Government of Western Australia
Department of Mines, Industry Regulation and Safety

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 8033/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **BHP Billiton Iron Ore Pty Ltd**

1.3. Property details

Property: *Iron Ore (McCarney's Monster) Agreement Authorisation Act 1972*, Mineral Lease 266SA (AM 70/266)
Local Government Area: Shire of East Pilbara
Colloquial name: Ministers North Exploration

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
200		Mechanical Removal	Mineral Exploration, Hydrological Investigations, Geological Investigations and Associated Activities

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 24 May 2018

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

The vegetation of the application area is broadly mapped as the following Beard vegetation associations:
18: Low woodland; mulga (*Acacia aneura*)
82: Hummock grasslands, low tree steppe; Snappy Gum over *Triodia wiseana* (GIS Database).

Numerous flora and vegetation surveys overlapping the application area have been undertaken, the most recent are:

- *Ministers North Detailed Flora and Vegetation Survey* (Biota, 2017)
  A two-phase flora and vegetation survey conducted by Biota Environmental Sciences (Biota), Phase 1 was undertaken during September 2016 and Phase 2 during May and July 2017; and
- *Consolidation of Regional Fauna Habitat Mapping BHP Billiton Iron Ore Pilbara Tenure* (Onshore Environmental, 2014)

The following vegetation associations were recorded within the application area (Biota, 2017 and Onshore Environmental, 2014):

Vegetation of Medium Drainage Lines

ME Ev EauSop Acp: Open woodland of *Eucalyptus victrix* over open tussock grassland of *Eulalia aurea* (*Sorghum plumosum* var. *plumosum*) with scattered tall shrubs of *Acacia coriacea* subsp. *pendens* over scattered low shrubs of *Tephrosia rosea* var. Fortescue Creeks (M.I.H. Brooker 2186) on dark reddish brown sand in creek beds along drainage lines.

ME MaEcr TydCyv GoroCule: Open forest of *Melaleuca argentea* (*Eucalyptus camaldulensis* subsp. *refulgens*) over open sedges of *Typha domingensis* (*Cyperus vaginatus*) with open shrubland of *Gossypium robinsonii* (*Cullen leucanthum*) over very open tussock grassland of *Eulalia aurea* (*Cymbopogon ambiguus, Sorghum plumosum* var. *plumosum*) on dark reddish brown clay loam along a drainage line.

ME TtAriCya ChEll AmPlAnl: Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Corymbia deserticola* subsp. *deserticola* and *Hakea chordophylla* over Open Shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* on red brown sandy loam on footslopes and stony plains.

MA EcrEvEx ApypAtpGoro TtEuaCyp: Low Open Forest of *Eucalyptus camaldulensis* subsp. *refulgens*, *Eucalyptus victrix* and *Eucalyptus xerothemica* over High Shrubland of *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis* and *Gossypium robinsonii* over Open Tussock Grassland of *Themeda triandra*, *Eulalia*

aurea and *Cymbopogon procerus* on red brown clay loam on major drainage lines.

Vegetation of Rocky Gullies and Gorges

GG Ccol Phba Cla TbifArb: Low open woodland of *Callitris columellaris* over high open shrubland of *Phyllanthus baccatus* over open shrubland of *Corchorus laniflorus* over scattered hummock grasses of *Triodia biflora* over scattered tussock grasses of *Aristida burbidgeae* on dark reddish brown sand and clay loam in a gorge.

GG AtpGrwhGoro ErmuTt Ch: Open scrub of *Acacia tumida* var. *pilbarensis, Grevillea wickhamii* subsp. *hispidula, Gossypium robinsonii* over very open tussock grassland of *Eriachne mucronata, Themeda triandra* with very open hummock grassland of *Triodia pungens* and scattered low trees of *Corymbia hamersleyana* on dark reddish brown sandy clay loam in gullies and gorges**.**

GG TbifTw EllCfCh: Open hummock grassland of *Triodia biflora, T wiseana* with low open woodland of *Eucalyptus leucophloia* subsp*. leucophloia, Corymbia ferriticola, C. hamersleyana* on dark reddish brown sandy clay loam in gullies.

HS TbrTw Ell: Hummock Grassland of *Triodia wiseana*, *Triodia brizoides* and *Triodia* sp. Shovellana Hill with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia*, *Eucalyptus xerothermica* and *Corymbia hamersleyana* over Low Open Shrubland of *Ptilotus calostachyus*, *Ptilotus astrolasius* and *Acacia hilliana* on brown loam on eroded outcroping upper slopes and crests.

Vegetation of Stony Hill Crests, Slopes and Foothills

HC TwTp EkEll Ah: Open hummock grassland of *Triodia wiseana* (*T. pungens*) with low open mallee woodland of *Eucalyptus kingsmillii* with scattered tall shrubs of *Acacia hamersleyensis* and scattered low trees of *Eucalyptus leucophloia* subsp. *leucophloia* on dark reddish brown sandy clay loam on upper hill crests and slopes.

FS Ts EllCh Hc Open hummock grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with low open woodland of *Eucalyptus leucophloia* subsp. *leucophloia, Corymbia hamersleyana* over scattered tall shrubs of *Hakea chordophylla* over low open shrubland of *Acacia hilliana* on dark reddish brown sandy clay loam on footslopes.

FS Tw Ell Aha: Open hummock grassland of *Triodia wiseana* with low open woodland of *Eucalyptus leucophloia* subsp. *leucophloia* over scattered tall shrubs of *Acacia hamersleyensis* on dark reddish brown sandy loam on footslopes.

HS TsTw Ell Ab: Open hummock grassland of *Triodia* sp. Shovelanna hill (S. van Leeuwen 3835), *T. wiseana* with low open woodland of *Eucalyptus leucophloia* subsp. *leucophloia* over open shrubland of *Acacia bivenosa* on dark reddish brown sandy clay loam on lower hill slopes.

HS Tw Ell Ab: Open hummock grassland of *Triodia wiseana* with scattered low trees of *Eucalyptus leucophloia* subsp. *leucophloia* over scattered shrubs of *Acacia bivenosa* on dark reddish brown sandy clay loam on steep hill slopes.

FS Ts CdHc AancAiGrwh: Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Corymbia deserticola* subsp. *deserticola* and *Hakea chordophylla* over Open Shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* on red brown sandy loam on footslopes and stony plains.

HS TsTwTp EllCh AhiAaa: Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835), *Triodia wiseana* and *Triodia pungens* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* over Low Open Shrubland of *Acacia hilliana* and *Acacia adoxa* var. *adoxa* on red brown sandy loam on hill slopes.

Clearing Description

Ministers North Exploration.
BHP Billiton Iron Ore Pty Ltd proposes to clear up to 200 hectares of native vegetation within a boundary of approximately 3,298 hectares, for the purpose of mineral exploration, hydrological investigations, geological investigations and associated activities. The project is located approximately 80 kilometres north of Newman, within the Shire of East Pilbara.

Vegetation Condition

Pristine: No obvious signs of disturbance (Keighery, 1994);

to

Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).

Comment

The vegetation condition was derived from a vegetation survey conducted by Biota (2017).

The proposed clearing is for mineral exploration, hydrological investigation, geological investigations and associated activities (BHP Billiton, 2018). The application area is partly covered by an existing permit, which was granted for the construction and maintenance of the Newman mainline railway.

3. Assessment of application against Clearing Principles

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

Comments

Proposal may be at variance to this Principle

The clearing permit application area is located within the Hamersley subregion of the Interim Biogeographic Regionalisation for Australia (IBRA) within the Pilbara Bioregion (GIS Database). The Hamersley subregion can be described as Mulga low woodlands over bunch grasses on fine textured soils in valley floors and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002).

The application area does not intersect any Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs) or known locations of Threatened flora (GIS Database).

The vegetation within the application area is considered to be in a 'Completely Degraded' to 'Pristine' condition (Biota, 2017). The vegetation considered 'Completely Degraded' is due to clearing associated with mining exploration activities, including tracks, drill pads and a rail line (Biota, 2017; GIS Database). The majority of the vegetation within the application area is considered to be in a 'Pristine' condition (Biota, 2017).

There have been a number of flora and vegetation surveys undertaken over the application area and surrounding area since 2008 (Onshore Environmental, 2014). The most recent survey conducted by Biota recorded three Priority Flora species within the application area (Biota, 2017):

- *Acacia bromilowiana* (Priority 4);
- *Fimbristylis sieberiana* (Priority 3); and
- *Sida* sp. Barlee Range (S. van Leeuwen 1642) (Priority 3)

The flora species *Acacia bromilowiana* has been recorded from 36 locations within the application area (BHP Billiton, 2018). There are three records of this species within Karijini National Park, 50 kilometres west of the application area and 60 other locations across the southern Pilbara (BHP Billiton, 2018; GIS Database). The proposed clearing of *Acacia bromilowiana* within the application area is unlikely to impact the conservation significance of this species as some records of the known populations will be avoided using a 10 metre buffer and there are multiple records of this species outside of the application area.

The flora species *Fimbristylis sieberiana* has been recorded from three locations within the application area (BHP Billiton, 2018). There are four records of this species within Karijini National Park and 357 other locations across the broader region outside the application area (BHP Billiton, 2018; GIS Database). The proposed clearing of three records of *Fimbristylis sieberiana* is unlikely to impact the conservation significance of this species.

The flora species *Sida* sp. Barlee Range (S. van Leeuwen 1642) has been recorded from 29 locations within the application area (BHP Billiton, 2018). There are four records of this species within Karijini National Park, three records within the Barlee Range Nature Reserve and 123 other locations across the broader region of the application area (BHP Billiton, 2018; GIS Database). The proposed clearing of three records of *Sida* sp. Barlee Range (S. van Leeuwen 1642) is unlikely to impact the conservation significance of this species.

There were four fauna habitat types recorded within the application area (Biologic, 2014; 2017). The faunal habitats within the application area are considered to be common and widespread within the subregion and faunal assemblages are unlikely to be different to those found in similar habitat located elsewhere in the region, with the exception of Gorge / Gully and Major Drainage Line habitats (GIS Database). The proposed clearing of 200 hectares of native vegetation within a 3,298 hectare boundary is unlikely to have a significant impact on faunal diversity in a regional and local context.

There are 18 weed species recorded within the application area (BHP Billiton, 2018). Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. Potential impacts to biodiversity as result of the proposed clearing may be minimised by the implementation of a weed management condition.

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

Methodology

CALM (2002)
BHP Billiton (2018)
Biota (2017)

GIS Database:
- IBRA Australia
- Pre-European Vegetation
- Threatened and Priority Flora
- Threatened and Priority Ecological Communities Boundaries

(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

The following four fauna habitats have been recorded within the application area (Biologic, 2014; 2017):

- Gorge / Gully
- Hillcrest / Hillslope
- Minor drainage line
- Major drainage line

The Gorge / Gully habitat is significant as it contains important habitat features that provide shelter and denning sites; however this habitat type only represents a small portion of the application area. The proponent will minimise disturbance to this habitat where practicable (BHP Billiton, 2018). The Major Drainage Line habitat is important for dispersal of mammal and reptile species in the local area. Potential impacts to this habitat type may be minimised by the implementation of a vegetation management condition.

Fauna surveys in the area have recorded one species of conservation significance within the application area (BHP Billiton, 2018). Based on habitats within the application area and surrounding records, a further seven species of conservation significance could potentially be found within the application area (BHP Billiton, 2018, GIS Database).

The recorded conservation significant species, the Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4 – DBCA) was recorded on six occasions, including three direct captures and three records of active mounds. This species is restricted to the Pilbara, where it is recognised as an endemic species. While the Hillcrest / Hillslope habitat of the application area provides suitable habitat for the Western Pebble-mound Mouse, the proposed area for clearing is small in a regional context (BHP Billiton, 2018). There are many additional records of this species throughout the wider local area surrounding the application area and the potential habitat for this species is widespread throughout the Hamersley Ranges (BHP Billiton, 2018). BHP Billiton (2018) has advised that active Pebble-mouse mounds will be avoided, where practicable.

The Ghost Bat (*Macroderma gigas*) (Vulnerable) occurs in a wide variety of habitats, and requires an undisturbed cave, deep fissure or disused mine shaft in which to roost. This species is known to forage over the habitats within the application area and surrounds, and two potential night roosts were identified by Biologic (2017) within the survey area. These caves are unlikely to be used regularly as the ceilings may be too low for use (BHP Billiton, 2018). The proponent has advised that both caves have been excluded from the application area. The proposed clearing is unlikely to impact the conservation significance of this species.

The Pilbara Flat-headed Blind-snake (*Anilios ganei*) (Priority 1 - DBCA) has been recorded from Hillcrest / Hillslope, Gorge / Gully, drainage and mulga woodland habitats across the Pilbara (BHP Billiton, 2018). This species is known to be associated with moist soils and leaf litter within gorges and gullies, and potentially a wider range of other stony habitats (Biologic, 2017). This proposed clearing is unlikely to impact the conservation significance of this species, particularly as the disturbance to the majority of its preferred habitat (Gorge / Gully), will be minimised as far as practicable.

The Pilbara Olive Python (*Liasis olivaceus barroni)* (Vulnerable) may have the potential to occur within the application area (BHP Billiton, 2018). This species is usually encountered in the vicinity of permanent waterholes in rocky ranges or riverine vegetation. The most significant habitat for this species within the survey area is the Gorge/Gully and Major Drainage Line habitat (BHP Billiton, 2018). A rock pool located within the application area with the potential to be used by this species has been excluded from the application area (BHP Billiton, 2018). Potential impacts to the Pilbara Olive Python may be minimised by the implementation of vegetation management condition.

The proposed clearing of 200 hectares within a total boundary of 3,298 hectares is unlikely to have an impact on the local fauna population.

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

Methodology

BHP Billiton (2018)
Biologic (2014)
Biologic (2017)

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 databases, there are no known records of Threatened flora within the application area

(GIS Database). Flora surveys of the application area did not record any species of Threatened flora (Biota, 2017).

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

Methodology Biota (2017)

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

There are two Threatened Ecological Communities (TECs) in the Pilbara bioregion: the '*Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)' and the 'Ethel Gorge aquifer stygobiont community'. The nearest area of the *Themeda* grasslands TEC is approximately 139 kilometres to the northwest of the application area, and the Ethel Gorge stygobiont TEC is located approximately 89 kilometres to the southeast. Neither TEC is therefore located within or in close proximity to the application area (GIS Database).

A flora and vegetation survey of the application area did not identify any TECs (Biota, 2017).

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

Methodology Biota (2017)

GIS Database:
- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffer

(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 Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately 99.58% of the pre-European vegetation still exists in the Pilbara IBRA Bioregion (Government of Western Australia, 2018). The application area is broadly mapped as Beard vegetation associations 18: Low woodland; mulga (*Acacia aneura*); and 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (BHP Billiton, 2018; GIS Database). The pre-European extent of each of these vegetation associations remains approximately just over 99% uncleared at both the state and bioregional level (Government of Western Australia, 2018).

Therefore, the application area does not represent a significant remnant of native vegetation in an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DBCA managed lands
IBRA Bioregion – Pilbara	17,808,657	17,733,583	99.58	Least Concern	6.36
Beard vegetation associations – WA					
Vegetation association 18	19,892,306	19,843,729	99.76	Least Concern	2.13
Vegetation association 82	2,565,901	2,553,217	99.51	Least Concern	10.25
Beard vegetation associations – Pilbara Bioregion					
Vegetation association 18	676,557	672,424	99.39	Least Concern	16.76
Vegetation association 82	2,563,583	2,550,899	99.51	Least Concern	10.26

* Government of Western Australia (2018)
** Department of Natural Resources and Environment (2002)

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

Methodology BHP Billiton (2018)
Department of Natural Resources and Environment (2002)
Government of Western Australia (2018)

GIS Database:
- IBRA Australia
- 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**
One named watercourse, Yandicoogina Creek, passes through the application area (GIS database). Streamflow is ephemeral and associated with high rainfall events during the summer months from December to April (BHP Billiton, 2018). There are numerous minor ephemeral watercourses and vegetation associated with drainage lines within the application area (BHP Billiton, 2018; Biota, 2017; Onshore Environmental, 2014; GIS Database). 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 associations.

Yandicoogina Creek forms part of the Major Drainage Line habitat, which is important for dispersal of mammal and reptile species in the local area. Potential impacts to this habitat type may be minimised by the implementation of a vegetation management condition.

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

Methodology BHP Billiton (2018)
Biota (2017)
Onshore Environmental (2014)

GIS Database:
- Hydrography, Lakes
- 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 lies within the Newman land system (GIS Database). This land system has been mapped and described in technical bulletins produced by the former Department of Agriculture (now the Department of Primary Industries and Regional Development).

The Newman land system is described as rugged jaspilite plateaus, ridges and mountains supporting hard spinifex grasslands. This land system is not generally susceptible to erosion (van Vreeswyk et al., 2004). The drainage areas within the application area may have erosional surfaces, however, due to the temporary nature of exploration activities and the planned re-vegetation of areas that will no longer be required (BHP Billiton, 2018), the proposed clearing is unlikely to increase the amount of erosion.

The proposed clearing of up to 200 hectares of native vegetation within a boundary of approximately 3,298 hectares, for the purpose of mineral exploration, hydrological investigations, geological investigations and associated activities is unlikely to cause appreciable land degradation.

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

Methodology BHP Billiton (2018)
Van Vreeswyk et al. (2004)

GIS Database:
- Landsystem Rangelands
- Soils, Statewide

(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**
There are no conservation areas in the vicinity of the application area. The nearest DBCA (formerly DPaW) managed land is the Karijini National Park which is located approximately 50 kilometres west of the application area (GIS Database). The proposed clearing is unlikely to impact on 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:
- 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**

There are no Public Drinking Water Source Areas within or in close proximity to the application area (GIS Database). There are no permanent watercourses or wetlands within the area proposed to clear (GIS Database). Creek lines in the region are dry for most of the year, only flowing briefly immediately following significant rainfall. The proposed clearing is unlikely to result in significant changes to surface water flows.

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 fresh water. It would not be expected that the proposed clearing would cause salinity levels within the application or surrounding area to alter.

The proposed clearing is unlikely to cause deterioration in the quality of underground water.

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

Methodology GIS Database:
- Hydrography, Linear
- Groundwater Salinity, Statewide
- 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 climate of the region is semi-arid, with a low average rainfall of approximately 332.6 millimetres per year (BoM, 2018). Drainage lines in the area are dry for most of the year, only flowing briefly immediately following significant rainfall (BHP Billiton, 2018).

There are no permanent water courses or waterbodies within the application area (GIS Database). Seasonal drainage lines are common in the region and temporary localised flooding may occur briefly following heavy rainfall events. However, the proposed clearing is unlikely to increase the incidence or intensity of natural flooding events.

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

Methodology BHP Billiton (2018)
BoM (2018)

GIS Database:
- Hydrographic Catchments - Catchments
- Hydrography, linear

Planning Instrument, Native Title, previous EPA decision or other matter.

Comments

The clearing permit application was advertised on 16 April 2018 by the Department of Mines, Industry Regulation and Safety (DMIRS), inviting submissions from the public. No submissions were received in relation to this application.

There is one native title claim over the area under application (DPLH, 2018). 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*.

There are no registered Aboriginal Sites of Significance within the application area (DPLH, 2018). 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 Water and Environmental Regulation and the Department of Biodiversity Conservation and Attractions, to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

Methodology DPLH (2018)

4. References

BHP Billiton (2018) Ministers North Exploration. Native Vegetation Clearing Permit Application Supporting Document. BHP Billiton Iron Ore Pty Ltd, Western Australia, 2018.

Biologic (2014) Consolidation of Regional Fauna Habitat Mapping BHP Billiton Iron Ore Pilbara Tenure. Unpublished report prepared for BHP Billiton Iron ore Pty Ltd, 2014.

Biologic (2017) Ministers North Level 2 Vertebrate Fauna Survey. Unpublished report prepared for BHP Billiton Iron Ore Pty Ltd, 2017.

Biota (2017) Ministers North Detailed Flora and Vegetation Survey. Unpublished report prepared for BHP Billiton Iron Ore Pty Ltd, 2017.

BoM (Bureau of Meteorology) (2018) Climate statistics for Australia locations – Newman Aero. www.bom.gov.au/climate/averages/tables/cw_007176.shtml (Accessed 6 April 2018)

CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia.

DPLH (2018) Aboriginal Heritage Enquiry System. Department of Planning, Lands and Heritage. http://maps.daa.wa.gov.au/AHIS/ (Accessed 10 May 2018).

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.

Government of Western Australia (2018) 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

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 (2014) Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure. Unpublished report prepared for BHP Billiton Iron Ore Pty Ltd, 2014.

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.

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DBCA	Department of Biodiversity Conservation and Attractions, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DBCA and DWER)
DEE	Department of the Environment and Energy, Australian Government
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora

DoE	Department of the Environment, Australian Government (now DEE)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DEE)
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	*Environmental Protection Act 1986*, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
PEC	Priority Ecological Community, Western Australia
RIWI Act	*Rights in Water and Irrigation Act 1914*, Western Australia
TEC	Threatened Ecological Community

Definitions:

{DPaW (2017) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

T **Threatened species:**
Published as Specially Protected under the *Wildlife Conservation Act 1950,* listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the *Wildlife Conservation Act 1950*.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the *Wildlife Conservation Act 1950*.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**
Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN **Endangered species**
Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU **Vulnerable species**
Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX **Presumed extinct species**
Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA **Migratory birds protected under an international agreement**
Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD **Conservation dependent fauna**
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna)

Notice.

OS **Other specially protected fauna**
Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P **Priority species**
Species which are poorly known; or
Species that are adequately known, are rare but not threatened, and require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

P1 **Priority One - Poorly-known species:**
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 **Priority Two - Poorly-known species:**
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 **Priority Three - Poorly-known species:**
Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations 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 locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

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 are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.