



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4470/2
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: Iron Ore (Mount Newman) Agreement Act 1964, Mineral Lease 244SA (AML 70/244)
Local Government Area: Shire of East Pilbara
Colloquial name: Orebody 24 Exploration Drilling Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
40		Mechanical Removal	Mineral Exploration, Hydrological Investigations and Associated Infrastructure, and Power Lines

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 8 December 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 for the whole of Western Australia and are useful to look at vegetation in a regional context. Two Beard vegetation associations have been mapped within the application area:

Beard vegetation association 29: Sparse low woodland; mulga, discontinuous in scattered groups; and
Beard vegetation association 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (Shepherd, 2009; GIS Database).

ENV Australia (2006) conducted a flora survey of the application area and surrounding areas between March to April 2006, and described six vegetation communities of the application area:

Hill crests and slopes:

- Rocky ridges and upper hill slopes: Low open *Eucalyptus leucophloia* woodland over an open *Acacia bivenosa* shrubland over a low open *Acacia hilliana* and *Gompholobium karjini* shrubland over an open *Triodia sp. hummock grassland*;
- Hill crests and gentle slopes: Low open *Eucalyptus leucophloia* woodland over scattered *Hakea sp.* over a low open shrubland over a *Triodia basedownii* hummock grassland;
- Hill slopes leading into small drainage lines: Low open *Eucalyptus leucophloia* woodland over an *Acacia bivenosa* shrubland over a *Triodia brizoides* hummock grassland;
- Upper hill slopes beside gullies: Low open *Acacia sp.* woodland over an *Halganina gustafsenii* var. *compactus* low shrubland over a *Triodia basedownii* hummock grassland; and
- Hill slopes of ridges other than Orebody 24: Open *Acacia ivenosa* shrubland over an open *Triodia wiseana*, *T. basedownii* and *T. pungens* hummock grassland.

Lower hill slopes and adjacent plains:

- Lower hill slopes and adjacent plains: An open *Eucalyptus gamophylla* mallee over an *Acacia bivenosa* shrubland over an open *Triodia sp. hummock grassland*;
- Undulating plains: Low open *Corymbia hamersleyana* woodland over an open *Acacia sp. shrubland* over an open *Triodia sp. hummock grassland*;
- Plains adjacent to flood plain: A low open *Eucalyptus sp.* woodland over an *Acacia sp. shrubland* over an open mixed hermland over a *Triodia sp. grassland*; and
- Plains: Open *Acacia sp. shrubland* over open mixed grassland and mixed herbs.

Flood Plains:

- Flood plains: An *Acacia aneura* shrubland over an open mixed low shrubland over mixed grasses and *Cenchrus ciliaris* grassland.

Riverine:

- River banks and adjacent flood plains: Open *Eucalyptus victrix* woodland over an *Acacia sp. shrubland* over mixed grasses, sedges and herbs.

- Gorges:
- A low *Eucalyptus leucophloia* woodland over a *Hibiscus haynaldii* and mixed species shrubland over an open mixed grasses and *Triodia pungens* hummock grassland; and
 - Cliff line and gorges: Low open *Eucalyptus leucophloia* woodland over a low open shrubland over *Triodia sp.* hummock grassland.

Drainage lines:

- Drainage lines: A low *Eucalyptus gamophylla* woodland over an *Acacia sp.* shrubland over *Triodia pungens* and *T. basedownii* hummock grassland;
- Rocky drainage lines: Low open *Corymbia hamersleyana* woodland over an open *Acacia bivenosa* shrubland over a *Triodia pungens* hummock grassland; and
- Drainage line and flood plain: A low open *Eucalyptus leucophloia* woodland over a high open *Petalostylis labicheoides* and *Acacia pyrifolia* shrubland over a low open *Acacia bivenosa* shrubland over a mixed open herbland over a very open *Triodia brizoides* hummock grassland.

Clearing Description

BHP Billiton Iron Ore is proposing to clear up to 40 hectares of native vegetation within a 1005.01 hectare application area, for the Orebody 24 Exploration Drilling Project. The clearing of vegetation is required for exploration drilling, hydrological investigations and supporting infrastructure.

The vegetation will be cleared using a dozer and/or excavator. The vegetation and topsoil will be stockpiled and used in rehabilitation.

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 application area is located in the Hamersley subregion of Western Australia and is situated approximately nine kilometres south-west of Newman.

The vegetation condition was derived from a vegetation survey conducted by Ecologia (2004) and ENV Australia (2006).

Clearing permit CPS 4470/1 was granted by the Department of Mines and Petroleum on 13 October 2011, and is valid from 5 November 2011 to 1 October 2016. The clearing permit authorised the clearing of 40 hectares of native vegetation. An application for an amendment to clearing permit CPS 4470/1 was submitted by BHP Billiton Iron Ore Pty Ltd on 27 October 2011. The proponent has requested to amend the purpose for which the clearing may be done to also include the installation of power lines. The duration of the permit has also been extended by 5 years to allow the rehabilitation condition to be implemented. There were no additional environmental impacts as a result of this amendment.

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 woodlands 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 consists of Beard vegetation associations 29 and 82, which are common and widespread throughout the Pilbara bioregion with approximately 100% of the pre-European vegetation extent remaining (Shepherd, 2009; GIS Database).

A vegetation survey by Ecologia (2004) during May 2004 and a supplementary survey by ENV Australia (2006) undertaken between March and April 2006 of the application areas and surrounding vegetation, identified 413 species of flora taxa belonging to 156 Genera and 53 Families. ENV Australia (2006) identified six vegetation communities within the application area. The condition of the vegetation types were classified as 'completely degraded' to 'excellent' (ENV Australia, 2006; Keighery, 1994; GIS Database).

A search of the Department of Environment and Conservation Declared Rare and Priority Flora databases revealed that no Declared Rare Flora (DRF) species and two Priority species may potentially occur within a 20 kilometre radius of the application area (DEC, 2011). ENV Australia (2006) identified no DRF and one Priority flora species within the application area. The species identified, *Isotropis winneckei* (P1), was advised by the WA Herbarium that it is a misidentified species and all *I. winneckei* species are actually *I. parviflora* species (BHP Billiton Pty Ltd, 2011). ENV Australia conducted a target survey for both *Isotropis* species during April 2011 within the application area and no *Isotropis* species were recorded (BHP Billiton Iron Ore Pty Ltd, 2011).

No Threatened Ecological Communities or Priority Ecological Communities were recorded or identified within the application area (GIS Database).

Eight weed species were identified during the survey: Spiked Malvastrum (*Malvastrum americanum*), Ruby Dock (*Acetosa vesicaria*), Couch Grass (*Cynodon dactylon*), Bipinnate Beggartick (*Bidens bipinnata*), Awnless Barnyard Grass (*Echinochloa colona*), Whorled Pigeon Grass (*Setaria verticillata*) Buffel Grass (*Cenchrus ciliaris*) and Black Berry Nightshade (*Solanum nigrum*) (ENV Australia, 2006). None of these species are listed by the Western Australian Department of Agriculture and Food as Declared Plants. Weeds have the potential to significantly change the dynamics of a natural ecosystem and lower the biodiversity of an area. Potential impacts to the biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

The broad-scale vegetation types and fauna habitat types are common and widespread both locally and regionally (ENV Australia, 2006). Aerial imagery also suggests the widespread availability of similar vegetation communities and landforms, and the application area is not considered to support a higher biological diversity than the adjoining local or regional areas (GIS Database). The proposed clearing may however have a significant impact on biodiversity on a local scale. Gorges and associated breakaways/rocky outcrop faunal habitats within the application area is considered to be of high ecological significance. The clearing of 40 hectares of native vegetation within a 1005.01 hectare application area, is unlikely to have a significant impact in a regional context.

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

Methodology BHP Billiton Iron Ore (2011)
CALM (2002)
DEC (2011)
Ecologia (2004)
ENV Australia (2006)
Keighery (1994)
Shepherd (2009)
GIS Database:
- Newman 1.4m Orthomosaic - Landgate 2003
- Threatened Ecological Sites Buffered
- IBRA WA (regions - subregions)

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

Comments Proposal may be at variance to this Principle

There were six broad fauna habitat types occurring within the survey area as recorded by ENV Australia (2006);

1. Hill crests and slopes;
2. Lower hill slopes and plains;
3. Flood plains;
4. Riverine;
5. Gorges; and
6. Drainage lines.

ENV Australia (2006) identified the vegetation condition to be 'completely degraded' to 'excellent' (Keighery, 1994). The landforms and habitat found within the application area is considered as being well represented in the Pilbara bioregion (ENV Australia, 2006; BHP Billiton Iron Ore, 2011). The application area does contain habitats or faunal assemblages that are ecologically significant such as the gorges and rocky outcrops associated with the habitat type. Given the presence of locally significant habitat types such as the gorges and rocky outcrops, local fauna species are likely to be impacted by the proposed clearing of 40 hectares of native vegetation.

There is approximately 100% of the pre-European vegetation remaining within the Pilbara bioregion (Shepherd, 2009; GIS Database). Given the extent of the native vegetation remaining in the local area and bioregion, the vegetation to be cleared does not represent a significant ecological link.

There are eight conservation significant fauna species listed as either Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* or protected under Western Australian legislation (*Wildlife Conservation Act, 1950*), that may potentially occur within a 20 kilometre radius of the application area (DEC, 2011). Ecologia (2004) conducted a level one fauna survey of the application area during May and August 2004, with supplementary surveys conducted by ENV Australia (2006) between March and April 2006. Incorporating Ecologia (2004) fauna survey results, ENV Australia (2006) recorded seven species of conservation significance within the application area. Four of these species; the Rainbow Bee-eater (*Merops ornatus*), Star Finch (*Neochmia ruficauda subclarensensis*), Western Pebble-mound Mouse (*Pseudomys chapmani*) and Ghost Bat (*Macroderma gigas*) may use the study area for foraging as part of a larger territory area. There have only been historical sightings and records (in the last 100 years) of the Northern Quoll (*Dasyurus hallucatus*) and Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*),

therefore these species are not expected to be in the surrounding area (ENV Australia, 2006; BHP Billiton Iron Ore, 2011).

The habitat present within the application area is not considered significant habitat for these species (ENV Australia, 2006; BHP Billiton Iron Ore, 2011). A record of both the Pilbara olive python (*Liasis olivaceus barroni*) and a potential Black-footed Rock-wallaby (*Petrogale* species) has also been recorded in the application area (ENV Australia, 2006). These species are ground-dwelling conservation significant fauna with limited dispersal abilities and are more likely to be impacted on by any development (ENV Australia, 2006). Therefore, any core habitats such as gorges could be considered as significant and should be avoided.

The proposed clearing of 40 hectares of native vegetation within a 1005.01 hectare application area, has the potential to reduce the potential habitat for local fauna and reduce the local population sizes of common ground-dwelling fauna such as reptiles and small mammals (Ecologia, 2004; ENV Australia, 2006). With respect to breakaways/rocky outcrops, the proponent has advised that these areas are not suitable for the placement of infrastructure associated with the project; therefore there should be no requirement to clear these habitats. Should a clearing permit be granted, it is recommended that breakaways/rocky outcrops be excluded from areas permitted to clear.

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

Methodology BHP Billiton Iron Ore (2011)
DEC (2011)
Ecologia (2004)
ENV Australia (2006)
Keighery (1994)
Shepherd (2009)
GIS Database:
- Pre-European Vegetation
- IBRA WA (regions - subregions)

(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 records of Declared Rare Flora (DRF) within the application area (GIS Database). A search of the Department of Environment and Conservation Declared Rare and Priority Flora databases identified no DRF species as occurring within a 20 kilometre radius of the application area (DEC, 2011).

ENV Australia (2006) conducted a vegetation and flora survey of the application area during March and April 2006. No DRF were recorded within the survey area.

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

Methodology ENV Australia (2006)
DEC (2011)
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 the available databases shows that the application area sits within the outer edge of the buffer zone of the 'EthelG' Threatened Ecological Community (TEC) (GIS Database; ENV Australia, 2006). EthelG is identified as the Ethel Gorge groundwater aquifer stygobiont community. This TEC is water dependent and therefore the greatest threat to this community is groundwater drawdown through water abstraction and dewatering activities (DEWHA, 2008). The clearing of 40 hectares of native vegetation for activities associated with this proposal is not likely to significantly impact upon water resources within the local area, and is therefore not likely to impact upon this TEC.

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

Methodology DEWHA (2008)
ENV Australia (2006)
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 application area falls within the Pilbara IBRA bioregion (GIS Database). The vegetation within the application area is recorded as:

Beard vegetation association 29: Sparse low woodland; mulga, discontinuous in scattered groups; and
Beard vegetation association 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (GIS Database; Shepherd, 2009).

According to Shepherd (2009), Beard vegetation associations 29 and 82 retain approximately 100% of their pre-European extent. Therefore, the areas proposed to be cleared are not a significant remnant of native 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	17,804,193.01	17,785,000.82	~99.98	Least Concern	6.32
Beard vegetation associations - State					
29	7,903,991.46	7,903,991.46	~100	Least Concern	0.29
82	2,565,901.28	2,565,901.28	~100	Least Concern	10.24
Beard vegetation associations - Bioregion					
29	1,133,219.78	1,133,219.78	~100	Least Concern	1.91
82	2,563,583.23	2,563,583.23	~100	Least Concern	10.25

* 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 - subregions)
 - 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 not likely to be at variance to this Principle

According to available databases there are several ephemeral drainage lines which intersect through the application area (GIS Database). These drainage lines are small and intermittent, and only flow after major rainfall events (ENV Australia, 2006). Ecologia (2004) defined the minor drainage lines onsite as generally shallow eroded channels with a sandy or gravelly washline and associated outwash areas. Drainage lines are known habitat for numerous fauna species of conservation significance, however the application areas lack a permanent waterbody and therefore there is no permanent fauna dependence on waterbodies. Based on vegetation mapping by ENV Australia (2006), there are no riparian vegetation types associated with the drainage lines.

The proposed drilling sites do not occur across a large amount of drainage lines onsite. The nature of the drill sites construction will be of low impact due to the shallow pushing of material to clear the site (BHP Billiton Iron Ore, 2011). The proposed clearing of 40 hectares is unlikely to result in any significant impact to vegetation growing near any drainage lines.

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

Methodology BHP Billiton Iron Ore (2011)
 Ecologia (2004)
 ENV Australia (2006)

GIS Database:
- Geodata, Lakes
- 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

According to available databases, the application area is comprised of the following:

- Boolgeeda land system: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands. Vegetation is generally not prone to degradation and the system is not susceptible to erosion;
- Newman land system: Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands; and
- Rocklea land system: Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands. The system has very low erosion hazard (van Vreeswyk et al., 2004; GIS Database).

All three land systems are generally not susceptible to erosion and all the land systems are characterised by Spinifex vegetation that is not suitable for pasture or grazing and is generally not prone to degradation (van Vreeswyk et al., 2004).

The majority of vehicle access is over pre-existing tracks. Any compaction that may occur will be confined to the tracks developed for the project and will be remedied upon completion as per the rehabilitation practices stated within the exploration environmental management plan (EEMP) (BHP Billiton Iron Ore, 2011).

Methodology BHP Billiton Iron Ore (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 application area is not located within any conservation area (GIS Database). The nearest conservation area is Karijini National Park, located approximately 121 kilometres west of the application area (GIS Database).

Given the distance of the application area from Karijini National Park, the proposed clearing is not likely to provide a significant ecological linkage or fauna movement corridor and is not likely to impact the environmental values of the conservation area.

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

Methodology 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

The proposed clearing area is located entirely within the Newman Water Reserve, a Public Drinking Water Source Area (PDWSA) gazetted under the *Country Areas Water Supply Act 1947* on 21 August 1983. This PDWSA is defined a 'Priority 1 (P1)' under the Water Source Protection Classification System (Department of Water, 2011). The Department of Water (DoW) is satisfied that the proposed clearing of 40 hectares is unlikely to have a significant impact on the quality or quantity of groundwater, provided activities are carried out in accordance with DoW advice and the BHP Billiton Iron Ore's exploration environmental management plans. The application area is located within the proclaimed Pilbara groundwater area under the Rights in Water and Irrigation Act 1994 (GIS Database). Any groundwater extraction and/or taking or diversion of surface water for the purposes other than domestic and/or stock watering is subject to licence by the Department of Water (Department of Water, 2011).

There are several ephemeral watercourses passing through the application area which only support surface water for short periods following significant rainfall events (GIS Database; ENV Australia, 2006). The proposed

clearing is not likely to cause deterioration in the quality of any surface water within or outside of the application area.

The application area lies within a low rainfall zone and any surface water within the application area is likely to only remain for short periods following significant rainfall events (BoM, 2011). The proposed clearing is not likely to cause deterioration in the quality of any surface water within or outside of the application area. Drill access tracks are proposed across landforms with low erosivity, therefore they are unlikely to create surface water impairment issues. Sediment traps and sumps will be constructed at all sites where erosion and sediment release has potential to occur (BHP Billiton Iron Ore, 2011).

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

Methodology BHP Billiton Iron Ore (2011)
BoM (2011)
Department of Water (2011)
ENV Australia (2006)
GIS Database:
- Geodata, Lakes
- RIWI Act, Groundwater Areas
- 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 experiences a semi-desert tropical climate with summer cyclonic or thunderstorm rainfall, with an annual average rainfall of approximately 312.7 millimetres per year (CALM, 2002; BoM, 2011). Based on an average annual evaporation rate of 3,200- 3,600 millimetres (BoM, 2011), any surface water resulting from rainfall events is likely to be relatively short lived.

Given the size of the area to be cleared (40 hectares) compared to the size of the Fortescue River catchment area (2,975,192 hectares) (GIS Database) it is not likely that the proposed clearing will lead to an appreciable increase in run off, and subsequently cause or exacerbate the incidence or intensity of flooding.

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

Methodology BoM (2011)
CALM (2002)
GIS Database:
- Hydrographic Catchments - Catchments
- Hydrography, Linear

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

Comments
There is one Native Title claim over the area under application (WC05/6). 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 17 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.

Clearing permit CPS 4470/1 was granted by the Department of Mines and Petroleum on 13 October 2011, and is valid from 5 November 2011 to 1 October 2016. The clearing permit authorised the clearing of 40 hectares of native vegetation. An application for an amendment to clearing permit CPS 4470/1 was submitted by BHP Billiton Iron Ore Pty Ltd on 27 October 2011. The proponent has requested to amend the purpose for which the clearing may be done to also include the installation of power lines. The duration of the permit has also been extended by 5 years to allow the rehabilitation condition to be implemented. There were no additional environmental impacts as a result of this amendment.

Methodology GIS Database:

- Aboriginal Sites of Significance
- Native Title Claims - Registered with the NNTT

4. References

- BHP Billiton Iron Ore (2011) Orebody 24 Exploration Drilling, Purpose Permit, Vegetation Clearing Permit Application Supporting Documentation, Prepared in June 2011.
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- DEC (2011) NatureMap - Mapping Western Australia Biodiversity, Department of Environment and Conservation, viewed 5 September 2011, <<http://naturemap.dec.wa.gov.au>>.
- Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.
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- Ecologia (2004) Orebody 24 Expansion Biological Survey. Prepared by Ecologica Environment on behalf of the Mine and Port Developments Joint Venture (MPDJV), 2004.
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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. (2009) 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.
- Van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A & Hennig, P. (2004) An Inventory and Condition Survey of the Pilbara Region, Western Australia, Department of Agriculture, Western Australia.

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.