



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4712/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: Iron Ore (Hamersley Range) Agreement Act 1963, Mineral Lease 4SA (AML 70/4)
Local Government Authority: Shire of Ashburton
Colloquial name: Brockman 2

1.4. Application

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

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 25 January 2012

2. Background

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 (GIS Database).

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

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

Six vegetation assemblages have been recorded in the application area from the Biota (2010a) and HGM (1999) surveys (Rio Tinto, 2011).

Stony Plains and Foothills

EIAbTeTw – *Eucalyptus leucophloia* subsp. *leucophloia* scattered trees over *Acacia bivenosa* scattered shrubs over *Triodia epactia*, *T. wiseana* hummock grassland.

EITeTw – *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees to open woodland over *Triodia epactia*, *T. wiseana* hummock grassland.

Hill/Stony Plain

A2 – *Eucalyptus leucophloia* over *Triodia wiseana*.

A3 – *Eucalyptus leucophloia* and mixed shrubs over *Triodia wiseana* / *T. pungens*.

A5 – Open tall shrubs dominated by *Acacia exilis* over *Triodia wiseana*.

Drainage

B8 – Dense *Acacia ancistrocarpa* / *A. atkinsania* / *A. exilis* tall shrubland.

Clearing Description

Hamersley Iron Pty Ltd (Hamersley Iron) has applied to clear up to 50 hectares of native vegetation within an application area of approximately 205 hectares for the purpose of mineral exploration. The clearing is for RC evaluation drilling at Brockman 2 Pits 8 to 13 and will be required for tracks, pads and sumps. The drill pads will comprise 30 hectares, the sumps 4.8 hectares and the tracks 14 hectares (approximately).

Vegetation will be cleared by mechanical means, using a raised blade clearing technique where possible.

Vegetation Condition

Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).

To:

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

Comment	<p>The application area is located in the Hamersley subregion of Western Australia and is situated approximately 45 kilometres north-west of Tom Price.</p> <p>The vegetation condition is derived from vegetation and flora surveys undertaken by Biota (2010a) and HGM (1999).</p>
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3 Assessment of application against Clearing Principles

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

Comments Proposal may be at variance to this Principle

The application area occurs within the Hamersley (PIL3) Interim Biogeographic Regionalisation of Australia (IBRA) subregion (GIS Database). This subregion is generally described as Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002).

The vegetation within the application area is broadly mapped as Beard vegetation associations 82 and 175, both of which have approximately 100% of their Pre-European vegetation extent remaining in the bioregion (Shepherd, 2009; GIS Database). Two surveys (Biota 2010a; HGM 1999) have provided vegetation mapping for the application area, which has produced six different vegetation types (Rio Tinto 2011; Biota 2010a; HGM 1999). None of the vegetation types were identified as being restricted to the application area, however one was considered to be of moderate conservation significance. This unit comprised of vegetation associated with gorge/breakaways (A3) (Rio Tinto, 2011). HGM 1999 rated this unit as significant due to the potential of the habitat to support two priority species, *Brachychiton acuminatus* and *Triumfetta leptacantha*, however no records of this species were identified in the study area. Additionally, the species has been found in several other locations in the Pilbara (HGM, 1999). The later study by Biota 2010a did not identify any habitat in the study area that supported these priority species and did not record the species in surveys. A search of DEC's 'FloraBase' database showed that these species were categorised as Priority 4 and Priority 3 respectively and had been recorded at numerous locations in the Pilbara region (DEC, 2011a).

The condition ranking of vegetation types was deemed to be good to excellent, with some disturbance noted on the stony plains habitat. The vegetation present within the application area is widely represented in the Hamersley sub-region and it is unlikely that the proposed clearing would impact biodiversity values within these vegetation types on a broader scale (Rio Tinto, 2011).

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

The total number of vascular flora species recorded from the two studies (Biota, 2010a; HGM, 1999) was within the expected range for the areas of their size, while the dominant families and genera of species recorded were also considered typical of the local area and widely represented in the Pilbara region (Rio Tinto, 2011).

No Declared Rare Flora have been recorded in the application area and no Priority Flora species have been recorded in the application area (Rio Tinto 2011; GIS Database).

HGM 1999 recorded five weed species in the broad study area and Biota (2010a) recorded four species in the eastern broad study area. The weed species that have been recorded are Bipinnate Beggartick (*Bidens bipinnata*), Buffel Grass (*Cenchrus ciliaris*), Purslane (*Portulaca oleracea*), Spiked Malvastrum (*Malvastrum americanum*), Whorled Pigeon Grass (*Setaria verticillata*), Indian weed (*Sigesbeckia orientalis*) and Ruby Dock (*Rumex vesicarius*) (HGM, 1999; Biota, 2010a). Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

There are no Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) occurring within the application area and the habitats recorded within the application area are not suitable for any of the listed TECs or PECs occurring in the locality (Rio Tinto, 2011; GIS Database). However the study area occurs within the large management buffer zone that surrounds the stands of the Themeda grasslands on Hamersley Station. The closest mapped stands of the actual TEC (rather than the buffer) lie just under 13 kilometres north-east of the application area. No vegetation types recorded within the application area are associated with the TEC and it is unlikely that the proposed clearing will impact on this community (Rio Tinto, 2011).

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

The Biota (2010b) study covered two areas, one to the west of the application area (the western polygon) and one adjacent to the application area (the eastern polygon). Biota (2010b) recorded a total of 75 vertebrate fauna species, comprising 37 bird species, 11 native mammals, 1 introduced mammal, 1 frog and 25 reptiles;

however the desktop review indicated the potential for 220 species to occur within the study area. It was concluded that the fauna habitat types of the study area are of a type that is well represented within both the study area and the Pilbara bioregion (Biota, 2010b).

The broad study areas described in Biota (2010a), Biota (2010b), Hamersley Iron (1999) and HGM (1999) do comprise a relatively high level of biological diversity. However, the application area is much smaller than these study areas (205 hectares). The only vegetation unit of moderate conservation significance, (Gorge/breakaways – A3), may be impacted by the proposed clearing, at a local scale. However, this vegetation unit is not restricted to the application area and it is not expected that this will impact flora diversity at a sub-regional or regional scale (Rio Tinto, 2011).

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

Methodology

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

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

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

Several fauna surveys have been undertaken over the application area and its surrounds between 1998 and 2010 as part of the Nammuldi-Silvergrass Project. These surveys have included a vertebrate fauna trapping survey over the large Nammuldi-Silvergrass tenements in 1998 and 1999 (Hamersley Iron, 1999) and targeted fauna surveys for conservation significant species (Biota, 2010b).

The dominant fauna habitats within the Nammuldi-Silvergrass leases are alluvial plains and outwash areas; areas associated with cracking and non-cracking clay soils; hill tops and slopes of the Marra Mamba ridges; and sites dominated by Spinifex that are often associated with minor creeklines (Hamersley Iron, 1999). Other fauna habitats within the leases are riverine sites, Mulga woodlands and a deep alluvial soil site. These other fauna habitat sites are generally small in their extent and are poorly represented on a local scale (Hamersley Iron, 1999). However, the habitats present within the application area are widespread and well represented in the locality and within the Pilbara bioregion (Rio Tinto, 2011).

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

Thirteen vertebrate fauna species listed as Threatened Species under the *Environment Protection and Biodiversity Act 1999* or specially protected under Western Australian legislation have the potential to occur within the application area (Rio Tinto, 2011; Hamersley Iron, 1999; Biota, 2010b).

The conservation significant species that have the potential to occur within the application area are listed below, along with their conservation status:

- Northern Quoll (*Dasyurus hallucatus*) Schedule 1;
- Pilbara Orange Leaf-nosed Bat (*Rhinonictis aurantius*) Schedule 1;
- Pilbara Olive Python (*Liasis olivaceus barroni*) Schedule 1;
- Rainbow Bee-eater (*Merops ornatus*) Migratory;
- Peregrine Falcon (*Falco peregrinus*) Schedule 4;
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*) Priority 3;
- Australian Bustard (*Ardeotis australis*) Priority 4;
- Bush Stone-curlew (*Burhinus grallarius*) Priority 4;
- Ghost Bat (*Macroderma gigas*) Priority 4;
- Long-tailed Dunnart (*Sminthopsis longicaudata*) Priority 4;
- Skink (*Notoscincus butleri*) Priority 4;
- Short-tailed Mouse (*Leggadina lakedownensis*) Priority 4; and

- Western Pebble-mound Mouse (*Pseudomys chapmani*) Priority 4 (Rio Tinto, 2011; Hamersley Iron, 1999; Biota, 2010b).

Of these species, the following have been recorded in the vicinity of the application area during the two studies (Hamersley Iron, 1999; Biota 2010b; Rio Tinto, 2011):

- Rainbow Bee-eater;
- Ghost Bat;
- Short-tailed Mouse;
- Long-tailed Dunnart;
- Western Pebble-mound Mouse; and
- *Notoscincus butleri*.

The three Schedule 1 species listed above, including the Northern Quoll were not recorded in the fauna survey by Biota 2010b, but suitable habitat for these three species was thought to occur in the western polygon of the study area (Biota 2010b). However, the application area for the proposed clearing occurs adjacent to the eastern polygon of the Biota (2010b) study, so it is unlikely that suitable habitat for these species occurs in the application area.

The Peregrine Falcon is widespread and inhabits mainly cliffs along coasts, rivers and ranges, and wooded watercourses and lakes (Johnstone and Storr, 1998), therefore its conservation status is unlikely to be affected by this clearing proposal.

It is not expected that any of the other species listed above would be impacted by the proposed clearing, given that none of the species are restricted to core habitat located within the study area (Rio Tinto, 2011).

The impact on subterranean fauna was considered to be one of the key environmental factors by the Environmental Protection Authority (EPA) in its assessment report on the original Nammuldi-Silvergrass Project (EPA, 2000). However, the impacts on subterranean fauna are from the mine dewatering and not from the clearing of native vegetation (EPA, 2000). The clearing of 50 hectares of native vegetation within the application area is unlikely to impact on the subterranean habitat of the stygofauna.

The application area provides habitat to many native fauna species, including conservation significant species, however the habitat types are common both locally and regionally.

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

Methodology Biota (2010b)
Department of Sustainability, Environment, Water, Population and Communities (2011)
EPA (2000)
Hamersley Iron (1999)
Johnstone and Storr (1998)
Rio Tinto (2011)

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

Comments **Proposal is not likely to be at variance to this Principle**
According to available databases there are no known records of Declared Rare Flora (DRF) within the application area (GIS Database). Additionally, no DRF have been recorded in surveys of the application area (Rio Tinto, 2011). There is, however, DRF that has the potential to occur within 20 kilometres of the application area (*Lepidium catapycnon*) (DEC, 2011b). Suitable habitat for this species is present in the application area, however no populations have been recorded from the Brockman-Nammuldi area to date.

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

Methodology Rio Tinto (2011)
DEC (2011b)
GIS Database:
- Declared Rare and Priority Flora List

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

Comments **Proposal is not likely to be at variance to this Principle**
According to available databases there are several occurrences of the Threatened Ecological Community (TEC) 'Themeda grasslands on cracking clays' in the vicinity of the application area (GIS Database).

Vegetation mapping has been conducted over the application area and no vegetation types occurring within the application area resemble this TEC (Rio Tinto, 2011).

The application area is within a large management buffer zone of this TEC, however, the nearest stands of the actual TEC are approximately 13 kilometres north-east of the application area. Given that no vegetation types recorded in the application area are associated with the TEC, it is unlikely that the proposed clearing will impact on this community (Rio Tinto, 2011).

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

Methodology Rio Tinto (2011)
GIS Database:
- Threatened Ecological Sites Buffered

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

Comments Proposal is not at variance to this Principle

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

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

82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*; and
175: Short bunch grassland - savannah/grass plain (Pilbara) (Shepherd, 2009; GIS Database).

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

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

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

* Shepherd (2009)

** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002)
Shepherd (2009)
GIS Database
- IBRA WA (Regions - Sub Regions)
- Pre-European Vegetation

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposal may be at variance to this Principle

There are no swamps, local wetlands, major watercourses, 'Wetlands of Regional Significance' or 'Wetlands of National Significance' within the application area. There are some minor, ephemeral drainage lines located in

the application area, which are only likely to flow after significant rainfall (Rio Tinto, 2011).

The minor non-perennial watercourses, and their associated vegetation, are widespread in the Pilbara region (GIS Database).

Rio Tinto (2011) derived 6 broad vegetation types based on previous vegetation mapping of the application area and one of these is associated with drainage areas – B8: Dense *Acacia ancistrocarpa* / *A. atkinsania* / *A. exilis* tall shrubland.

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

Methodology Rio Tinto (2011)
GIS Database:
- Hydrography, Linear
- Rivers

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

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

According to available datasets the application area intersects the Boolgeeda and Newman Land Systems (GIS Database).

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

The Newman Land System is characterised by rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (Van Vreeswyk et al, 2004). Each of the landforms in the land system have a mantle of abundant pebbles of ironstone and other rocks, which translates to a low soil erosion risk (Van Vreeswyk et al., 2004).

The proposed clearing of 50 hectares over a total application area of approximately 205 hectares is unlikely to result in appreciable land degradation.

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

Methodology Van Vreeswyk et al. (2004)
GIS Database:
- Rangeland Land System Mapping

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

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

The proposed clearing is not located within a conservation reserve (GIS Database). The nearest conservation area is Karijini National Park, which is located approximately 57 kilometres east of the application area (GIS Database). A large proportion of the vegetation in the Pilbara bioregion remains uncleared, approximately 99.9% (Shepherd, 2009), so it is unlikely the application area provides an important buffer or ecological linkage to Karijini National Park.

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

Methodology Shepherd (2009)
GIS Database:
- DEC Tenure

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

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

According to available databases the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database). The nearest PDWSA is Millstream Water Reserve, which is approximately 16 kilometres north-east of the application area (GIS Database). At this distance the proposed clearing is unlikely to deteriorate the quality of surface or underground water within the reserve.

The groundwater salinity within the application area is approximately 500 - 1,000 milligrams/Litre Total Dissolved Solids (TDS) (GIS Database). Given the size of the area to be cleared (50 hectares) compared to

Biota (2010a) Mammuldi Infill Areas Vegetation and Flora Survey. Unpublished Report for Rio Tinto Iron Ore, Prepared by Biota Environmental Sciences, June 2010.
 Biota (2010b) Mammuldi Infill Areas Fauna Survey Report. Unpublished Report for Rio Tinto Iron Ore, Prepared by Biota Environmental Sciences, June 2010.
 DEC (2011a) Florabase: The Western Australian Flora. Department of Environment and Conservation. <http://forabase.dec.wa.gov.au> (Accessed 17 January 2012).
 DEC (2011b) NatureMap: Mapping Western Australia's Biodiversity. Department of Environment and Conservation.

4 References

Methodology

GIS Database:
 - Aboriginal Sites of Significance
 - Native Title Claims – Registered with the NNTT

The clearing permit application was advertised on 28 November 2011 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received.

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.

There are numerous registered Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

There is one Native Title Claim (WC97/89) over the area under application (GIS Database). This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

Comments

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Methodology

GIS Database:
 - Hydrographic Catchments - Catchments

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

Comments

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Methodology

Rio Tinto (2011)
 Van Vreeswyk et al. (2004)
 GIS Database:
 - Groundwater Provinces
 - Groundwater Salinity, Statewide
 - Hydrography, Linear
 - Public Drinking Water Source Areas

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

There are no permanent watercourses or wetlands within the application area but there is a multitude of minor ephemeral watercourses (Rio Tinto 2011; GIS Database). Rainfall in the Pilbara tends to be unpredictable and erratic and the rocky-sloping topography of much of the upper catchments often produces considerable run-off. As such, ephemeral watercourses tend to have high levels of sedimentation and turbidity after rainfall events (Van Vreeswyk et al., 2004). Therefore the proposed clearing is unlikely to increase the sediment load of the surface water significantly compared to surrounding cleared areas.

the size of the Hamersley Groundwater Province (10,166,833 hectares) (GIS Database), the proposed clearing is not likely to cause salinity levels to alter significantly.

Proposal is not likely to be at variance to this Principle

The application area is located within the Ashburton River catchment area (GIS Database). Given the size of the area to be cleared (50 hectares) in relation to the size of the catchment area (7,877,743 hectares) (GIS Database), the proposed clearing is not likely to increase the potential of flooding on a local or catchment scale.

http://naturemap.dec.wa.gov.au/default.aspx (Accessed 13 January 2012).
 CALM (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.
 Department of Sustainability, Environment, Water, Population and Communities (2011) Australia's 15 National Biodiversity Hotspots. <http://www.environment.gov.au/biodiversity/hotspots/national-hotspots.html> (Accessed 12 April 2011).
 EPA (2000) Nammuldi-Silvergrass Iron Ore Project, 55 km north-west of Tom Price - Report and Recommendations of the Environmental Protection Authority. Bulletin 997, Perth, Western Australia.
 Hamersley Iron (1999) Nammuldi-Silvergrass Exploration Project, Biological Survey Report November 1998 - May 1999. Report by Hamersley Iron Pty Ltd, August 1999.
 HGM (1999) Nammuldi/Silvergrass Soils, Vegetation and Flora Survey. Unpublished Report for Hamersley Iron Pty Ltd, Prepared by Halpern Glick Maunsell Pty Ltd, February 1999.
 Johnstone, R.E. and Storr, G.M. (1998) Handbook of Western Australian Birds, Volume 1 - Non-Passerines (Emu to Dollarbird), Western Australian Museum, Perth.
 Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc), Nedlands, Western Australia.
 Rio Tinto (2011) Statement Addressing the 10 Clearing Principles – RC Drilling at Brockman 2 Pits 8 to 13. November 2011. Unpublished. Document number RTIO-HSE-0128145.
 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. and Hennig, P. (2004) Technical Bulletin - An Inventory and Condition Survey of the Pilbara Region, Western Australia, No. 92. Department of Agriculture, Government of Western Australia, Perth, Western Australia.

Glossary

Acronyms:	BOM	Bureau of Meteorology, Australian Government
	CALM	Department of Conservation and Land Management (now DEC), Western Australia
	DARFWA	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. 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 (= <i>Threatened Flora</i> = <i>Endangered</i> + <i>Vulnerable</i>): 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.
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), <i>Priority Codes for Fauna</i> . Department of Conservation and Land Management, Compo, 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 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 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 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.