



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2447/2
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: Iron Ore (Hamersley Range) Agreement Act 1963, Mineral Lease 4SA (AML70/4)
Local Government Area: Shire Of Ashburton
Colloquial name: Brockman Syncline 4 Access Track

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
4		Mechanical Removal	Mineral Exploration

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 5 May 2011

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

Beard vegetation associations have been mapped at a 1:250,000 scale for the whole of Western Australia and are useful to look at vegetation extent in a regional context. One Beard vegetation association is located within the application area (GIS Database):

82 - Hummock Grasslands, low tree steppe; snappygum over *Triodia wiseana*. According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 82 is a grassland dominated by *Triodia wiseana*, with emergent trees of *Eucalyptus leucophloia* and *E. gamophylla*, with various emergent shrubs including *Senna artemisioides* ssp. *sturtii*, *Dodonaea viscosa*, *Grevillea wickhamii*, *Hakea lorea* and *Senna pleurocarpa* var. *pleurocarpa*.

The application area was surveyed by Biota Environmental Sciences in 2004 and Pilbara Iron Staff in 2007 (Hamersley Iron, 2008). The following vegetation types were identified within the application area:

Vegetation of Stony Hills:

H14: *Eucalyptus leucophloia* scattered low trees over *Triodia wiseana* mid-dense hummock grassland. Other associated species include *Acacia pruinocarpa*, *Hakea chordophylla* and *Solanum lasiophyllum*.

H15: *Eucalyptus leucophloia* scattered low trees over *Triodia epactia* mid-dense hummock grassland. Other associated species include *Acacia pruinocarpa*, *Goodenia stobbsiana*, *Indigofera monophylla* and *Ptilotus calostachyus* var. *calostachyus*.

Vegetation of Plains:

P5: *Acacia xophophylla*, *A. aff aneura* (narrow fine veined) tall shrubland over *Triodia brizoides*, *T. epactia* open hummock grassland. Other associated species include *A. synchronicia*, *Senna stricta*, *Eucalyptus leucophloia* ssp. *leucophloia*, *Ptilotus schwartzii* and *Triodia longiceps*.

P12: *Acacia synchronicia*, *A. bivenosa*, *Senna pruinosa*, *S. luerssenii* mixed shrubland over *Triodia brizoides* closed hummock grassland. Other associated species include *A. exilis*, *S. oligophylla*, *Solanum lasiophyllum*, *Triodia epactia* and *T. longiceps*.

P15: *Acacia bivenosa*, *A. exilis*, *A. ancistrocarpa* tall open shrubland over *Triodia wiseana* mid-dense hummock grassland. Other associated species include *Petalostylis labicheoides*.

Vegetation of Drainage Areas:

C12: *Acacia monticola*, *A. maitlandii*, *A. atkinsiana* tall open shrubland over *Triodia epactia*, *T. wiseana* mid-dense to open hummock grassland. Other associated species include *A. bivenosa*, *A. citrinoviridis*, *Gossypium robinsonii*, *Grevillea wickhamii* ssp. *hispidula*, *Petalostylis labicheoides*, *Porana commixta*, *Rulingia luteifolia* and *Themeda triandra*.

Clearing Description Hamersley Iron Pty Ltd (Hamersley Iron) have applied to clear up to 4 hectares of native vegetation within an application area of 30.5 hectares for the purpose of creating an access track. The track will be 6 kilometres long and 4.5 metres wide and is being created to avoid an area identified by Hamersley Iron as having conservation significance.

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

Comment Vegetation condition was determined by the assessing officer based on descriptions by Hamersley Iron (2008) and analysis of aerial photography.

Clearing permit CPS 2447/1 was granted by the then Department of Industry and Resources (now Department of Mines and Petroleum) on 5 June 2008, and is valid from 5 July 2008 to 31 March 2013. The clearing permit authorised the clearing of 4 hectares of native vegetation. An application for an amendment to clearing permit CPS 2447/1 was submitted by Hamersley Iron Pty Limited on 15 February 2011. The proponent has requested to change the annual reporting date from 31 March each year for the life of the permit to 31 July each year for the life of the permit. The duration of the permit has also been extended by 3 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) Interim Biogeographic Regionalisation of Australia (IBRA) sub-region (GIS Database). This sub-region is characterised by Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002). The vegetation described within the application area (Hamersley Iron, 2008) is typical of the bioregion.

A vegetation survey of the application area and surrounding vegetation identified 222 flora species from 48 Families (Hamersley Iron, 2008). This is considered to be very biologically diverse. Poaceae (33), Malvaceae (18), Mimosaceae (23), Papilionaceae (12) and Amaranthaceae (15) families are particularly diverse within the application area (Hamersley Iron, 2008). This is typical of the floristics of the Pilbara IBRA Region.

An area search of the Western Australian Museum's Faunabase conducted by the assessing officer suggests that the application area is diverse in reptile species, particularly Skinks (21) and Geckos (15) (Western Australian Museum, 2008). The database search found a total of 61 reptile species from 7 Families as potentially occurring within the application area, or within 50 km of the application area.

Four alien weed species were recorded within the vegetation survey area (Hamersley Iron, 2008). 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.

Although the application areas are high in floral and faunal diversity, they are not likely to have greater diversity than similar areas within the region, particularly as parts of the application area that have been degraded by previous disturbance from mining activities.

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

Methodology CALM (2002)
Hamersley Iron (2008)
Western Australian Museum (2008)
GIS Database:
- 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 is not likely to be at variance to this Principle**

The assessing officer has conducted a search of the Western Australian Museum's online fauna database between the coordinates 116.72°E, 22.15°S and 117.71°E, 23.05°S, representing a 50 kilometre radius around the

application area.

This search identified four Amphibian, 34 Avian, 20 Mammalian and 61 Reptilian species that may occur within the application area (Western Australian Museum, 2008). Of these, the following species of conservation significance have previously been recorded within the search area: Long-tailed Dunnart (*Sminthopsis longicaudata*), Lakeland Downs Mouse (*Leggadina lakedownensis*), Pebble-mound Mouse (*Pseudomys chapmani*), Ghost Bat (*Macroderma gigas*), Star Finch (*Neochmia ruficauda clarescens*) and a skink (*Notoscincus butleri*).

Hamersley Iron (2008) requested the DEC conduct a co-ordinate search of its threatened fauna database to identify species of conservation significance that had been recorded within the area specified. The co-ordinates supplied by Hamersley are similar to those used by the assessing officer above. In addition to those species listed above, the following fauna species of conservation significance were identified through this database search: Australian Bustard (*Ardeotis australis*), Bush Stone-curlew (*Burhinus grallarius*) and Striated Grasswren (*Amytornis striatus striatus*).

The Long-tailed Dunnart (DEC - Priority 4) occurs in rugged rocky landscapes that support low open woodland or shrubland of Acacia's (especially Mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and Cassia's from the Pilbara and upper Gascoyne region (DNREA, 2007). They have also more recently been recorded from plateaus near breakaways and screes and rugged boulder strewn screes in the Goldfields region. The habitat types found within the application area may support populations of Long-tailed Dunnart. However, it is unlikely that the vegetation to be cleared represents significant habitat for this species, given its widespread distribution.

The Lakeland Downs Mouse (DEC - Priority 4) is known to occur on sandy soils and cracking clays that support native grasses (DEC, 2006). It is known that this species experiences great fluctuations in population size depending on seasonal factors, reaching plague proportions in good years (DEC, 2006). The soil types of the application areas appear to be gravelly stony soils and the area is not likely to be habitat for this species. Therefore, it is unlikely that the vegetation to be cleared is significant habitat for this species.

The Western Pebble-mound Mouse (DEC - Priority 4) is described as constructing pebble mounds on slopes composed of stony soils, near sharply incised drainage lines (Start et al, 2000). Mounds are built in vegetation dominated by hard spinifex (*Triodia basedowii*) or *T. wiseana*. One active mound has previously been recorded by Hamersley Iron within the application area (Hamersley Iron, 2008). Much larger populations occur to the west of the application area. The vegetation within the application area is not likely to be significant habitat for this species.

The Ghost Bat (DEC - Priority 4) roosts in caves, old mine shafts and deep cracks in rocks (Australian Museum Online, 2008). It is not known if suitable habitat occurs within the application area. The application area occurs on the top of a ridge/plateaux that breaks away quickly to the stony plains below. There is potential for fissures to occur within this escarpment that may be habitat for the ghost bat. Given its widespread distribution across Northern Australia, the area is not likely to be significant habitat for this species, although it may be prone to disturbance.

The Star Finch (DEC - Priority 4) has a patchy distribution within the Pilbara and at low densities where it occurs (Garnett et al, 2000). There are occasional concentrations at Exmouth and Millstream (Garnett et al, 2000). Star Finch inhabits grasslands and eucalypt woodland close to water, where they feed on seeds (Garnett et al, 2000). Birds tend to be resident in large flocks during the dry season, and disperse to breed during the wet season (Garnett et al, 2000). The Star Finch is unlikely to be present within the application area, although more suitable habitat occurs south of the application area on the stony plains near drainage lines. It is unlikely that the vegetation to be cleared represents significant habitat for this species.

Notoscincus butleri (DEC - Priority 4) is a small skink that is considered endemic to the Pilbara (Morton et al, 1995). It has a restricted range along the coastal area of the Pilbara, commonly occurring in spinifex dominated areas adjacent to riparian habitats. The vegetation within the application area may be suitable habitat for this species. However, given the large amounts of suitable habitat within the Pilbara region, the vegetation within the application area is not likely to be significant habitat for this species.

The Australian Bustard (DEC - Priority 4) prefers tussock grassland, *Triodia* hummock grassland, grassy woodland and low shrublands (Garnett et al, 2000). This species may occur within the application area. However, given the widespread distribution of this species, the habitat within the application area is not likely to be significant habitat for this species.

The Bush Stone-curlew (DEC - Priority 4) is known to frequent lightly timbered open woodlands. This species may occur within the application area. However, given the widespread distribution of this species, it is not likely that the Bush Stone-curlew is dependant upon the vegetation within the application area for its continued existence in the local area (Garnett et al, 2000). Therefore, the vegetation is not significant habitat for this species.

Striated Grasswrens (DEC - Priority 4) live on sandplains dominated by mature *Triodia* hummock grassland with

an over-storey of shrubs, usually mallee eucalypts (Garnett et al, 2000). Currently the major threat throughout the subspecies' range is fire, especially extensive fires that destroy mature hummock grassland over large areas. There are vast amounts of *Triodia* hummock grassland within the Pilbara IBRA region that this species can utilise. It is not likely that the vegetation within the application areas is significant habitat for this species.

An assessment of aerial imagery suggests that there are no significant fauna habitat types within the application area. Habitat types include stony low rises and hills, stony plains and drainage lines. None of these habitat types are restricted or unique.

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

Methodology Australian Museum Online (2008)
DEC (2006)
DNREA (2007)
Garnett et al (2000)
Hamersley Iron (2008)
Start et al (2000)
Western Australian Museum (2008)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

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

According to available databases, no Declared Rare Flora (DRF) or Priority flora species occur within the application area (GIS Database).

A flora survey was conducted over the application area and surrounding areas by Pilbara Iron staff in May 2007 (Hamersley Iron, 2008). This survey involved the area being traversed by an experienced botanist in transects spaced between 50-100 metres apart. All vascular plant species were recorded. As a result of this survey no DRF or Priority flora species were identified within the application area.

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

Methodology Hamersley Iron (2008)
GIS Database:
- Declared Rare and Priority Flora List

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

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

According to available databases, no Threatened Ecological Communities (TEC) occur within the application area. The nearest TEC occurs approximately 35 kilometres north of the application area. It is not expected that the proposed clearing will impact the conservation of this TEC.

None of the vegetation types identified within the application area (Hamersley Iron, 2008) are representative of a TEC or an ecological community at risk.

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

Methodology Hamersley Iron (2008)
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

According to available databases, the application area falls within the Pilbara IBRA Bioregion (GIS Database). This bioregion's vegetation extent remains at approximately 100% of its Pre-European extent (see table). Beard vegetation association 82 occurs within the application area (GIS Database). This vegetation association remains at approximately 100% of its Pre-European extent. This vegetation association is well represented in conservation estate.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves*
IBRA Bioregion – Pilbara	17,804,193	17,785,001	~99.9	Least Concern	6.3
Beard veg assoc. – State					
82	2,565,901	2,565,901	~100	Least Concern	10.2
Beard veg assoc. - bioregion					
82	2,563,583	2,563,583	~100	Least Concern	10.2

* Shepherd (2009)

** Department of Natural Resources and Environment (2002)

Therefore, the application area is not part of a remnant of native vegetation in an area that has been extensively cleared.

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 Databases:
- 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 at variance to this Principle

According to available databases there are several minor, non-perennial drainage lines within the application area (GIS Database).

Two larger drainage line or non-perennial creeks occur within the application area. Analysis of aerial photography suggests that the creeks have a stony substrate fringed by trees. Hamersley Iron have recorded one vegetation types within these creeks and drainage lines (C12). This vegetation type is characterised by Acacia trees over closed or open scrub over *Triodia* hummock grasslands. This vegetation type is not riparian in nature. The creeks would not experience water flows except after periods of intense rainfall.

Based on the above the proposed clearing is at variance to this Principle. However, it is not expected that the proposed clearing will significantly impact the environmental values of these drainage lines.

Methodology Hamersley Iron (2008)
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):

Newman;
Robe; and
Rocklea.

The Newman Land System is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (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 'Plateau, ridge mountain and hill' land unit. The soil types within this land unit (stony soils, red shallow loams) are not susceptible to erosion due to the presence of a stony mantle (Van Vreeswyk et al, 2004). The vegetation described by Van Vreeswyk et al (2004) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Hamersley Iron, 2008).

The Robe Land System is described as low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands. The system is not generally susceptible to vegetation degradation or 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 'lower slope land unit'. The soil types within this land unit (stony soils, shallow gravel soils) are not susceptible to erosion (Van Vreeswyk et al, 2004). The vegetation described by Van Vreeswyk et al (2004) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Hamersley Iron, 2008).

The Rocklea Land System is described as basalt hills and restricted stony plains with hard spinifex (Van Vreeswyk et al, 2004). An analysis of aerial photography suggests the application area is most likely to fall with the 'upper slope' land unit. This land unit is not susceptible to erosion due to a surface mantle of cobbles and pebbles. The vegetation described by Van Vreeswyk et al (2004) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Hamersley Iron, 2008).

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

Methodology Hamersley Iron (2008)
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 located approximately 70 kilometres to the west of Karijini National Park (GIS Database). At this distance it is not likely that the vegetation within the application area provides a buffer to a conservation area, or is important as an ecological link to a conservation area. The vegetation types within the application areas are well replicated in other land systems within the Pilbara region. Subsequently, their conservation status is under no threat.

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

According to available databases, the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database).

The area is located within a *Rights in Water Irrigation Act 1914* (RIWI Act) Surface Water Management Area (DoW, 2008). The proponent is required to obtain a Beds and Banks Permit in order to disturb any watercourse. The area is located in a RIWI Act Groundwater area. The proponent is required to obtain permits to extract groundwater in this area.

There are no permanent waterbodies or watercourses within, or in association with the application area (GIS Database). Rainfall in this area is mainly restricted to a wet summer season, where precipitation can be variable. Rain can be either intense falls associated with cyclonic events, or scattered falls associated with local thunderstorms. The application area receives average annual rainfall of approximately 284 millimetres (BoM, 2008), and experiences a pan evaporation rate of approximately 3,400 millimetres/year (Luke et al, 1987). Therefore, during normal rainfall events, surface water within the application area is likely to evaporate or be utilised by vegetation quickly. However, substantial rainfall events create surface sheet flow which is likely to be high in sediments.

During normal rainfall events, the proposed clearing would not to an increase in sedimentation of waterbodies on or off site.

The application area is located within the Pilbara Groundwater Area (DoW, 2008). Any extraction of groundwater in this area will require a groundwater license. The groundwater salinity within the application area is approximately 500 – 1,000 milligrams/Litre Total Dissolved Solids (TDS) (GIS Database). This is considered to be potable water. Given the size of the area to be cleared (4 hectares) compared to the size of the Hamersley groundwater province (101,668 square kilometres) (GIS Database), the proposed clearing is not likely to cause salinity levels within the application area to alter significantly.

There are no known Groundwater Dependant 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 BoM (2008)
DoW (2008)
Luke et al (1987)
GIS Databases:
- Groundwater, Statewide
- Public Drinking Water Source Areas (PDWSA)
- Hydrography, Linear
- 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 an arid, tropical climate with a wet summer season and a dry winter season (BoM, 2008). Most rainfall is received during the wet season, but falls can be variable (BOM, 2008). Rain can either be sporadic (local thunderstorms) or heavy and intense (cyclonic events). It is likely that during times of intense rainfall there may be some localised flooding in adjacent areas. However, the small area to be cleared (4 hectares) in relation to the size of the Ashburton River catchment area (7,877,743 hectares; GIS Database) is not likely to lead to an increase in flood height or duration. Flooding is not expected within the application area as it is located higher in the landscape.

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

Methodology BoM (2008)
GIS Database:
- Hydrographic Catchments - Catchments

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

Comments

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

A search of available databases reveals there are no registered Aboriginal sites of significance within the application area (GIS Database). Hamersley Iron (2008) have advised that heritage surveys have been conducted over the application areas and any sites identified have been excised from the application area. 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.

The application area is located within a *Rights in Water Irrigation Act 1914* (RIWI Act) Surface Water Management Area (GIS Database). The proponent is required to obtain a Beds and Banks Permit in order to disturb any water course (DoW, 2008). The application area is located in a RIWI Act Groundwater area. The proponent is required to obtain permits to extract groundwater in this area.

Clearing permit CPS 2447/1 was granted by the then Department of Industry and Resources (now Department of Mines and Petroleum) on 5 June 2008, and is valid from 5 July 2008 to 31 March 2013. The clearing permit authorised the clearing of 4 hectares of native vegetation. An application for an amendment to clearing permit CPS 2447/1 was submitted by Hamersley Iron Pty Limited on 15 February 2011. The proponent has requested to change the annual reporting date from 31 March each year for the life of the permit to 31 July each year for the life of the permit. The duration of the permit has also been extended by 3 years to allow the rehabilitation condition to be implemented. There were no additional environmental impacts as a result of this amendment.

Methodology DoW (2008)
Hamersley Iron (2008)
GIS Database:
- Native Title Claims
- Aboriginal Sites of Significance

4. References

- Australian Museum Online (2008). Bats in Australia, Ghost Bat. <http://www.amonline.net.au/bats/records/bat14.htm> Accessed 23/4/08.
- BoM (2008). Climate Averages - Paraburdoo. http://www.bom.gov.au/climate/averages/tables/cw_007185.shtml Accessed 28/1/08. Bureau of Meteorology.

- DEC (2006). Plants and Animals of Western Australia: Fauna Species profiles.
<http://www.naturebase.net/content/view/840/1288/> Accessed 22-4-08.
- Department of Conservation and Land Management (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions.
- 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.
- DNREA (2007). Threatened Species Of The Northern Territory - Long-Tailed Dunnart (*Sminthopsis longicaudata*).
http://nt.gov.au/nreta/wildlife/animals/threatened/pdf/mammals/longtailed_dunnart_vu.pdf Accessed 16/10/07.
 Department of Natural Resources, Environment and the Arts, Northern Territory.
- DoW (2008). Advice for land clearing application 2235/1. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR), received 21/1/08. Department of Water, Western Australia.
- Garnett ST & Crowley GM (2000). Action Plan for Australian Birds 2000. Environment Australia, Canberra.
- Hamersley Iron (2008). Supporting documentation supplied within clearing permit application for Access Track- Brockman Syncline 4. Hamersley Iron Pty Ltd.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Luke GJ, Burke KL and O'Brien TM (1987). Evaporation Data for Western Australia. Resource Management Technical Report No. 65. Department of Agriculture, Western Australia
- Morton SR, Short J and Barker RD (1995). Refugia for Biological Diversity in Arid and Semi-arid Australia - Biodiversity Series, Paper No. 4. <http://www.environment.gov.au/biodiversity/publications/series/paper4/pil.html> Accessed 30/1/08.
 Department of Environment, Water, Heritage and the Arts.
- 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.
- Start AN, Anstee SD & Endersby M, (2000). A review of the biology and conservation status of the Ngadjji, *Pseudomys chapmani* Kitchener 1980 (Rodentia: Muridae). CALMScience, Vol 2, No 2, p 125-147.
- Van Vreeswyk AME, Payne AL, Leighton KA & Hennig P, (2004). Technical Bulletin No. 92: An inventory and condition survey of the Pilbara region, Western Australia. Department of Agriculture, Western Australia.
- Western Australian Museum (2008). Faunabase - Western Australian Museum, Queensland Museum and Museum & Art Gallery of NT Collections Databases. <http://www.museum.wa.gov.au/faunabase/prod/index.htm> Accessed 21/2/08.
 Western Australian Museum.

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.