



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 8245/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Resources Limited

1.3. Property details

Property: Temporary Reserves 70/4192, 70/4266, 70/4267 and 70/4737 pursuant to *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972*
Local Government Area: Shire of East Pilbara
Colloquial name: Rhodes Ridge Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
200		Mechanical Removal	Mineral Exploration and Geotechnical Investigations

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 31 January 2019

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*);
29: Sparse low woodland; mulga, discontinuous in scattered groups; and
82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (GIS Database)

A flora and vegetation survey was conducted over the application area by Eco Logical Australia during April 2016. The following vegetation associations were recorded within the application area (Eco Logical Australia, 2017):

Drainage Plains:

DP01 - *Acacia catenulata* subsp. *occidentalis* low open woodland to low woodland over *Acacia pruinocarpa* scattered tall shrubs to tall open shrubland over mixed open tussock grassland. Can exist with *Triodia pungens* very open hummock grassland.

DP02 - *Acacia aptaneura* and *Acacia pruinocarpa* tall shrubland over *Triodia pungens* hummock grassland.

Minor Creek Lines and Drainage Lines:

MnC01 - *Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* and *Petalostylis labicheoides* open shrubland to open heath over *Themeda triandra* very open tussock grassland to tussock grassland. Can exist with *Triodia pungens* very open to open hummock grassland.

Hillslopes and Crests:

HSC01 - *Eucalyptus gamophylla* low open woodland over mixed *Acacia* open shrubland over *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) hummock grassland.

HSC02 (This is a mosaic of two vegetation types that could not be mapped separately)

- Eucalyptus leucophloia* subsp. *leucophloia* over mixed *Acacia* scattered low shrubs to shrubland over *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) and *Triodia pungens* open hummock grassland to hummock grassland.
- Eucalyptus gamophylla* scattered low trees over *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) very open hummock grassland to open hummock grassland and *Amphipogon sericeus* very open tussock grassland to open tussock grassland.

Rocky Ridges and Breakaways

RrB01 - *Eucalyptus leucophloia* subsp. *leucophloia*, *Eucalyptus gamophylla* and *Corymbia hamersleyana* low open woodland over *Acacia hamersleyana* shrubland over *Triodia pungens* and *Triodia* sp. Shovelanna Hill (S.

van Leeuwen 3835) hummock grassland.

Clearing Description	Rhodes Ridge Project Hamersley Resources Limited proposes to clear up to 200 hectares of native vegetation within a boundary of approximately 1656 hectares, for the purpose of mineral exploration and geotechnical investigations. The project is located approximately 50 kilometres north-west of Newman, within the Shire of East Pilbara.
Vegetation Condition	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).
Comment	The vegetation condition was derived from a vegetation survey conducted by Eco Logical Australia (2017). The proposed clearing is for mineral exploration and geotechnical investigation activities.

3. Assessment of application against Clearing Principles

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

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

The clearing permit application area is located within the Hamersley subregion of the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara Bioregion (GIS Database). This subregion is characterised as a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges. The vegetation is characterised as low Mulga (*Acacia aneura*) woodland over bunch grasses on fine textured soils and Snappy Gum (*Eucalyptus leucophloia*) over *Triodia brizoides* on the skeletal sandy soils of the ranges (Eco Logical Australia, 2017; CALM 2002).

A flora and vegetation survey was conducted over the area by Eco Logical Australia in April 2016. A total of 18 species, from 41 genera and 67 families were recorded within the survey area (Eco Logical Australia, 2017). The vegetation in the application area was considered to range from 'Excellent' to 'Completely Degraded', with the majority of vegetation within the survey recorded as 'Excellent'. Areas of disturbance were mostly attributed to tracks, historic exploration and low level cattle grazing (Eco Logical Australia, 2017).

No Threatened Ecological Communities or Priority Ecological Communities have been recorded within the application area (GIS Database), and none were found during the flora survey (Eco Logical Australia, 2017). The closest Priority Ecological Community is 14 kilometres to the west of the application area (Eco Logical Australia, 2017; GIS Database).

Desktop surveys of available databases identified 18 Priority flora species with the potential to occur within a 20 kilometre radius of the survey area, based on known distributions (Eco Logical Australia, 2017). With the exception of the Priority 3 flora species *Rhagodia* sp. Hamersley, none of these species were found during the site survey (Eco Logical Australia, 2017). A second Priority 3 flora species (*Aristida jerichoensis* var. *subspinulifera*), was not recorded during the 2017 survey but is considered likely to occur in the area due to the proximity of nearby records and presence of suitable habitat (Astron, 2014; Eco Logical Australia, 2017).

Rhagodia sp. Hamersley is a perennial shrub, measuring between 1.5 – 2 metres in height. It occurs on a variety of substrates, including clay pans, pebbly ironstone mulga plains, low slopes and rocky cliffs (Western Australian Herbarium, 2019). Over the course of the survey, plants were recorded at five locations, with nine individuals identified (Eco Logical Australia, 2017). Populations were located in the drainage plain vegetation associations (DP01 and DP02) and the rocky ridges vegetation association (RrB01). Available records indicate that this species is well represented throughout the Pilbara Bioregion, with records of the species occurring from Brockman/Nammuldi, across to Newman, and to the Fortescue Marsh (Western Australian Herbarium, 2019). Though individuals of *Rhagodia* sp. Hamersley recorded within the survey area are likely to be impacted on a local scale, given the wide distribution of the species, the proposed clearing is unlikely to affect the conservation status of this species.

Aristida jerichoensis var. *subspinulifera* is a perennial grass, measuring 0.3 – 0.8 metres in height, most commonly associated with hard pan plains, grass flats and valley floors in the Pilbara (Eco Logical Australia, 2017; Western Australian Herbarium, 2019). *Aristida jerichoensis* var. *subspinulifera* have previously been recorded within the area to be cleared, often growing in close proximity to *Rhagodia* sp. Hamersley within the DP01 vegetation association (Astron, 2014). Given this, it is considered likely that this species occurs within the area proposed to be cleared. Available records indicate that this species is known from more than one IBRA subregion and has a range extending from west of Karijini National Park to south of Newman (Eco Logical Australia, 2017; Western Australian Herbarium, 2019). Though individuals of *Aristida jerichoensis* var. *subspinulifera* may be impacted on a local scale, given the known distribution of the species, the proposed clearing is unlikely to affect the conservation status of this species.

One weed species (*Bidens bipinnata*) was recorded during the 2016 field survey, and four other species have previously been recorded in the study area: *Cenchrus ciliaris*, *Cenchrus setiger*, *Setaria verticillata* and *Rumex*

vesicarius (Eco Logical Australia, 2017). Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

There were four fauna habitats identified within the application area based on vegetation mapping by Eco Logical Australia (2017). The fauna habitats within the application areas are considered to be common and widespread within the subregion and faunal assemblages are unlikely to be different to that found in similar habitat located elsewhere in the region (Eco Logical Australia, 2017). The clearing of 200 hectares of native vegetation within a 1,656 hectare boundary is unlikely to have a significant impact on faunal diversity at a regional and local context.

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

Methodology Astron (2014)
CALM (2002)
Eco Logical Australia (2017)
Western Australian Herbarium (2019)

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

(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 (Eco Logical Australia, 2017):

- Mulga woodland;
- Hill top and hill slope;
- Drainage line; and
- Gorge/gully.

None of the fauna habitats occurring within the application area correspond to any ecosystems listed as Threatened under the EPBC Act and none are consistent with ecosystems listed as TECs by the DBCA (Eco Logical Australia, 2017, GIS Database). Of the habitats present, the hill top and hill slope and mulga woodland were the most prevalent, accounting for 55.1% and 39% of the area to be cleared respectively. Drainage line and gorge/gully habitats accounted for only 2.3% and 0.1% respectively.

As detailed below, the hill top and hill slope, drainage line and gorge/gully habitats within the application area all have the potential to support a range of conservation listed fauna. In particular, the drainage line and gorge/gully habitat can be considered restricted at a local level, and therefore may be important to local populations of conservation significant fauna. However, the majority of habitats present are considered typical of the Hamersley subregion and are found outside of the application area (Eco Logical Australia, 2017). It is therefore unlikely that the proposed clearing will have a significant impact on fauna habitat availability at a local or regional scale.

A search of available biological databases was undertaken and no Threatened fauna were recorded in the application area (GIS Database). A desktop survey identified 20 fauna species of conservation significance potentially occurring within the application area. Of these, there are seven fauna species that are likely or have the potential to occur within the study area, based on the habitats present (Eco Logical Australia, 2017). Species considered likely to occur in the area include the Western Pebble-mound Mouse (Priority 4) and Rainbow Bee-eater (Migratory). Species that have the potential to occur in the application area include the Fork-tailed Swift (Migratory), Northern Quoll (Endangered), Pilbara Olive Python (Vulnerable), Ghost Bat (Vulnerable) and Pilbara Leaf-nosed Bat (Vulnerable).

The Western Pebble-mound Mouse (*Pseudomys chapmani*) favours scree and stony plains with skeletal soils where it constructs conspicuous, extensive mounds from small stones or pebbles (Eco Logical Australia, 2017). A previous fauna survey identified eight active Western Pebble-mound Mouse mounds in an area adjacent the application area, suggesting that the hill slope and hill top habitat represents potentially suitable habitat for this species (Astron, 2014). The Western Pebble-mound mouse has a widespread distribution of across the Pilbara, Carnarvon and upper Gascoyne regions (Eco Logical Australia, 2017). Due to this species' large area of occupancy across the Pilbara, the proposed clearing of 200 hectares within a 1,656 hectare boundary is not expected to have a significant impact on habitat availability for the Western Pebble-mound Mouse.

The Rainbow Bee-eater (*Merops ornatus*) and the Fork-tailed Swift (*Apus pacificus*) are both migratory species which could potentially utilise all habitat types within the application area for foraging, roosting and possibly breeding. Given the wide ranging and migratory nature of these species, it is unlikely that the proposed clearing

will significantly impact habitat availability for these species or impact their conservation significance (Eco Logical Australia, 2017).

The Northern Quoll (*Dasyurus hallucatus*) occurs in a range of habitats in the Pilbara including rocky areas, Eucalypt forest and woodland, shrubland, grassland, desert, gorge, breakaway and major drainage line habitat (Eco Logical Australia, 2017). Suitable foraging and denning habitat for the Northern Quoll could be present in the drainage line and gorge/gully habitat types (Eco Logical Australia, 2017), however previous fauna surveys in the application area did not identify any suitable denning sites within these habitat types (Astron, 2014). Given this, and the fact that drainage line and gorge/gully habitats accounts for only 0.1% of the application area, the area proposed to be cleared is not considered likely to represent significant habitat for the Northern Quoll.

The Pilbara Olive Python (*Liasis olivaceus* subsp. *barroni*) inhabits rocky escarpments, deep gullies and gorges within the Pilbara region and is often recorded near water holes and riverine habitats. Suitable habitat for the Pilbara Olive Python is present in the application area, within the drainage lines and gorge/gully habitat types (Eco Logical Australia, 2017). However, given that these habitat types account for only 2.4% of the application area (Eco Logical Australia, 2017) and given the lack of any major rivers, gorges or permanent water bodies within the application area, it is considered unlikely that the area represents a significant habitat for the species. Potential impacts to conservation significant fauna within the 'drainage line' habitat as a result of the proposed clearing may be minimised by a watercourse management condition.

Two bat adits which may provide potential habitat and support roosting activity for the Pilbara Leaf-nosed Bat have been identified within the area proposed to be cleared (Eco Logical, 2017). Hamersley Resources have committed to maintaining an exclusion buffer around these adits (Hamersley Resources Limited, 2019), and potential impacts may be further minimised by the implementation of a restricted clearing condition.

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

Methodology Astron (2014)
Eco Logical Australia (2017)

GIS Database
- Imagery
- Pre-European Vegetation
- 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

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 (Eco Logical Australia, 2017).

The vegetation associations within the application area are common and widespread within the region (Eco Logical Australia, 2017; GIS Database), and the vegetation proposed to be cleared is unlikely to be necessary for the continued existence of any species of Threatened (rare) flora.

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

Methodology Eco Logical Australia (2017)

GIS Database:
- Pre-European Vegetation
- 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

According to available databases, there are no known Threatened Ecological Communities (TECs) within the application area (GIS Database). A flora and vegetation survey of the application area also did not identify any TECs (Eco Logical Australia, 2017) within the area proposed to be cleared. The closest TEC is the Ethel Gorge aquifer stygobiont community, located approximately 58 kilometres east-southeast of the proposed clearing areas (GIS Database). The proposed clearing is unlikely to have an impact on this TEC.

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

Methodology Eco Logical Australia (2017)

GIS Database:

- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffers

(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 99.6% of the pre-European vegetation still exists in the IBRA Pilbara Bioregion (Government of Western Australia, 2018). The application area is broadly mapped as Beard vegetation associations 19: Low woodland; mulga (*Acacia aneura*); 29: Sparse low woodland; mulga, discontinuous in scattered groups, and 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana* (Eco Logical Australia, 2017; GIS Database). The pre-European extent of each of these vegetation associations remains at approximately just over 99% uncleared at both the state and bioregional level (Government of Western Australia, 2018).

Based on the information below, 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	~99.6	Least Concern	6.3
Beard vegetation associations – WA					
18	19,892,306	19,843,729	~99.7	Least Concern	2.1
29	7,903,991	7,900,200	~99.9	Least Concern	0.3
82	2,565,901	2,553,217	~99.5	Least Concern	10.2
Beard vegetation associations – Pilbara Bioregion					
18	676,556	672,424	~99.4	Least Concern	16.7
29	1,133,219	1,132,939	~99.9	Least Concern	1.9
82	2,563,583	2,550,899	~99.5	Least Concern	10.3

* 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 Department of Natural Resources and Environment (2002)
Eco Logical Australia (2017)
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

There are no permanent watercourses or wetlands within the area proposed to clear (GIS Database). There are several minor ephemeral drainage lines that pass through the application area (GIS Database), which are only likely to flow following heavy rainfall events (Eco Logical Australia, 2017). The MnC01 vegetation association was found to be associated with minor creek lines and drainage lines (Eco Logical Australia, 2017) and Hamersley Resources Limited have indicated that vegetation association MnC01 is likely to be disturbed as part of this application (Eco Logical, 2017).

Based on the above, the proposed clearing is at variance to this Principle. Potential impacts to vegetation growing in association with watercourses may be minimised by the implementation of a watercourse

management condition.

Methodology Eco Logical Australia (2017)

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 is comprised of four land systems (GIS Database). The Newman land system is the main component of the proposed area to be cleared, with smaller areas mapped as Spearhole, Boolgeeda and Wannamunna (Eco Logical Australia, 2017). These land systems have 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 plateaux, ridges and mountains supporting hard spinifex grasslands. This unit is not susceptible to large-scale degradation or erosion (Van Vreeswyk *et al.* 2004).

The Spearhole land System consists of gently undulating gravelly hardpan plains and dissected slopes supporting groved mulga shrublands and hard spinifex. This unit is not prone to erosion (Van Vreeswyk *et al.* 2004).

The Boolgeeda land system consists of stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands. This unit is not susceptible to degradation or erosion (Van Vreeswyk *et al.* 2004).

The Wannamunna land system consists of hardpan plains and internal drainage track supporting mulga shrublands and woodlands, occasionally with eucalypt woodlands. This unit is not susceptible to degradation, however if grazing pressure is excessive, degradation could occur (Van Vreeswyk *et al.* 2004).

Given that these land systems are typically not susceptible to degradation or erosion, and given the purpose of proposed clearing (mineral exploration and geotechnical investigations) it is considered unlikely that the proposed clearing will cause appreciable land degradation.

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

Methodology Eco Logical Australia (2017)
Van Vreeswyk *et al.* (2004)

GIS Database:

- Landsystem Rangelands

(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 65 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. Given that the Minor Creek Lines and Drainage Lines vegetation association (MnC01) is

likely to be disturbed under the proposal (Eco Logical Australia, 2017), vegetation clearing could result in localised increases to sediment loading during surface runoff. However, potential impacts to surface water as a result of clearing for exploration activities is likely to be low, and will be further minimised by the implementation of a watercourse management condition.

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

Methodology Eco Logical Australia (2017)

GIS Database:

- Hydrography, Linear
- Public Drinking Water Source Areas

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

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

The climate of the region is arid, with very hot temperatures from November to February, and milder conditions in winter. The average annual rainfall at Newman is 317 millimetres (BOM, 2019), with the region having an average annual evaporation of approximately 2,500 millimetres, exceeding the average annual rainfall (BOM, 2019). Seasonal drainage lines are common in the region (GIS Database) and temporary localised flooding may occur briefly following heavy rainfall events. However, the proposed clearing for the purpose of exploration activities 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 BOM (2019)

GIS Database:

- Hydrography, linear

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

Comments

The clearing permit application was advertised on 26 November 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, 2019). This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are several registered Aboriginal Sites of Significance within the application area (DPLH, 2019). 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 (2019)

4. References

- Astron (2014) Rhodes Ridge, AR-13-11926 Vegetation, Flora and Fauna Survey. Report prepared for Rio Tinto Iron Ore, by Astron, May 2014.
- BoM (2018) Bureau of Meteorology Website – Climate Data Online, Weather Station Name. Bureau of Meteorology. <http://www.bom.gov.au/climate/data/> (Accessed 11 January 2019).
- 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 11 January 2019).
- Eco Logical Australia (2017) Rhodes Ridge Flora, Vegetation and Fauna Habitat Assessment. Report prepared for Hamersley Iron Pty Ltd, by Eco Logical Australia, December 2017.

- 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>
- Hamersley Resources Limited (2019) Additional information received in relation to Clearing Permit Application CPS 8245/1. Hamersley Resources Limited, Western Australia.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- 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 (2019). FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/> (Accessed 8 January 2019).

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	<i>Environmental Protection Act 1986</i> , Western Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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	<i>Rights in Water and Irrigation Act 1914</i> , 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.