



# Clearing Permit Decision Report

## 1. Application details

### 1.1. Permit application details

Permit application No.: 4473/1  
Permit type: Purpose Permit

### 1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

### 1.3. Property details

Property: Section 91 Licence LIC\_005-2011\_A870394 under the *Land Administration Act 1997*;  
*Iron Ore (Mount Goldsworthy) Agreement Act 1964*  
Miscellaneous Licence 45/190  
Miscellaneous Licence 45/194  
Local Government Area: Town of Port Hedland  
Colloquial name: Western Spur Geotechnical Investigations

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
120		Mechanical Removal	Geotechnical Investigations

### 1.5. Decision on application

Decision on Permit Application: Grant  
Decision Date: 25 August 2011

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

**Vegetation Description** Beard vegetation associations have been mapped for the whole of Western Australia and are useful to look at vegetation in a regional context. The following Beard vegetation associations have been mapped within the application area (GIS Database):

93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

589: Mosaic: Short bunch grassland - savanna/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft spinifex; and

647: Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* over soft spinifex.

A flora and vegetation survey of the application area was conducted by botanists from ENV Australia in October 2007 and May 2008. The following twenty-two vegetation units were recorded within the application area (ENV Australia, 2009a):

**1. Billabong** - Scattered low *Eucalyptus victrix* trees over scattered mixed grasses;

**2. Drainage B** - A low open *Eucalyptus victrix* woodland over a high open *Acacia ampliceps* shrubland over a low open *Acacia stellaticeps* and *Pluchea ferdinandi-muelleri* shrubland over a closed *Triodia epactia* and *Triodia secunda* hummock grassland over an open *Eriachne obtusa*, *Aristida holathera* var. *latifolia* and *\*Cenchrus ciliaris* tussock grassland;

**3. Grassland B** - *Triodia epactia* hummock grassland;

**4. Low Hill** - An *Acacia tumida* var. *pilbarensis* shrubland over a low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland;

**5. Major Drainage Line A** - Scattered low *Eucalyptus victrix* trees over a high open *Meleleuca argentea*, *Acacia ampliceps* and *Acacia trachycarpa* shrubland over scattered *Andriana urticoides* var. *urticoides* and *Pluchea ferdinandi-muelleri* shrubs over a open *Triodia epactia* hummock grassland;

**6. Major Drainage Line B** - A low open *Eucalyptus victrix* woodland over an *Acacia tumida* var. *pilbarensis* and *Acacia colei* var. *colei* shrubland over a very open *Triodia epactia* hummock grassland;

**7. Quartz Outcrop** - Small low calcrete hills/rock piles with scattered shrubs over scattered herbs;

**8. Rockpile** - Scattered low *Ficus brachypoda*, *Clerodendrum tomentosum* var. *lanceolatum* and *Carissa lanceolata* trees over scattered herbs;

- 9. Sandplain B** - An open *Acacia coleii* var. *coleii* shrublands over low *Acacia stellaticeps* shrublands over *Triodia epactia* and *Triodia secunda* hummock grasslands/low *Acacia stellaticeps* shrublands over *Triodia epactia* and *Triodia secunda* hummock grasslands mosaic;
- 10. Sandplain C** - A low open *Corymbia flavescens* woodland over an open *Acacia coleii* var. *coleii* shrubland over a low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland / low *Acacia stellaticeps* shrublands over *Triodia epactia* and *Triodia secunda* hummock grasslands/ *Triodia epactia* and *Triodia secunda* hummock grasslands mosaic;
- 11. Sandplain E** - A low open *Corymbia flavescens* and *Eucalyptus victrix* woodland over an *Acacia coleii* var. *coleii* and *Acacia sericophylla* shrubland over a low open *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland;
- 12. Sandplain F** - An open *Acacia tumida* var. *pilbarensis* and *Acacia coleii* var. *coleii* shrubland over an open *Triodia epactia* hummock grassland;
- 13. Sandplain G** - A low open *Corymbia flavescens* woodland over an *Acacia coleii* var. *coleii*, *Carissa lanceolata* and *Acacia sericophylla* shrubland over a *Triodia epactia* hummock grassland over a very open \**Cenchrus ciliaris*, *Chrysopogon fallax* and *Eriachne obtusa* tussock grassland;
- 14. Sandplain H** - An *Acacia tumida* var. *pilbarensis* and *Acacia coleii* var. *coleii* shrubland over a low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland/ low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland mosaic;
- 15. Sandplain I** - An *Acacia tumida* var. *pilbarensis* shrubland over a low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland / low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland / *Triodia epactia* hummock grassland mosaic;
- 16. Sandplain J** - Scattered low *Corymbia flavescens* trees over an open *Acacia tumida* var. *pilbarensis* shrubland over a low open *Acacia stellaticeps* shrubland over a *Triodia epactia* and *Triodia secunda* hummock grassland / *Triodia secunda* and *Triodia epactia* hummock grassland mosaic;
- 17. Sandplain K** - Scattered low *Owenia reticulata* trees over an *Acacia tumida* var. *pilbarensis* and *Acacia coleii* var. *coleii* shrubland over a low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland / low *Acacia stellaticeps* shrubland over a *Triodia epactia* hummock grassland mosaic;
- 18. Sandplain L** - A low open *Corymbia zygophylla* woodland over an open *Acacia coleii* var. *coleii*, *Acacia inaequilatera* and *Acacia ancistrocarpa* shrubland over a low *Acacia sericophylla*, *Acacia stellaticeps*, *Senna artemisioides* aff. Subsp. *oligophylla* (thinly sericeous) and *Dodonaea coriacea* shrubland over a very open *Triodia lanigera* and *Triodia epactia* hummock grassland;
- 19. Sandplain N** - A low open *Corymbia zygophylla* woodland over an open *Acacia ancistrocarpa*, *Acacia inaequilatera*, *Acacia tumida* var. *pilbarensis*, and *Acacia sericophylla* shrubland over *Acacia stellaticeps* low open shrubland over *Triodia epactia* and *Triodia lanigera* hummock grassland;
- 20. Sandplain O** - Scattered low *Eucalyptus victrix*, *Corymbia hamersleyana* trees over an open *Acacia ancistrocarpa*, *Acacia tumida* var. *pilbarensis*, *Acacia inaequilatera* and *Acacia trudgeniana* shrubland over a low open *Acacia stellaticeps* shrubland over a *Triodia epactia* and *Triodia lanigera* hummock grassland;
- 21. Sandplain P** - A low *Eucalyptus victrix*, *Corymbia hamersleyana* and *Corymbia flavescens* woodland over an open *Acacia coleii* var. *coleii* shrubland over a low open *Acacia stellaticeps* and *Pluchea tetranthera* shrubland over a *Triodia epactia* hummock grassland; and
- 22. Sandplain Q** - Scattered low *Corymbia flavescens* trees over an open *Acacia ancistrocarpa* and *Acacia bivenosa* shrubland over scattered low *Acacia stellaticeps* shrubs over a *Triodia epactia* and *Triodia lanigera* hummock grassland.

<b>Clearing Description</b>	BHP Billiton Iron Ore Pty Ltd (BHP Billiton) has applied to clear up to 120 hectares of native vegetation within an application area of approximately 5,482 hectares (GIS Database). The application area is located approximately 10 kilometres south-west of Port Hedland at its closest point (GIS Database).  The proposed clearing is for the purpose of geotechnical investigations. Clearing will be by mechanical means.
<b>Vegetation Condition</b>	Pristine: No obvious signs of disturbance (Keighery, 1994);  to  Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).
<b>Comment</b>	The vegetation condition was assessed by botanists from ENV Australia. The vegetation condition was described using a scale based on Trudgen (1988) and has been converted to the corresponding condition from the Keighery (1994) scale.

### 3. Assessment of application against clearing principles

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

<b>Comments</b>	<b>Proposal is not likely to be at variance to this Principle</b> A flora and vegetation survey of the Port Hedland outer harbour development identified 22 vegetation
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communities within the application area (ENV Australia, 2009a). None of these communities have been identified as a Threatened or Priority Ecological Community and there are no records of either within the application area (ENV Australia, 2009a; GIS Database).

A total of 394 flora taxa were recorded from the greater Port Hedland outer harbour flora survey (ENV Australia, 2009a). A number of flora surveys have been undertaken in the surrounding area, however, none of these have been undertaken over a similarly large area or cover the same habitats (ENV Australia, 2009a). Given this, it is difficult to gauge the level of floral diversity recorded from the survey area.

The Priority flora species *Heliotropium muticum* (Priority 1), *Tephrosia rosea* var. *venulosa* (Priority 1) and *Goodenia nuda* (Priority 4) have been recorded within the application area (ENV Australia, 2009a). *Goodenia nuda* was recorded from one location within the application area (BHP Billiton, 2011). This species has been recorded throughout the Pilbara bioregion (Western Australian Herbarium, 2011), and the removal of one population is not likely to significantly impact this species. *Tephrosia rosea* var. *venulosa* was also recorded from one location within the application area (ENV Australia, 2009a). There was one individual recorded from this location. The Western Australian Herbarium (2011) has 15 records of this species. ENV Australia has undertaken a further targeted regional survey for this species which recorded 42 additional locations (BHP Billiton, 2011). The potential removal of one individual is not expected to have a significant impact on this species. *Heliotropium muticum* was recorded within the application area at two locations (BHP Billiton, 2011). This species is known from seven records all within 100 kilometres of Port Hedland (Western Australian Herbarium, 2011). As there are only seven records, the local population is considered highly conservation significant (Maia Environmental Consultancy, 2010). However, recent flora surveys on the Abydos Plain have recorded this species suggesting that it may be more common than the current records suggest (Maia Environmental Consultancy, 2010). Potential impacts to this species may be mitigated by the implementation of a flora management condition.

A Level 2 fauna survey of the greater Port Hedland outer harbour development recorded a total of 25 mammal, 53 reptile, six amphibian and 115 bird species (ENV Australia, 2009b). No species of conservation significant fauna were recorded within the application area (BHP Billiton, 2011). The large majority of the habitat present is common throughout the local area and is not expected to contain a higher level of faunal diversity than surrounding habitats that have a greater array of micro habitats.

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

**Methodology** BHP Billiton (2011)  
ENV Australia (2009a)  
ENV Australia (2009b)  
Maia Environmental Consultancy (2010)  
Western Australian Herbarium (2011)  
GIS Database:  
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**  
ENV Australia has conducted a multi seasonal Level 2 fauna survey that included the application area during October/November 2007 and May 2008. This survey identified two fauna habitat types within the application area. These were the Riverine habitat and the Sandplain habitat (ENV Australia, 2009b). The Riverine habitat is characterised by thick vegetation dominated by *Eucalyptus* species, and is considered to have a high habitat value due to it providing an abundance of micro habitats and its ability to provide an ecological linkage (ENV Australia, 2009b). The Sandplain habitat is characterised by thick vegetation dominated by *Acacia* species and was considered to have low conservation significance due to it being widespread in the Port Hedland area (ENV Australia, 2009b). The Riverine and Sandplain habitats are associated with the River and Uaroo land systems respectively (ENV Australia, 2009b). The large majority of the application area is comprised of the Uaroo land system with less than three percent (approximately 130 hectares) being comprised of the River land system (GIS Database). Whilst the Riverine habitat has been described as being associated with the River land system, none of the areas mapped as the River land system have been mapped by ENV Australia (2009b) as containing the Riverine habitat. The areas mapped as Riverine habitat appear to be associated with areas mapped as vegetation units Major Drainage Line A and B and Drainage B that are associated with South West Creek (ENV Australia, 2009a; 2009b). These areas comprise an even smaller proportion of the application area than that of the River land system. BHP Billiton plans to implement a 50 metre buffer to all drainage lines where possible (BHP Billiton, 2011).

The survey did not record any conservation significant fauna species within the application area, however, it did record a number of conservation significant species nearby and identify others that may potentially be found within the application area (BHP Billiton, 2011). Whilst there may be some conservation significant fauna within the application area, most are likely to only use it for foraging, or given the species transient nature are not likely to rely solely on the application area for habitat. Given that the application area is almost entirely comprised of the Sandplain habitat which is well represented throughout the local area, the proposed clearing is not expected to significantly impact local fauna species.

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

**Methodology** BHP Billiton (2011)  
ENV Australia (2009a)  
ENV Australia (2009b)  
GIS Database:  
- Rangeland Land System Mapping

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

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

According to available databases, there are no records of any Declared Rare Flora (DRF) within the application area (GIS Database). A flora survey of the application area was conducted by ENV Australia in October 2007 and May 2008. This flora survey did not record any DRF (ENV Australia, 2009a).

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

**Methodology** ENV Australia (2009a)  
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 no records of any Threatened Ecological Communities (TECs) within the application area (GIS Database). A vegetation survey was conducted by ENV Australia in October 2007 and May 2008. This survey did not identify any vegetation communities as being a TEC (ENV Australia, 2009a).

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

**Methodology** ENV Australia (2009a)  
GIS Database:  
- Threatened Ecological Sites Buffered

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

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

The application area falls within the Pilbara Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 99.9% of the pre-European vegetation remains (see table) (GIS Database, Shepherd, 2009).

The vegetation of the application area has been mapped as the following Beard vegetation associations (GIS Database):

93: Hummock grasslands, shrub steppe; kanji over soft spinifex;  
589: Mosaic: Short bunch grassland - savanna/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft spinifex; and  
647: Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* over soft spinifex.

According to Shepherd (2009) approximately 100% of these Beard vegetation associations remains at both a state and bioregional level. Therefore the area proposed to be cleared does not represent 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	17,804,193	17,785,000	~99.9	Least Concern	6.3
Beard veg assoc. – State					
93	3,044,308	3,044,249	~100	Least Concern	0.4
589	809,754	809,637	~100	Least Concern	1.6
647	196,372	196,372	~100	Least Concern	
Beard veg assoc. – Bioregion					
93	3,042,113	3,042,064	~100	Least Concern	0.4
589	730,718	730,683	~100	Least Concern	1.8
647	196,371	196,371	~100	Least Concern	

\* 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 is at variance to this Principle**

The ephemeral watercourse South West Creek passes through the application area in two locations (GIS Database). There were three vegetation communities associated with South West Creek (ENV Australia, 2009a):

- Major Drainage Line A;
- Major Drainage Line B; and
- Drainage B.

South West Creek flows for over 50 kilometres and eventually empties into the harbour at Port Hedland (GIS Database). Vegetation units Major Drainage Line A and Drainage B that are associated with South West Creek at the north of the application area have already been disturbed by an existing road (GIS Database). Only a relatively small amount (approximately five hectares) of these vegetation units are located within the application area. Impacts on these vegetations units are expected to be minimal. Vegetation unit Major Drainage Line B is associated with South West Creek in the west of the application area (ENV, 2009a). BHP Billiton plans to implement a 50 metre buffer to all drainage lines where possible (BHP Billiton, 2011).

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

**Methodology** BHP Billiton (2011)  
ENV Australia (2009a)  
GIS Database:  
- Hydrography, linear  
- Port Hedland 50cm Orthomosaic - Landgate 2004  
- 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**

The application area has been mapped as occurring on the Uaroo and River land systems (GIS Database). Over 99% of the application area is comprised of the Uaroo land system. There is occasionally some erosion evident on drainage tracts within this land system, however, it is generally not susceptible to erosion or significant vegetation degradation (Van Vreeswyk et al., 2004). The River land system has a high to very high risk of erosion if vegetation cover is removed (Van Vreeswyk et al., 2004). As this land system only forms a

minor part of the application area, there is not expected to be large amounts of disturbance to the River land system. The potential impacts from erosion may be minimised by the successful implementation of a rehabilitation condition.

At a broad scale the surface soil pH of the application area ranges from 5.5 to 6.5 (CSIRO, 2009). The majority of the application area has no known occurrence of acid sulphate soils, however, there is a minor part that has a low probability and an even smaller part that has a high probability of acid sulphate soils occurring (CSIRO, 2009). As the proposed clearing activities are only disturbing the upper surface of the soil, the proposed clearing is not expected to cause the formation of acid sulphate soils. The average annual evaporation rate is over ten times the annual average rainfall so there is a low probability of the proposed clearing causing increased groundwater recharge resulting in rising saline water tables (BoM, 2011; GIS Database).

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

**Methodology** BoM (2011)  
CSIRO (2009)  
Van Vreeswyk et al. (2004)  
GIS Database:  
- Evaporation Isopleths  
- 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 does not lie within any conservation areas or DEC managed lands (GIS Database). The nearest conservation area is Mungaroona Range Nature Reserve located approximately 90 kilometres south-west of the application area (GIS Database). Given the distance between the application area and the Nature Reserve, the proposed clearing is not likely to impact the environmental values of any conservation area.

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

**Methodology** GIS Database:  
- DEC Tenure

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

**Comments** **Proposal is not likely to be at variance to this Principle**  
The application area is partly located within the Turner River Water Reserve (GIS Database). This Public Drinking Water Source Area (PDWSA) is currently designated as 'policy use not assigned' (Department of Water, 2011). Advice from the Department of Water (2011) indicates that this potential source is not likely to be viable as public drinking water supply option and will be de-proclaimed in the near future. Despite this the Department of Water (2011) recommends that the following measures are implemented in order to protect the Turner River from degradation:

- All clearing activities should adhere to established codes of practice. Best management practices should be followed;
- Disturbance to riparian vegetation should be managed to maintain foreshore stability and protect riparian habitats; and
- There should be no significant alteration of the natural hydrological regime and geomorphology of the river and its catchment.

The proposed clearing has not been identified as occurring within riparian vegetation of the Turner River and over a third of the application area is not located within the Turner River PDWSA (ENV Australia, 2009b; GIS Database).

The groundwater within the application area is between 500 – 1,000 milligrams per litre of Total Dissolved Solids (TDS) (GIS Database). This is considered to be brackish water. Advice from the Department of Water (2011) indicates that the proposed clearing is not likely to have a significant impact on the quality or quantity of groundwater, provided activities are carried out in accordance with Department of Water advice.

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

**Methodology** Department of Water (2011)  
ENV Australia (2009b)  
GIS Database:  
- Groundwater Salinity, Statewide  
- Public Drinking Water Source Areas (PDWSAs)

**(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**

With an average annual rainfall of 314 millimetres and an average annual evaporation rate of 3,400 millimetres there is likely to be little surface flow during normal seasonal rains (BoM, 2011; GIS Database). Whilst large rainfall events may result in the flooding of the area, the proposed clearing is not likely to lead to an increase in incidence or intensity of flooding.

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

**Methodology** BoM (2011)  
GIS Database:  
- Evaporation Isopleths

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

**Comments**

There is one native title claim over the area under application (GIS Database). This claim (WC99/3) has been registered with the National Native Title Tribunal on behalf of the claimant group (GIS Database). 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*.

According to available databases, there is no registered Aboriginal Site 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 25 July 2011 by the Department of Mines and Petroleum inviting submissions from the public. There were no submissions received.

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

#### **4. References**

- BHP Billiton (2011) Supporting documentation for a clearing permit application, dated June 2011.
- BoM (2011) BOM Website - Climate statistics for Australian locations, Averages for Port Hedland Airport. Available online at: [http://www.bom.gov.au/climate/averages/tables/cw\\_004032.shtml](http://www.bom.gov.au/climate/averages/tables/cw_004032.shtml) Accessed on 17 August 2010.
- CSIRO (2009) Australian Soil Resource Information System. Available online at: [http://www.asris.csiro.au/index\\_ie.html](http://www.asris.csiro.au/index_ie.html) Accessed on 18 August 2011.
- 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 Water (2011) Advice to assessing officer for clearing permit application CPS 4473/1. Received on 17 August 2011.
- ENV Australia (2009a) Outer Harbour Development Flora and Vegetation Assessment. Unpublished report for BHP Billiton, dated October 2009.
- ENV Australia (2009b) Outer Harbour Development Fauna Assessment. Unpublished report for BHP Billiton, dated October 2009.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Maia Environmental Consultancy (2010) BHPBIO Mooka Siding, Level One Flora and Vegetation Assessment. Unpublished report for BHP Billiton Iron Ore Pty Ltd, December 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.
- Trudgen M.E. (1988) A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Van Vreeswyk, A.M.E., Payne, A.L., Hennig, P., and Leighton, K.A. (2004) An Inventory and Condition Survey of the Pilbara Region, Western Australia, Department of Agriculture, Western Australia.
- Western Australian Herbarium (2011) Florabase - The Western Australian Flora. Department of Environment and Conservation. Available online at <http://florabase.dec.wa.gov.au/> Accessed on 17 August 2011.

## 5. Glossary

### Acronyms:

<b>BoM</b>	Bureau of Meteorology, Australian Government
<b>CALM</b>	Department of Conservation and Land Management (now DEC), Western Australia
<b>DAFWA</b>	Department of Agriculture and Food, Western Australia
<b>DEC</b>	Department of Environment and Conservation, Western Australia
<b>DEH</b>	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
<b>DEP</b>	Department of Environment Protection (now DEC), 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 (now DEC), Western Australia
<b>DoIR</b>	Department of Industry and Resources (now DMP), Western Australia
<b>DOLA</b>	Department of Land Administration, Western Australia
<b>DoW</b>	Department of Water
<b>EP Act</b>	Environmental 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>ha</b>	Hectare (10,000 square metres)
<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 Act</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>TEC</b>	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*} :-

<b>P1</b>	<b>Priority One - Poorly Known taxa:</b> 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.
<b>P2</b>	<b>Priority Two - Poorly Known taxa:</b> 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.
<b>P3</b>	<b>Priority Three - Poorly Known taxa:</b> 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.
<b>P4</b>	<b>Priority Four – Rare taxa:</b> 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.
<b>R</b>	<b>Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):</b> 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.
<b>X</b>	<b>Declared Rare Flora - Presumed Extinct taxa:</b> 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] :-

<b>Schedule 1</b>	<b>Schedule 1 – Fauna that is rare or likely to become extinct:</b> being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
<b>Schedule 2</b>	<b>Schedule 2 – Fauna that is presumed to be extinct:</b> being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
<b>Schedule 3</b>	<b>Schedule 3 – Birds protected under an international agreement:</b> 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.
<b>Schedule 4</b>	<b>Schedule 4 – Other specially protected fauna:</b> 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.