;
- *Eucalyptus xerothermica - Acacia aneura* woodland in major flowlines;
- *Eucalyptus xerothermica - Acacia aneura* woodland over *Acacia citrinoviridis* tall shrubland in major flowlines;

The vegetation associated with any drainage channels is likely to be a fauna refuge and as such disturbance should be kept to a minimum. The vegetation communities growing in association with the watercourses are not unique and are considered common and widespread in the Pilbara bioregion (Shepherd, 2007; GIS Database). The proposed clearing is unlikely to significantly impact on vegetation communities growing in association with these drainage channels.

Based on the above, the proposed clearing is at variance to this Principle. The application area has suffered prior disturbance from historic earthworks for infrastructure including an airstrip, waste dump and various access tracks (Biota, 2008a) and as such the clearing of 1.7 hecatres shoud not significantly impact on the extent of these vegetation communities within the application area, or local area.

Methodology

Biota (2008a)
GIS Database
- Hydrography - Linear

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

Comments

Proposal is not likely to be at variance to this Principle

The application area has been surveyed by the Department of Agriculture and Food (Van Vreeswyk et al., 2004). The application area is composed of the following land systems (GIS Database);

- Boolgeeda Land System
- Jurrawarrina Land System
- Newman Land System

The Boolgeeda Land System is described as stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands (Van Vreeswyk et al., 2004). The vegetation of this land system is generally not prone to degradation and the system is not susceptible to erosion (Van Vreeswyk et al., 2004). An analysis of aerial photography for the application area reveals the application area is most likely to fall within the 'stony slopes and upper plains' land unit. The soils of this land unit are not susceptible to erosion due to surface mantle of very abundant pebbles of ironstone and other rocks.

The Jurrawarrina Land System is described as hardpan plains and alluvial tracts supporting mulga shrublands with tussock and spinifex grasses (Van Vreeswyk et al., 2004). This system generally has a low susceptibity to erosion (Van Vreeswyk et al., 2004). An analysis of aerial photography for the application area reveals the application area is most likely to fall within the 'stony plains' land unit. The soils of this land unit (red shallow sandy duplex soils) are not susceptible to erosion due to a surface mantle of pebbles of ironstone and other rocks.

The Newman Land System is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (Van Vreeswyk et al., 2004). Most of this system is not susceptible to erosion or vegetation degradation (Van Vreeswyk et al., 2004). An analysis of aerial photography for the application area reveals the application area is most likely to fall within the 'plateaux, ridges, mountains and hills' land unit. The soils of this land unit (stony soils, red shallow loams and some red shallow sands) are not susceptible to erosion due to a surface mantle of pebbles of ironstone and other rocks, as well as outcrops of parent rock.

Based on the above, the proposed clearing is not likely to be at variance to this Principle. It is recommended that should a permit be granted, a condition be imposed on the permit to retain vegetative material and topsoil.

Methodology

Van Vreeswyk et al. (2004)

GIS Database
- Rangeland Land System Mapping

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments

Proposal is not likely to be at variance to this Principle

The application area occurs within an ESA (Register of National Estate), which is the Hamersley Range National Park (GIS Database).

According to the Australian Heritage Database (Australian Heritage Database, 2009) the Hamersley Range National Park is an area of approximately 620,000 hectares and its value as a representative example of the Hamersley Ranges is enhanced by most of the area being relatively unmodified by pastoralism or large scale mining operations.

The Hamersley Ranges National Park is an area of great flora diversity with eight of the flora species found within the national park are listed as either rare, poorly known or of restricted distribution (Australian Heritage Database, 2009). This national park is an important refuge for three mammal species which are endemic to the Pilbara, the Western Pebble-mound Mouse (*Pseudomys chapmani*), *Ninguai timealeyi* and *Antechinus rosamondae* (Australian Heritage Database, 2009).

The boundaries listed are those of the Hamersley Range National Park (since renamed Karijini National Park) as of 28 February 1977 (Australian Heritage Database, 2009). The Marandoo iron ore deposit is located on a reserve of 48 square kilometres held under a Government Agreement Act (DEC, 1999). There are two components to the Marandoo tenement, a reserve and an infrastructure corridor, which were excised from the Park to facilitate mining of the Marandoo deposit (DEC, 1999). The application area is located within the excised portion of Karijini National Park. The Marandoo proposal was approved on 6 October 1992, subject to Ministerial conditions on protection of the environment and pursuant to the provisions of the Environmental Protection Act 1986 (DEC, 1999).

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

Methodology

Australian Heritage Database (2009)
DEC (1999)
GIS Database
- Environmentally Sensitive Areas

(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 application area is located within a *Rights in Water Irrigation Act, 1914* (RIWI Act) Groundwater Area (DoW, 2009; GIS Database). The proponent is required to obtain permits to abstract groundwater in this area.

The application area is located within the Pilbara Groundwater Area (DoW, 2009). Any extraction of groundwater in this area will require a groundwater license. The groundwater salinity within the application area is approximately 500 - 1000 milligrams/Litre Total Dissolved Solids (TDS) (GIS Database). This is considered to be potable water. Given the size of the area to be cleared (1.7 hectares) compared to the size of the Hamersley Groundwater Province (10,166,832 hectares) (GIS Database), the proposed clearing is not likely to cause salinity levels within the application area to alter significantly.

There are no known groundwater dependent ecosystems within the application area (GIS Database).

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

Methodology

DoW (2009)
GIS Database
- Public Drinking Water Source Area
- Groundwater Salinity, Statewide
- RIWI Act, Groundwater Areas
- Groundwater Provinces
- Potential Groundwater Dependent Ecosystems

(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 experiences a semi-desert, tropical climate with an average annual rainfall of 459.7 millimetres recorded from the nearest weather station at Wittenoom approximately 49 kilometres north-east of the application area (CALM, 2001; BoM, 2009). Rainfall is usually experienced during summer months and can be either cyclonic or thunderstorm events (CALM, 2001). It is likely that during times of intense rainfall there may be some localised flooding in adjacent areas.

The application area is located within the Ashburton River and Fortescue River catchment areas (GIS Database). However, the small area to be cleared (1.7 hectares) in relation to the size of the Ashburton River and Fortescue River catchment areas (7,877,743 hectares and 1,860,784 hectares respectively) (GIS Database) is not likely to increase the potential for flooding within the application area, local area or within the catchment (GIS Database).

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

Methodology

BoM (2009)
CALM (2001)
GIS Database
- Hydrographic Catchments - Catchments

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

Comments

There is one Native Title Claim (WC97_089) over the area under application. This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the tenements have been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There is one known Aboriginal site of significance within the application area (ID_11268) (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.

The application area falls within a surface water and groundwater management area under the *Rights in Water Irrigation Act, 1914* (DoW, 2009). Extraction of groundwater, obstruction or interference of the beds and banks of a watercourse or wetland is subject to licensing by the Department of Water (DoW).

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.

The application area relates to a proposal that is currently under assessment by the Environmental Protection Authority (EPA) (Marandoo Mine Phase 2 Project Environmental Referral July 2007). The proponent has been granted approval to commence geotechnical drilling at the site of the proposed residue storage facility under s41A(3) of the *Environmental Protection Act 1986* as these activities are considered to be minor and preliminary works (EPA, 2009).

One public submission was received in regard to this Clearing Permit application stating no objection to the proposal.

Methodology

DoW (2009)
EPA (2009)
GIS Database
- Aboriginal Sites of Significance
- Native Title Claims
- RIWI Areas

4. Assessor's comments

Comment

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

It is recommended that should a permit be granted, conditions be imposed on the permit for the purpose of weed management, fauna management, stockpiling all cleared topsoil and vegetation, record keeping and permit reporting.

5. References

Australian Heritage Database (2009) Register of National Estate: Hamersley Range National Park. http://www.environment.gov.au (Accessed 11 August 2009)

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Biota Environmental Sciences Pty Ltd (2008b) Marandoo Mine Phase 2 Seasonal Fauna Survey. Unpublished report prepared for Rio Tinto, August 2008

BoM (2009) Bureau of Meteorology Website - Climate Averages by Number, Averages for WITTENOOM. www.bom.gov.au/climate/averages/tables/cw_005026.shtml (Accessed 11 August 2009)

CALM (2001) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Pilbara 3 (PIL3 - Hamersley subregion) Department of Conservation and Land management, Western Australia

DEC (1999) Karijini National Park Management Plan 1999-2009. Management Plan No 40. Department of Conservation and Land Management for the National Parks and Nature Conservation Authority, Western Australia

DEC (2009) NatureMap - Department of environment and Conservation and Western Australian Museum. http://naturemap.dec.wa.gov.au/default.aspx (Accessed 10 August 2009)

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DoW (2009) Water Quality Advice. Advice to assessing officer, Native Vegetation Assessment Branch, Department of Mines and Petroleum (DMP), received (15 June). Department of Water, Western Australia

EPA (2009) Minor and Preliminary Work Approval. Advice to Environmental Approval Manager, Rio Tinto Iron Ore, received (3 August 2009). Environmental Protection Authority, Western Australia

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

Shepherd, D.P. (2007). Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.

Van Vreeswyk, A.M.E., Payne, A.L., Hennig, P., and Leighton, K.A. (2004) An Inventory and Condition Survey of the Pilbara Region, Western Australia, Department of Agriculture, Western Australia

6. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government.
CALM	Department of Conservation and Land Management, Western Australia.
DAFWA	Department of Agriculture and Food, Western Australia.
DA	Department of Agriculture, Western Australia.
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DoE), Western Australia.
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia.
DMP	Department of Mines and Petroleum, Western Australia.
DoE	Department of Environment, Western Australia.
DoIR	Department of Industry and Resources, Western Australia.
DOLA	Department of Land Administration, Western Australia.
DoW	Department of Water
EP Act	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.