



# Clearing Permit Decision Report

## 1. Application details

### 1.1. Permit application details

Permit application No.: 3858/1  
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 246SA (AML 70/246)  
Local Government Area: Shire of Ashburton  
Colloquial name: Paraburdoo Minesite

### 1.4. Application

| Clearing Area (ha) | No. Trees | Method of Clearing | For the purpose of:             |
|--------------------|-----------|--------------------|---------------------------------|
| 82.1               |           | Mechanical Removal | Extension of Pit and Waste Dump |

## 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. Two Beard Vegetation Associations have been mapped within the application areas (GIS Database):

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

181: Shrublands; mulga and snakewood scrub.

Rio Tinto (2010) conducted a flora and vegetation survey over the application area and its surrounding vegetation in February and April 2010. The entire application area was searched in a grid fashion, with an approximate 25 metre space maintained between the two botanists traversing the area (Rio Tinto, 2010). A total of 16 intact vegetation types have been identified during the vegetation survey. These are:

##### Vegetation of the Stony Undulating Plains

AapEcSoGc: *Acacia aneura* subsp. *pilbarana*, *A. xiphophylla*, *A. tetragonophylla* scattered tall shrubs over *Eremophila cuneifolia*, *Senna artemisioides* subsp. *oligophylla*, *Ptilotus obovatus* open shrubland over *Gomphrena canescens* open herbs;

AapEcAc: *Acacia aneura* var. *pilbarana* scattered low trees over *Eremophila cuneifolia*, *Senna artemisioides* subsp. *oligophylla*, *S. glutinosa* subsp. *chatelainiana* scattered shrubs to open shrubland over *Aristida contorta* very open hummock grassland;

AxAsFh: *Acacia xiphophylla* scattered tall shrubs over *A. synchronicia*, *Senna* sp. Meekatharra (E. Bailey 1-26), *Eremophila cuneifolia* scattered shrubs to open shrubland over *Frankenia hispidula*, *Sclerolaena eriacantha*, *S. cuneata* low scattered shrubs;

AxEpSgc: *Acacia xiphophylla*, *A. tetragonophylla* scattered tall shrubs over *Eremophila phyllopoda*, *E. cuneifolia*, *A. tetragonophylla* scattered shrubs over *Senna glutinosa* subsp. *chatelainiana* low open shrubland;

AsMvScAl: *Acacia synchronicia* open shrubland over *Maireana villosa*, *Sclerolaena cuneata*, *Atriplex lindleyi* scattered low shrubs;

##### Vegetation of Minor Drainage Lines

A(Mix)PoSITe: *Acacia aneura* var. *pilbarana* tall shrubland over *A. wanyu*, *A. tetragonophylla*, *A. xiphophylla* shrubland over *Ptilotus obovatus*, *Senna glutinosa* subsp. *x luerssenii* low scattered shrubs over *Triodia epactia* very open to open hummock grassland with *Cenchrus ciliaris* very open tussock grassland;

##### Vegetation of Major Drainage Lines

EcAcCc: *Eucalyptus camaldulensis* scattered trees over *Acacia citrinoviridis* scattered low trees over *A. citrinoviridis*, *A. pyrifolia* open shrubland over *Cenchrus ciliaris* very open tussock grassland;

##### Vegetation of Rocky Low Hills

AapAtTsTeEm: *Acacia aneura* var. *pilbarana* scattered tall shrubs over *A. tetragonophylla*, *Eremophila latrobei* scattered shrubs over *Tribulus suberosus* low open shrubland over *Triodia epactia* scattered hummock grasses to very open hummock grassland with scattered *Eriachne mucronata* tussock grasses;

### Vegetation of Footslopes of Ranges

AcApEcrTsCcTe: *Acacia citrinoviridis*, *A. pruinocarpa* scattered low trees over *A. pruinocarpa*, *Senna glutinosa* subsp. *glutinosa* scattered tall shrubs, over *Eremophila cryptothrix*, *S. glutinosa* subsp. *glutinosa* open shrubland over *Tribulus suberosus*, *E. cryptothrix* and *E. cuneifolia* low open shrubland over *Cenchrus ciliaris* very open tussock grassland over *Triodia epactia* open hummock grassland;

AapSo: *Acacia aneura* var. *pilbarana*, *A. tetragonophylla* scattered tall shrubs over *Senna artemisioides* subsp. *oligophylla*, *S. artemisioides* subsp. *helmsii*, *Eremophila cuneifolia* shrubland;

AapAtEcTe: *Acacia aneura* var. *pilbarana* low open woodland over *A. tetragonophylla* scattered tall shrubs over *Eremophila cuneifolia*, *A. tetragonophylla*, *Senna artemisioides* subsp. *oligophylla* scattered shrubs over *Triodia epactia* open hummock grassland;

### Vegetation of Upper & Mid-slopes of Ranges

ApEpTe: *Acacia pruinocarpa* high open shrubland over *A. pruinocarpa* scattered shrubs over *Eremophila phyllopoda* scattered low shrubs over *Triodia epactia* open hummock grassland;

AapTsTeEm: *Acacia aneura* var. *pilbarana*, *A. tetragonophylla*, *A. pruinocarpa* scattered tall shrubs over *Tribulus suberosus*, *Eremophila latrobei* subsp. *latrobei*, *Ptilotus obovatus* low open shrubland over *Triodia epactia* scattered hummock grasses with *Eriachne mucronata* scattered tussock grasses;

AapSoTsMgTe: *Acacia aneura* var. *pilbarana* high open shrubland over *Senna artemisioides* subsp. *oligophylla* shrubland over *Tribulus suberosus*, *Ptilotus obovatus* low open shrubland over *Maireana georgei* low scattered shrubs over scattered *Triodia epactia* hummock grasses;

### Vegetation of Cliff/Steep Rock Slope

ApElIPoTeEm: *Acacia pruinocarpa*, *Corymbia ferritcola* low scattered trees over *Eremophila latrobei* subsp. *latrobei*, *Hibiscus* sp. (?aff. *haynaldii*), *A. pruinocarpa* scattered shrubs over *Ptilotus obovatus*, *P. schwartzii* var. *schwartzii* scattered low shrubs over *Triodia epactia* scattered hummock grasses with *Eriachne mucronata* scattered tussock grasses;

ApEcrTeEm: *Acacia pruinocarpa* scattered tall shrubs over *Eremophila cryptothrix*, *Ptilotus obovatus* scattered shrubs over *Triodia epactia* scattered hummock grasses and *Eriachne mucronata* scattered tussock grasses;

### Other Mapping Units

Dg: Disturbed ground.

### Clearing Description

Hammersley Iron Pty Ltd has applied to clear up to 82.1 hectares of native vegetation (GIS Database; Rio Tinto, 2010). The application area is located approximately 11.8 kilometres west, south-west of Paraburdoo at Paraburdoo Mine (GIS Database). The proposed clearing is for the purposes of extension of pit and waste dump.

Clearing will be done using a dozer, blade down (Rio Tinto, 2010). Vegetation will be stockpiled and used for rehabilitation.

### Vegetation Condition

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

To

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

### Comment

Vegetation descriptions were derived from descriptions by Rio Tinto (2010).

## 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 is not likely to be at variance to this Principle

The application area is located within the Hamersley subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). This subregion generally consists of mountainous areas of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite) (Kendrick, 2001). The Hamersley subregion generally contains 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 (Kendrick, 2001).

The vegetation within the application area consists of Beard Vegetation Associations 82 and 181, which are considered both common and widespread throughout the Pilbara region, with approximately 100% of these pre-European vegetation types remaining in both the State and the Pilbara Bioregion (GIS Database; Shepherd, 2007).

Rio Tinto (2010) conducted a flora and vegetation survey over the application area and its surrounding vegetation in February and April 2010. A total of 94 vascular plant taxa were recorded, belonging to 48 genera, representing 28 native plant families (Rio Tinto, 2010). This result is characteristic of the flora typically

encountered in the greater Paraburdoo area.

The study area contains a moderate diversity of landforms including rocky ranges, low undulating plains and minor and major watercourses (Rio Tinto, 2010). These landforms occur extensively throughout the Hamersley and Ashburton subregions, and no landforms unique to the application area were identified (Rio Tinto, 2010). The moderate landform diversity largely accounts for the relatively high number of vegetation units described from the application area (Rio Tinto, 2010).

Five introduced flora species have been identified within the application area. The presence of introduced weed species lowers the biodiversity value of the proposed clearing area. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. The risk of spreading weed species can be mitigated by imposing a condition for the purpose of weed management.

A fauna survey of the application area was not conducted, however, Rio Tinto (2010) reviewed databases held by the Department of Environment and Conservation, the Department of Environment, Heritage and the Arts, the Western Australian Museum and Rio Tinto. A total of 13 listed threatened or migratory fauna species were identified as potentially occurring within the application area, however, an assessment of each species found that habitat within the study area was largely inadequate or restricted to marginal foraging habitat (Rio Tinto, 2010).

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

**Methodology** Kendrick (2001)  
Rio Tinto (2010)  
Shepherd (2007)  
GIS Database:  
-Declared Rare and Priority Flora  
-IBRA WA (Regions - Sub Regions)  
-Pre European Vegetation

**(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**

According to available databases, there no known records of threatened fauna within the application area (GIS Database). No specific fauna surveys have been conducted within the application area, however, databases held by the Department of Environment and Conservation, the Department of Environment, Heritage and the Arts, the Western Australian Museum and Rio Tinto have been reviewed, and habitats observed during the vegetation survey were recorded (Rio Tinto, 2010).

Five fauna habitats have been identified within the application area:

- *Acacia* spp. over mixed shrubs over Spinifex (*Triodia epactia*) on rocky ranges;
- Mulga and *Acacia* shrubs over Spinifex (*Triodia epactia*) on upper and mid-slopes of rocky ranges;
- Mulga and Snakewood (*Acacia xiphophylla*) on stony plains at the base of ranges;
- Mixed *Acacia* spp. on minor flowlines intersecting stony plains; and
- River redgum (*Eucalyptus camaldensis*) over *Acacia* spp. open shrubland over *Cenchrus ciliaris* on sandy bank of Pirraburdu Creek.

The habitat's identified above have been extensively surveyed by Biota (2010) during the first stage of a two phase fauna survey of the Western Ranges area (Rio Tinto, 2010). Biota (2010) noted that based on available vegetation and land system mapping, all of the habitats present in the Western Range study area are well represented in the locality and wider region and not of elevated conservation significance.

The search of the databases carried out by Rio Tinto (2010) indicated that a number of listed threatened or migratory species may utilise the application area. An assessment of each species found that while the application area may provide suitable habitat, the loss of such habitat would be unlikely to impact the conservation status of any native fauna (Rio Tinto, 2010). The application area and surrounding vegetation does not contain 'core habitat' for any of the listed species and the vegetation proposed to be cleared is typical of vegetation and habitats in the area and region (Rio Tinto, 2010).

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

**Methodology** Biota (2010)  
Rio Tinto (2010)  
GIS Database:  
-Threatened Fauna

**(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 datasets, there are no known records of Declared rare Flora (DRF) or Priority Flora species within the application area (GIS Database). The nearest recorded location of a DRF (*Lepidium catapycnon*) is approximately 58 kilometres north, north-east of the application area (GIS Database).

A flora and vegetation survey of the application area was conducted by Rio Tinto in February and April 2010. The entire application area was searched in a grid fashion, with an approximate 25 metre space maintained between the two botanists traversing the area (Rio Tinto, 2010).

No DRF or Priority Flora species were recorded within the application area during the flora and vegetation survey (Rio Tinto, 2010).

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

**Methodology** Rio Tinto (2010)  
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**

There are no known Threatened Ecological Communities (TEC's) or Priority Ecological Communities (PEC's) within the application area (GIS Database). There are no known TEC's or PEC's within a 50 kilometre radius of the application area (GIS Database).

Rio Tinto (2010) report that no TEC's or PEC's were identified within the application area during the vegetation surveys.

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

**Methodology** Rio Tinto (2010)  
GIS Database:  
-Threatened Ecological Communities

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

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

The application area falls within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). Shepherd (2007) reports that approximately 100% of the pre-European vegetation still exists within this bioregion (see table below). The vegetation within the application area is recorded as the following Beard Vegetation Associations (Shepherd, 2007):

- Beard Vegetation Association 82: hummock grasslands, low tree steppe, snappy gum over *Triodia wiseana*;
- Beard Vegetation Association 181: shrublands; mulga and snakewood scrub.

According to Shepherd (2007) approximately 100% of these vegetation associations remain within the bioregion (see table below).

Therefore, the vegetation within the application area is not a significant remnant of native vegetation within 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                  | 17,804,188              | 17,794,647           | ~99.9        | Least Concern         | ~6.3                                       |
| Beard vegetation associations - State     |                         |                      |              |                       |  |
| 82  | 2,565,901               | 2,565,901            | ~100         | Least Concern         | ~10.2                                      |
| 181                                       | 1,697,291               | 1,697,291            | ~100         | Least Concern         | ~2.4                                       |
| Beard vegetation associations - Bioregion |                         |                      |              |                       |  |
| 82  | 2,563,583               | 2,563,583            | ~100         | Least Concern         | ~10.2                                      |
| 181                                       | 65,091                  | 65,091               | ~100         | Least Concern         | ~4.9                                       |

\* Shepherd (2007)

\*\* Department of Natural Resources and Environment (2002)

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

**Methodology** Department of Natural Resources and Environment (2002)  
Shepherd (2007)  
GIS Database  
- IBRA WA (Regions - Subregions)

**(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 datasets, there are no permanent wetlands or watercourses within the application area (GIS Database; Rio Tinto, 2010). Numerous minor ephemeral watercourses traverse the application area (GIS Database). These ephemeral watercourses are minor natural drainage channels that are widespread across the Pilbara landscape and are responsible for quickly dispersing floodwaters after significant rainfall events (ANRA, 2007).

Pirraburdu Creek, an ephemeral creekline, wraps around the application area, within approximately 30 metres at its nearest point (GIS Database). Rio Tinto (2010) has advised that clearing of native vegetation associated with Pirraburdu Creek will be minimised. Grazing by cattle and weed invasion has significantly impacted Pirraburdu Creek, and it is unlikely that the proposed clearing in close proximity to the creekline will lead to significant decline in the condition of the riparian vegetation associated with Pirraburdu Creek (Rio Tinto, 2010).

Based on the above, the proposed clearing is at variance to this Principle. The risk of further degrading riparian vegetation can be minimised by the implementation of a Vegetation Management - Watercourse condition.

**Methodology** ANRA (2007)  
Rio Tinto (2010)  
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 mapped as occurring within the Ethel, Newman and River Land Systems (GIS Database).

The Ethel Land System is described as highly dissected plains and slopes with sparse mulga shrublands, geologically consisting of partly consolidated and cemented tertiary colluvium (Payne et al., 1988). The Ethel Land System is comprised of five landform units: Low Hills and Stony Rises; Raised Cobble Plains; Saline Plains; Drainage Floors; and Braided Channels (Payne et al., 1988). Analysis of aerial photography indicates the application area is most likely to occur within the landform units: Low hills and stony rises; and Drainage floors. The soils are likely to have high resistance to erosion due to the stony nature of the surface materials.

The Newman Land System consists of rugged jaspilite plateaux, ridges and mountains with hard spinifex which typify much of the Pilbara (GIS Database; Rio Tinto, 2010). The Newman Land System is comprised of four

landform units: Plateaux, ridges, mountains and hills; Lower slopes; Stony plains; and Narrow drainage floors with channels (Payne et al., 1998). Analysis of aerial photography indicates the application area is most likely to occur within the landform units: Plateaux, ridges, mountains and hills; and Narrow drainage floors with channels (Payne et al., 1988). The Newman Land System has stony surface materials which are likely to show high resistance to erosion (Payne et al., 1988). The proposed clearing may expose surface mantles which may cause an increase in surface water runoff, however, given the stony nature of the surface materials, water and/or wind erosion is unlikely to occur.

The River land system is described by Payne et al. (1988) as consisting of active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands. This system is largely stabilised by spinifex and accelerated erosion is uncommon, however, susceptibility to erosion is high or very high if vegetative cover is removed (Payne et al., 1988). The River Land System is primarily located around the northern section of the application area (GIS Database). Analysis of aerial photography indicates the application area is most likely to occur within the landform unit: Stony Plains. Aerial imagery indicates that this section of the proposal has been highly modified and the vegetation quite sparse (GIS Database).

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

**Methodology** Payne et al. (1998)  
Rio Tinto (2010)  
GIS Database:  
-Rangelands 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 any conservation areas (GIS Database). The nearest Department of Environment and Conservation managed land is Karijini National Park located approximately 45 kilometres east of the application area (GIS Database).

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 application area is located in a semi-desert-tropical region, within the Ashburton River catchment. The Paraburdoo area has an average annual rainfall of approximately 283.8 millimetres (BoM, 2010) falling mainly during the summer months, although rainfall may vary widely from year to year (ANRA, 2007). With an average annual pan evaporation rate of 3200-4000 millimetres, the presence of surface water resulting from significant rain events is relatively short lived (Eberhard et al., 2004).

There are no permanent watercourses or wetlands within the application area (GIS Database; Rio Tinto, 2010). Numerous minor watercourses traverse the application area (GIS Database). None of these watercourses are perennial.

It is likely that existing surface water quality within the minor drainage lines traversing the site have been affected by previous clearing activities within the Paraburdoo mine site. It is unlikely that the proposed clearing activity will significantly increase runoff or sediment transport to the watercourses present within and surrounding the application area (GIS Database; Rio Tinto, 2010).

The proposed clearing occurs within the Hamersley Groundwater Province (GIS Database). Groundwater resources in the area are primarily recharged via streams such as Pirraburdu and Seven Mile Creek. Given the size of the application area (82.1 hectares) in relation to the size of the Hamersley Groundwater Province (10,166,832 hectares), the proposed clearing is unlikely to have a significant impact on groundwater levels or quality (GIS Database; Rio Tinto, 2010).

The application area is not located within a Public Drinking Water Source Area (GIS Database).

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

**Methodology** ANRA (2007)  
BoM (2010)  
Eberhard et al. (2004)  
Rio Tinto (2010)  
GIS database:

- Groundwater Provinces
- 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 is located in a semi-arid region where the average annual evaporation rate greatly exceeds the average annual rainfall (ANRA, 2007). Natural local flooding occurs seasonally in the Pilbara region as a result of cyclonic activity and sporadic thunderstorm activity (Rio Tinto, 2010).

The application area is located within the Ashburton River Catchment area (GIS Database). The area to be cleared (82.1 hectares) in relation to the size of the Ashburton River Catchment area (7,877,743 hectares) is not likely to lead to an increase in flood height or duration (GIS Database).

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

- Methodology**
- ANRA (2007)
  - Rio Tinto (2010)
  - GIS Database:
    - Hydrographic Catchments - Catchments
    - Hydrography, Linear

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

**Comments**

There are two native title claims over the area under application; (WC97/043) and (WC98/069) (GIS Database). These claims have been registered with the National Native Title Tribunal on behalf of the claimant group. However, the tenement has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore the granting of a permit is not a future act under the *Native Title Act 1993*.

According to available databases there are numerous known 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.

The clearing permit application was advertised on 2 August 2010 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received during the public comment period.

- Methodology**
- GIS Database:
    - Aboriginal Sites of Significance
    - Native Title Claims

**4. Assessor's comments**

**Comment**

The application has been assessed against the clearing principles, planning instruments and other matters in accordance with s.51O of the *Environmental Protection Act 1986*, and the proposed clearing is at variance to Principle (f), is not likely to be at variance to Principles (a), (b), (c), (d), (g), (h), (i), and (j) and is not at variance to Principle (e).

**5. References**

- ANRA (2007) Australian Natural Resources Atlas: Rangelands overview; Pilbara. Available online from: <http://www.anra.gov.au/tropics/rangelands/overview/wa/ibra-pil.html> Last accessed 14 September, 2010.
- Biota Environmental Sciences (2010) Western Range Phase I Fauna Survey. Unpublished report to Rio Tinto Iron Ore, January, 2010.
- BoM (2010) Bureau of Meteorology. Climate Statistics for Australian Locations - Paraburdoo. Available online from: [http://www.bom.gov.au/climate/averages/tables/cw\\_007178.shtml](http://www.bom.gov.au/climate/averages/tables/cw_007178.shtml) Last accessed 14 September, 2010.
- 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.
- Eberhard, S.M., Halse, S.A., Scanlon, M.D., Cocking, J.S., and Barron H.J. (2004) Assessment and conservation of aquatic life in the subsurface of the Pilbara region, Western Australia. Available online from: [http://www.subterraneanecology.com.au/file%20downloads/Pascalis\\_proceedings\\_CALM.pdf](http://www.subterraneanecology.com.au/file%20downloads/Pascalis_proceedings_CALM.pdf) Last accessed 14

September, 2010.

- Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Kendrick, P. (2001) Pilbara 3 (PIL3 - Hamersley subregion). In a Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management, pp 568-580.
- Payne, A.L., Mitchell, A.A., and Holman, W.F. (1988) Technical Bulletin No. 62; An inventory and condition survey of rangelands in the Ashburton River catchment, Western Australia. Department of Agriculture, Western Australia.
- Rio Tinto (2010) *Flora and Vegetation of the proposed 11W & 11W1 Pit Extensions and 11W Waste Dump Extension, Paraburdoo*. Native Vegetation Clearing Permit Supporting Report prepared by Rio Tinto Botanists, June 2010.
- 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.

## 6. Glossary

### Acronyms:

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

### Definitions:

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

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



**X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

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

**Schedule 1** **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.

**Schedule 2** **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.

**Schedule 3** **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.

**Schedule 4** **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

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

**P1** **Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

**P2** **Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

**P3** **Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

**P4** **Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.

**P5** **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

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

**EX** **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.

**EX(W)** **Extinct in the wild:** A native species which:  
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or  
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

**CR** **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

**EN** **Endangered:** A native species which:  
(a) is not critically endangered; and  
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

**VU** **Vulnerable:** A native species which:  
(a) is not critically endangered or endangered; and  
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

**CD** **Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.