



# Clearing Permit Decision Report

## 1. Application details

### 1.1. Permit application details

Permit application No.: 6683/1  
Permit type: Purpose Permit

### 1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

### 1.3. Property details

Property: Miscellaneous Licence 45/135  
Miscellaneous Licence 45/136  
Local Government Area: Shire of East Pilbara  
Colloquial name: Turner River Project

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
30		Mechanical Removal	Access Tracks, Hydrogeological and Geotechnical Investigations and Associated Works

### 1.5. Decision on application

Decision on Permit Application: Grant  
Decision Date: 17 September 2015

## 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. Two Beard vegetation associations have been mapped within the application area (GIS Database):

**Beard vegetation association 93:** Hummock grasslands, shrub steppe; kanji over soft spinifex; and  
**Beard vegetation association 619:** Medium woodland; river gum (*Eucalyptus camaldulensis*).

Numerous vegetation surveys have been undertaken over the application area and its surrounds since 2004. Onshore Environmental (2014a) has consolidated these vegetation surveys into one report, and has identified a total of four broad floristic communities with six vegetation associations being present within the application area:

#### **Melaleuca High Open Forest**

MA MaEcEv MgAcpAtr Cv: High Open Forest of *Melaleuca argentea*, *Eucalyptus camaldulensis* var. *refulgens* and *Eucalyptus victrix* over High Open Shrubland of *Melaleuca glomerata*, *Acacia coriacea* subsp. *pendens* and *Acacia trachycarpa* over Very Open Sedges of *Cyperus vaginatus* on alluvial gravelly soils on major drainage channels with seasonal pools.

#### **Mosaic: Triodia Hummock Grassland**

HS Mosaic low granite hills: Mosaic: Hummock Grassland of *Triodia epactia*, *Triodia basedowii* and *Triodia wiseana* with High Shrubland of *Acacia orthocarpa* and *Acacia inaequilatera* in brown loamy sand on low undulating granite hills; High Open Shrubland of *Acacia tumida* var. *pilbarensis* with Scattered Low Trees of *Terminalia canescens* and *Ficus brachypoda* over Very Open Hummock Grassland of *Triodia epactia* over Very Open Tussock Grassland of *Triopogon loliiformis*, *Aristida contorta* and *Sporobolus australasicus* on skeletal brown sandy loam on granite plateau / sheet outcrops.

#### **Triodia Hummock Grassland**

FP TsTlAbAsPfm: Hummock Grassland of *Triodia secunda* and *Triodia longiceps* with Low Open Shrubland of *Acacia bivenosa*, *Acacia stellaticeps* and *Pluchea ferdinandi-muelleri* on orange sandy clay loam on stony floodplains.

HS TbTeTw AtpGw AanAbAac: Hummock Grassland of *Triodia basedowii*, *Triodia epactia* and *Triodia wiseana* over High Open Shrubland of *Acacia tumida* subsp. *pilbarensis* and *Grevillea wickhamii* over Low Open Shrubland of *Acacia ancistrocarpa*, *Acacia bivenosa* and *Acacia acradenia* on red brown silty/sandy loam on undulating low hills and stony plains.

HS TeTbTw AorAi: Hummock Grassland of *Triodia epactia*, *Triodia basedowii* and *Triodia wiseana* with High Open Shrubland of *Acacia orthocarpa* and *Acacia inaequilatera* on brown loamy sand on low undulating granite hills.

#### **Triodia Open Hummock Grassland**

GR Te AdTmaCci PclCc: Open Hummock Grassland of *Triodia epactia* with Open Shrubland of *Abutilon* sp. *Dioicum*, *Triumfetta maconochieana* and *Cajanus cinereus* over Very Open Tussock Grassland of *Paspadium*

*clementii* and \**Cenchrus ciliaris* on skeletal brown loamy sand on granite rockpiles.

<b>Clearing Description</b>	Turner River Project BHP Billiton Iron Ore Pty Ltd proposes to clear up to 10 hectares of native vegetation within a total boundary area of approximately 121.49 hectares for the purposes of access tracks, hydrogeological and geotechnical investigations and associated works. The proposal is located approximately 114 kilometres south of Port Hedland in the Shire of East Pilbara.
<b>Vegetation Condition</b>	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994);  To  Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).
<b>Comment</b>	The vegetation condition was assessed by botanists from Onshore Environmental (2014a).

### 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>	<p><b>Proposal is not likely to be at variance to this Principle</b></p> <p>The application area occurs within the Chichester subregion of the Pilbara Interim Biogeographic Regionalisation of Australia bioregion (GIS Database). This subregion comprises of the northern section of the Pilbara Craton. Plains support a shrub steppe characterised by <i>Acacia inaequilatera</i> over <i>Triodia wiseana</i> (formerly <i>Triodia pungens</i>) hummock grasslands, while <i>Eucalyptus leucophloia</i> tree steppes occur on ranges (CALM, 2002).</p> <p>Numerous vegetation surveys have been undertaken over the application area and its surrounds since 2004. Onshore Environmental (2014a) has consolidated these vegetation surveys into one report and identified six vegetation communities within the application area, with the condition of these vegetation types being 'excellent to 'completely degraded' (Keighery, 1994). A search of the Department of Parks and Wildlife Declared Rare and Priority Flora databases revealed that no Threatened and two Priority flora species as potentially occurring within a 10 kilometre radius of the application area (DPaW, 2015). Onshore Environmental (2014a; 2014b) identified no Threatened or Priority flora species within the application area. The native vegetation within the Application Area is not considered to have a higher genetic diversity than the native vegetation within the surrounding area (BHP Billiton, 2015).</p> <p>There are no known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) mapped within the application area (GIS Database). During a flora and vegetation survey, no TECs or PECs were recorded within the application area (Onshore Environmental, 2014a). The nearest Threatened or Priority Ecological Community is the Freshwater Claypans of the Fortescue Valley (PEC 1), which is located approximately 108 kilometres to the south-west of the application area (GIS Database).</p> <p>Two non-endemic species were identified during the flora surveys (BHP Billiton, 2015), these being: Buffel Grass (<i>Cenchrus ciliaris</i>) and Kapok Bush (<i>Aerva javanica</i>). Neither of these species is declared plants under the <i>Biosecurity and Agriculture Management Act 2007</i>. Weeds have the potential to significantly change the dynamics of a natural ecosystem and lower the biodiversity of an area. Potential impacts to the biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.</p> <p>There were six faunal habitat types recorded within the application by Biologic (2014), with these being well represented within the regional area (Biologic, 2014; GIS Database). Whilst a number of fauna species indigenous to Western Australia are expected to use habitat within the application area, this is not considered significant habitat (BHP Billiton, 2015). It has been noted that there is the potential for the Northern Quoll to utilise the Major Drainage Line habitat, however no probable den sites were identified within the application area (BHP Billiton, 2015). BHP Billiton (2015) have advised that disturbance within the Major Drainage Line habitat will be minimised. Potential impacts to the Major Drainage Line habitat may be minimised by the implementation of a fauna management condition.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this Principle.</p>
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<b>Methodology</b>	BHP Billiton (2015) Biologic (2014) CALM (2002) DPaW (2015) Keighery (1994) Onshore Environmental (2014a) Onshore Environmental (2014b) GIS Database: - IBRA WA (Regions - Sub Regions) - Threatened and Priority Flora - Threatened Ecological Sites Buffered
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**(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.**

**Comments Proposal may be at variance to this Principle**

Biologic (2014) undertook a project to consolidate all fauna mapping undertaken on BHP Billiton Iron Ore tenure. Based on the Biologic (2014) report, the following six fauna habitat types occur within the application area:

1. **Crest/Slope:** These fauna habitats tend to be more open and structurally simple due to their recent depositional history than other fauna habitats, and are dominated by varying species of spinifex. A common feature of these habitats is a rocky substrate, often with exposed bedrock, and skeletal red soils. These are usually dominated by *Eucalyptus woodlands*, *Acacia* and *Grevillea* scrublands and *Triodia* spp. low hummock grasslands.
2. **Granite Domes:** This habitat occurs where the surrounding material has eroded, exposing large domes and boulders. Boulder piles and exfoliating rock on the granite domes provide excellent crevices and cracks for fauna to inhabit. Vegetation is sparse through these areas due to the lack of soil availability. They are almost always surrounded by sand plains.
3. **Major Drainage Line:** Major Drainage Lines comprise mature River Red Gums, Coolibahs and stands of Silver Cadjeput over river pools. Open, sandy or gravelly riverbeds characterise this habitat type. In ungrazed areas, the vegetation adjacent to the main channel or channels is denser, taller and more diverse than adjacent terrain and can include reedbeds around pools.
4. **Sand Plain:** Sand Plain habitat is characterised by relatively deep sandy soils supporting dense spinifex grasslands and sparse shrubs. This habitat transitions into patches of Mulga in places. This habitat often occurs as terraces along Major Drainage Lines.
5. **Sandy / Stony Plain:** These are predominantly stony plains with localised depositions of sand.
6. **Stony Plain:** These are erosional surfaces of gently undulating plains, ridges and associated footslopes. Mainly support hard spinifex (and occasionally soft spinifex) with a mantle of gravel and pebbles.

These habitat types are typical of the Pilbara region and occur extensively outside of the application area (Biologic, 2014). The habitat types recorded within the application area are expected to support diverse fauna assemblages, particularly given the potential availability of surface water in the Turner River (Major Drainage Line habitat) (BHP Billiton, 2015; Biologic, 2014).

The surveys undertaken across the application area have resulted in three fauna species of conservation significance being recorded from within the application area (Biologic, 2014):

- Northern Quoll (*Dasyurus hallucatus*) (Endangered, EPBC Act; Schedule 1, WC Act);
- Rainbow Bee-eater (*Merops ornatus*) (Migratory, EPBC Act; Schedule 3, WC Act); and
- Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4, DPAW).

Based on the fauna habitat types present within the application area, an additional two species are considered to potentially occur within the Application Area:

- Ghost Bat (*Macroderma gigas*) (Priority 4, DPaW); and
- Greater Bilby (*Macrotis lagotis*) (Vulnerable, EPBC Act; Schedule 1, WC Act).

Northern Quoll are both arboreal and terrestrial, inhabiting ironstone ridges, scree slopes of sandstone or ironstone and granite boulders and outcrops. Northern Quoll also inhabit drainage lines and riverine habitats where it utilises tree hollows as den sites. There is one Northern Quoll record from the application area (Biologic, 2014), however no probable den sites were identified. Northern Quolls have also been recorded in the broader region (BHP Billiton, 2015). While the habitats within the application area are utilised by the Northern quoll (specifically the Major Drainage Line), the proposed area for clearing is small in a regional context and is contiguous with habitats in the local and regional area (Biologic, 2014). Potential impacts to the Northern Quoll may be minimised by the implementation of a fauna management condition.

The Rainbow Bee-eater is a common and widespread species in Western Australia, except in the drier interior of the State and the far southwest. It occurs in lightly wooded, often sandy country, preferring areas near water. As this species is common and widespread the potential impact on this species is low. This species is likely to forage within the application area, however is not likely to be reliant on this area as suitable habitat in the same or better condition is widespread in the region (BHP Billiton, 2015).

The Western Pebble-mound Mouse is restricted to the Pilbara, where it is recognised as an endemic species. The Western Pebble-mound Mouse construct extensive pebble mounds, built from small stones, which typically cover areas from 0.5-9.0 square metres. Mounds are restricted to suitable class stones, and are usually found on gentle slopes and spurs (van Dyck and Strahan, 2008). While the Crest / Slope and Stony Plain habitats of the application area may be utilised by the Western Pebble-mound Mouse, the proposed area for clearing is small in a regional context and is contiguous with habitats in the local and regional area (BHP Billiton, 2015). There are large areas of suitable habitat for this species adjacent to the application area and BHP Billiton (2015) has advised that active Pebble-mouse mounds will be avoided, where practicable. Potential impacts to the Western Pebble-mound Mouse may be minimised by the implementation of a fauna management condition.

The Ghost Bat occurs in a wide variety of habitats, and requires an undisturbed cave, deep fissure or disused

mine shaft in which to roost. It is patchily distributed across Australia, and is sensitive to disturbance (BHP Billiton, 2015). The Ghost Bat forages in areas of open woodland (Churchill, 2008). This species is known to forage over the habitats within the application area and surrounds however, impacts are considered to be low as there are no suitable caves within the area.

The Greater Bilby are known to utilise habitats including stony downs, cracking clays, desert sandplains and dune fields, spinifex grassland and *Acacia* species shrublands on red earths (Johnson, 2008). Although it has not been recorded within the application area, the Greater Bilby has been recorded adjacent to the Newman Rail Line approximately 7 kilometres south of the application area. There is likely to be a low impact on this species given that the Sand Plain habitat within the application area is widespread throughout the Pilbara and the small size of the application area (10 hectares).

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

**Methodology** BHP Billiton (2015)  
Biologic (2014)  
Churchill (2008)  
Johnson (2008)  
van Dyck and Strahan (2008)

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

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

According to available databases, there are no known records of Threatened Flora species within the application area (GIS Database). A search of the Department of Parks and Wildlife's Threatened and Priority Flora databases identified no Threatened Flora species as occurring within a 10 kilometre radius of the application area (DPaW, 2015).

Numerous vegetation surveys have been undertaken over the application area and its surrounds since 2004. Onshore Environmental (2014a) has consolidated these vegetation surveys into one report. Based upon these surveys, no Threatened Flora have been recorded within the application area

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

**Methodology** DPaW (2015)  
Onshore Environmental (2014a)  
GIS Database:  
- Threatened and Priority Flora

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

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

A search of the available databases showed that there are no known Threatened Ecological Communities situated within 200 kilometres 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:  
- 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 lies within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 99.58% of the pre-European vegetation remains (see table) (Government of Western Australia, 2014; GIS Database).

The vegetation in the application area is broadly mapped as Beard Vegetation Associations 19 and 619 (GIS Database):

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

619: Medium woodland; river gum (*Eucalyptus camaldulensis*).

These vegetation associations have not been extensively cleared as over 99% remains at a State, and 99% at a bioregional level for all vegetation associations (see table) (Government of Western Australia, 2015). There has not been extensive clearing in the local region and the vegetation within the application area is not a remnant nor does it form part of any remnants within the local area (GIS Database).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DPAW Managed Lands
IBRA Bioregion - Pilbara	17,808,657	17,733,584	~99.58	Least Concern	~8.4
Beard vegetation associations - State					
93	3,044,310	3,040,641	~99.88	Least Concern	~1.96
619	119,374	118,205	~99.02	Least Concern	~0.2
Beard vegetation associations - Bioregion					
93	3,042,114	3,038,472	~99.88	Least Concern	~1.96
619	118,920	118,117	~99.32	Least Concern	~0.2

\* Government of Western Australia (2014)

\*\* 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)  
Government of Western Australia (2014)  
GIS Database:  
- IBRA WA (regions – subregions)  
- Pre-European Vegetation

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

**Comments Proposal is at variance to this Principle**

According to available databases, a number of ephemeral drainage tracts transect the application area as well as the Turner River, which crosses through the centre of the application area (GIS Database). Several riparian species were identified within one of the vegetation communities mapped within the application area, associated with the Turner River and the ephemeral drainage tracts (BHP Billiton, 2015; Onshore Environmental 2014a):

MA MaEcEv MgAcpAtr Cv: High Open Forest of *Melaleuca argentea*, *Eucalyptus camaldulensis* var. *refulgens* and *Eucalyptus victrix* over High Open Shrubland of *Melaleuca glomerata*, *Acacia coriacea* subsp. *pendens* and *Acacia trachycarpa* over Very Open Sedges of *Cyperus vaginatus* on alluvial gravelly soils on major drainage channels with seasonal pools.

The Turner River streamflow is ephemeral and associated with high rainfall events during December to April (BHP Billiton, 2015). Although the proposed clearing has been designed to avoid, where practicable, drainage lines and the Turner River, there have been a number of modifications to the surface water flow within the application area that has placed further stress on the vegetation in the area (GIS Database). Clearing of areas which contain drainage line associated native vegetation have the potential to cause localised erosion and degrade faunal habitats. Provided disturbance to riparian habitats is avoided or minimised where possible, and weed hygiene procedures are followed, the proposed works are not expected to substantially impact these vegetation units. Potential impacts to riparian vegetation may be minimised through the implementation of a vegetation management condition.

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

**Methodology** BHP Billiton (2015)  
Onshore Environmental (2014a)  
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 intercepts the Macroy, and River land systems.

The Macroy land system is characterised by stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands. The system has low or very low erosion hazard (Van Vreeswyk et al., 2004).

The River land system is characterised by active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands. However, susceptibility to erosion is high or very high if vegetative cover is removed (Van Vreeswyk et al., 2004). Due to the small amount of clearing (10 hectares) it is unlikely that the removal of vegetation will contribute to increased amounts of wind or water erosion in the application area or adjacent areas (BHP Billiton, 2015).

The application area is not situated within an area at risk of acid sulphate soils, and there are no recorded acid sulphate soils within the application area (BHP Billiton, 2015). It is unlikely that the proposed clearing will result in changes to soil pH (BHP Billiton, 2015).

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

**Methodology** BHP Billiton (2015)  
Van Vreeswyk et al. (2004)  
GIS Database:  
- IBRA WA (Regions – Sub Regions)

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

**Comments** **Proposal is not likely to be at variance to this Principle**  
The application area is not located within any conservation area (GIS Database). The nearest conservation area is Mungaroona Range Nature Reserve, located approximately 60 kilometres south west of the application area (GIS Database).

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

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

**Methodology** GIS Database:  
- DPaW 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 not located within a Public Drinking Water Source Area (GIS Database). The application areas are located within the proclaimed Pilbara groundwater area under the *Rights in Water and Irrigation Act 1914* (GIS Database). Any groundwater extraction and/or taking or diversion of surface water for the purposes other than domestic and/or stock watering is subject to licence by the Department of Water.

There are no permanent watercourses or water bodies within the application area (GIS Database). The Turner River crosses through the centre of the application area and a few ephemeral drainage tracts transect the application area (GIS Database). These drainage tracts are dry for most of the year and only flow and hold surface water for short durations following significant rainfall events during December to April (BHP Billiton, 2015; Onshore Environmental, 2014a; GIS Database). BHP Billiton (2015) have advised that appropriate surface water management practices will be put in place to minimise erosion and potential impacts on the quality of surface waters. The small amount of clearing is unlikely to cause deterioration in the quality of any surface of groundwater (BHP Billiton, 2015).

The application area has a groundwater salinity that ranges from potable to saline (500- 1,000 milligrams/Litre Total Dissolved Solids) (GIS Database). The clearing of vegetation as a result of this proposal is therefore unlikely to result in any further deterioration in surface or groundwater quality in the local area.

There are no known groundwater dependent ecosystems within the application area (GIS Database). Due to the absence of calcrete below the water table, it is unlikely that Stygofauna are present within the application area (GIS Database).

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

**Methodology** BHP Billiton (2015)  
Onshore Environmental (2014a)  
GIS Database:  
- Evaporation Isopleths  
- Groundwater Salinity, Satewide  
- Hydrography, linear  
- 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**

The application area experiences a semi-desert-tropical climate with an average rainfall of 300 millimetres per year (CALM, 2002; BoM, 2015). Based on an average annual evaporation rate of 3,200 - 3,600 millimetres (BoM, 2015), any surface water resulting from rainfall events is likely to be relatively short lived.

Given the size of the area to be cleared (10 hectares) compared to the size of the Turner River catchment area (480,185 hectares) (GIS Database) it is not likely that the proposed clearing will lead to an appreciable increase in run off, and subsequently cause or exacerbate the incidence or intensity of flooding.

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

**Methodology** BoM (2015)  
CALM (2002)  
GIS Database:  
- Evaporation Isopleths  
- Hydrography, linear

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

**Comments**

There are two native title claims over the area under application: WC99/003 and WC14/001 (GIS Database). These claims have 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*.

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

It is the proponent's responsibility to liaise with the Department of Environment Regulation, Department of Parks and Wildlife 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 24 August 2015 by the Department of Mines and Petroleum inviting submissions from the public. There were no submissions received.

**Methodology** DAA (2015)  
GIS Database:  
- Aboriginal Sites of Significance

**4. References**

- BHP Billiton (2015) Application for an NVCP: Turner River Rail Access Tracks. Native Vegetation Clearing Permit Application Supporting Document, July 2015.
- Biologic (2014) *Consolidation of Regional Fauna Habitat Mapping BHP Billiton Iron Ore Pilbara Tenure*. Internal Report for BHP Billiton Iron Ore, May 2014.
- BoM (2015) Climate Statistics for Australian Locations. A Search for Climate Statistics for Marble Bar, Australian Government Bureau of Meteorology, viewed 14 September 2015, <[http://www.bom.gov.au/climate/averages/tables/cw\\_012038.shtml](http://www.bom.gov.au/climate/averages/tables/cw_012038.shtml)>.
- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management, Western Australia.
- Churchill (2008) 'Australian Bats.' Allen and Unwin: Sydney.
- DAA (2015) Aboriginal Heritage Inquiry System, Government of Western Australia, Department of Aboriginal Affairs, Perth, viewed 14 September 2015 < <http://maps.dia.wa.gov.au/AHIS2/>>.
- 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.
- DPaW (2015) NatureMap - Mapping Western Australia Biodiversity, Department of Parks and Wildlife, viewed 14 August 2015, < <http://naturemap.dpaw.wa.gov.au/default.aspx>>.
- Government of Western Australia (2014) 2014 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). WA Department of Environment and Conservation, Perth.
- Johnson (2008) *Bilby Macrotis lagotis* (Reid, 1837). In: S. Van Dyck and R. Strahan (eds.) *The Mammals of Australia Third edition*. p 191-193. New Reid Holland, Sydney.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Onshore Environmental (2014a) *Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure*. Internal Report for BHP Billiton Iron Ore, June 2014.

Onshore Environmental (2014b) *Mainline Rail Expansion Level 2 Flora and Vegetation Survey*. Internal Report for BHP Billiton Iron Ore.

van Dyck and Strahan (2008) *The Mammals of Australia, Third Edition*. Reed New Holland, Sydney.

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.

## 5. Glossary

### Acronyms:

<b>BoM</b>	Bureau of Meteorology, Australian Government
<b>DAA</b>	Department of Aboriginal Affairs, Western Australia
<b>DAFWA</b>	Department of Agriculture and Food, Western Australia
<b>DEC</b>	Department of Environment and Conservation, Western Australia (now DPaW and DER)
<b>DER</b>	Department of Environment Regulation, Western Australia
<b>DMP</b>	Department of Mines and Petroleum, Western Australia
<b>DRF</b>	Declared Rare Flora
<b>DotE</b>	Department of the Environment, Australian Government
<b>DoW</b>	Department of Water, Western Australia
<b>DPaW</b>	Department of Parks and Wildlife, Western Australia
<b>DSEWPaC</b>	Department of Sustainability, Environment, Water, Population and Communities (now DotE)
<b>EPA</b>	Environmental Protection Authority, Western Australia
<b>EP Act</b>	<i>Environmental Protection Act 1986</i> , Western Australia
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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>PEC</b>	Priority Ecological Community, Western Australia
<b>RIWI Act</b>	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia
<b>s.17</b>	Section 17 of <i>the Environment Protection Act 1986</i> , Western Australia
<b>TEC</b>	Threatened Ecological Community



## **Definitions:**

{DPaW (2013) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

- T**            **Threatened species:**  
Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna or the Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).  
  
Threatened Fauna and Flora are further recognised by the Department according to their level of threat using IUCN Red List criteria. For example Carnaby's Cockatoo *Calyptorhynchus latirostris* is specially protected under the *Wildlife Conservation Act 1950* as a threatened species with a ranking of Endangered.  
  
Rankings:  
CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.  
EN: Endangered - considered to be facing a very high risk of extinction in the wild.  
VU: Vulnerable - considered to be facing a high risk of extinction in the wild.
- X**            **Presumed Extinct species:**  
Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).
- IA**          **Migratory birds protected under an international agreement:**  
Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.  
Birds that are subject to an agreement between governments of Australia and Japan, China and The Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
- S**            **Other specially protected fauna:**  
Specially protected under the *Wildlife Conservation Act 1950*, listed under Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- P1**          **Priority One - Poorly-known species:**  
Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, rail reserves and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
- P2**          **Priority Two - Poorly-known species:**  
Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
- P3**          **Priority Three - Poorly-known species:**  
Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
- P4**          **Priority Four - Rare, Near Threatened and other species in need of monitoring:**  
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.  
(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.  
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
- P5**          **Priority Five - Conservation Dependent species:**  
Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.