Government of Western Australia
Department of Mines and Petroleum

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 7017/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Lithium Australia NL**

1.3. Property details

Property: *Exploration Licence 74/543*
Local Government Area: Shire of Ravensthorpe

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
2.89		Mechanical Removal	Mineral exploration and access tracks

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 26 May 2016

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. One Beard vegetation association is located within the application area (GIS Database):

Beard vegetation association 516: Shrublands; mallee scrub, black marlock.

Keith Lindbeck and Associates (2010) conducted a flora and vegetation survey over the application and identified 5 vegetation types:

1) Tall mallee shrubland of *Eucalyptus oleosa* subsp. *corvina* and patches of *E. cernua* over *Melaleuca cliffortioides*, *Acacia cyclops*, *Alyogyne hakeifolia*, *Dodonaea ptarmicaefolia*, *Halgania andromedifolia*, and *Acacia glaucoptera*. On dark redbrown mineralised cracking clays;
2) Mallee shrubland of *Eucalyptus pleurocarpa* and occasional *E. uncinata* over *Calothamnus quadrifidus*, *Melaleuca hamata*, *Allocasuarina campestris*, *Leptospermum erubescens*, *Daviesia pachyphylla*, *Acacia mimica* var. *angusta*, *Gastrolobium parviflorum*, *Gyrostemon subrudus*, *Goodenia scapigera*, *Commersonia crispa*, and *Lepidosperma* sp. Mt Benson. On sandy clay soils among white quartz rocks of weathered pegmatite;
3) Mallee shrubland of *Eucalyptus proxima*, *E. pluricaulis* and *E. flocktoniae* over *Melaleuca cliffortioides*, *M. lateriflora*, *Hakea strumosa*, *Eutaxia cuneata*, *Acacia glaucoptera*, *Dodonaea pinifolius*, *Hibbertia pungens*, *Boronia crenulata*, *B. inornata* subsp. *inornata*, *Lepidosperma* sp. Ravensthorpe, *Gahnia ancistrophylla*, and *Teucrium sessiliflorum*;
4) Tall mallee shrubland of *Eucalyptus sporadica* over *Calothamnus quadrifidus*, *Melaleuca hamata*, *Daviesia pachyphylla*, *Gastrolobium parviflorum*, *Gyrostemon subrudus*, *Goodenia scapigera*, *Dampiera angulata* and *Hibbertia recurvifolia*. On loamy clay in sites of moisture expression on mid slopes;
5) Melaleuca low shrubland of *Melaleuca elliptica* over *Spartochloa scirpiodea*, on open quartz-rich granite sheets

Clearing Description Lithium Australia NL proposes to clear up to 2.89 hectares of native vegetation within a total boundary of approximately 48 hectares, for the purpose of mineral exploration and access tracks. The project is located approximately 17 kilometres south west of Ravensthorpe in the Shire of Ravensthorpe.

Vegetation Condition Good : Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).

To:

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

Comment The condition of the vegetation under application was determined via a flora and vegetation survey conducted over the application area by Keith Lindbeck and Associates (2010) in support of the previously granted clearing permit CPS 4081/1.

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 proposed clearing of 2.89 hectares of native vegetation is to occur within a clearing permit boundary of approximately 48 hectares and will allow for a drilling program to be completed. Thirty five drill holes, three

costeans and 3.5 kilometres of tracks are proposed.

The application areas fall within the Fitzgerald sub-region of the Esperance Plains Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). This sub-region includes the Stirling Ranges Flora, the Fitzgerald River National Park (Biosphere) and has been recognised as a centre of species diversity in southwest Western Australia (CALM, 2002). The vegetation within this sub-region is characterised as having myrtaceous and proteaceous scrub and mallee heaths on sand plain overlying Eocene sediments; rich in endemics. Herb fields and heaths (rich in endemics) occur on abrupt granite tors and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and alluvial foot-slopes (CALM, 2002).

The application area was affected by a fire event that occurred during 2008 and the fire scar appears to remain visible on current aerial imagery (Keith Lindbeck and Associates, 2010; GIS Database). The majority of the vegetation present within the application area has returned to a Good (Keighery, 1994) condition, while areas of Very Good to Pristine (Keighery, 1994) vegetation persist sporadically throughout (Keith Lindbeck and Associates, 2010; GIS Database).

A Level 1 flora survey was conducted over the majority of the application area in 2010 by Keith Lindbeck and Associates and no Threatened flora were recorded; however the survey was undertaken 2 years after the fire event. This was noted as a limitation within the flora survey report, as species found regenerating in burnt areas were not able to be accurately identified (DPaW, 2016b; Keith Lindbeck and Associates, 2010).

According to available databases, six Priority 1 flora species, four Priority 2 flora species and seven Priority 3 listed flora species have been recorded within the local area (20 kilometre radius) (DPaW, 2016a). Of these, two Priority 1 species (*Austrostipa* sp. Carlingup Road and *Austrostipa* sp. Ravensthorpe Range), two Priority 2 species (*Cassinia arcuata and Levenhookia pulcherrima)* and three Priority 3 species (*Acacia bifaria, Gnephosis intonsa* and *Gonocarpus trichostachyus)* are known to occur within 5 kilometres of the application area (DPaW, 2016a). Only *Eucalyptus proxima* was recorded during the flora survey. This species in no longer a Priority listed species (Western Australian Herbarium, 1998-; Keith Lindbeck and Associates, 2010).

DPaW (2016b) have advised that Priority flora species with the potential to persist within the application area, would not have been located (if present) during the 2010 survey due to the recent fire event. As it is now eight years since the fire event, sufficient time has passed for a survey to be undertaken where Priority flora (if present) will be identifiable within the now regenerated vegetation (DPaW, 2016b). If any Priority flora are proposed to be impacted, the extent of the local population should be recorded to enable an assessment of the proportional impact of the proposal to the local population (DPaW, 2016b). Potential impacts to Priority flora species as a result of the proposed clearing may be minimised by the implementation of a flora management condition.

The application area falls within the Cocanarup Reserve (Crown Reserve 30795) which is recognised as an Environmentally Sensitive Area (GIS Database), is known to be comprised of *Eucalytpus salmonophloia* over Acacia acuminata woodlands on red loams and is considered to be an ecosystem at risk (CALM, 2002).

No Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) are known within the application area (GIS Database) and none were identified during the flora and vegetation survey. The closest PEC is located approximately 20 kilometres north east.

Very few weeds were identified within the application area during the flora survey. Scarlet Pimpernel (*Lysimachia arvensis*) and Capeweed (*Arctotheca calendula*) were recorded in areas north of the application area. These species are not listed as a declared pest on the Western Australian Organism List (WAOL) (DAFWA, 2016). Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. The application area is located within a Dieback (*Phytophthora cinnamomi*) Risk Zone (Keith Lindbeck and Associates, 2010). Dieback is not known in the immediate vicinity and no signs of dieback were observed within the application area. The relatively rich soils limit the amount of susceptible species with only a few proteaceous and other susceptible taxa resent. Weed invasion and dieback infestation has the potential to alter the biodiversity of an area. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed and dieback management condition.

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

Methodology

CALM (2002)
DAFWA (2016)
DPaW (2016a)
DPaW (2016b)
Keighery (1994)
Keith Lindbeck and Associates (2010)
Western Australian Herbarium (1998-)

GIS Database:
- IBRA WA (Regions - Sub Regions)
- Imagery
- Pre-European vegetation
- Threatened and Priority Ecological Communities Buffers

- 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

There are a number of fauna species of conservation significance that have been recorded within the local area (20 kilometre radius); Carnaby's cockatoo (*Calyptorhynchus latirostris* – EN), Chudich (*Dasyurus geoffroii* - VU), Malleefowl (*Leipoa ocellata* - VU), Numbat (*Myrmecobius fasciatus* - EN), Western Ground Parrot (*Pezoporus flaviventris* - CR) and Heath mouse (*Pseudomys shortridgei* - VU). A Level 1 fauna assessment conducted over the application area and surrounding area, identified minor areas of potential habitat for Carnaby's cockatoos, in the form of scattered *Eucalyptus salmonophloia* (Keith Lindbeck and Associates, 2010). Areas of significant fauna habitat were identified to the north, such as *Eucalyptus salmonophloia* and E. *occidentalis* with scattered *E. salmonophloia* woodlands (Keith Lindbeck and Associates, 2010). There are also large areas of native vegetation remaining in the local area and region, including the Fitzgerald River National Park, which is situated approximately 10 kilometres south west and has an extent of over 280,000 hectares (GIS Database).

The Fitzgerald River National Park is connected to the application area via relatively continuous vegetation and while local fauna may prefer the higher quality vegetation of the national park, it is likely that local fauna forage and traverse through the application area, particularly as parts of the national park were burnt in late 2015 (DPaW, 2016b).

Although impacts to the majority of local fauna species (including species of conservation significance) are not likely to be significant due to the small size of the proposed clearing and large amount of surrounding vegetation, DPaW (2016b) have advised that impacts to the Numbat, Carnabys cockatoo and Malleefowl may potentially be significant if key habitat/breeding features are present.

The Numbat is of concern, given that the application area was previously used as a translocation site. The 2008 fire impacted on the population, and it is likely that they are no longer extant in the area. However, a survey should be conducted targeting suitable habitat for numbats within the application area and adjoining bushland. If numbats or recent evidence of numbats is found then the clearing may have a significant impact on the local population (DPaW, 2016b).

The proposed clearing area falls within a confirmed breeding area for the Carnaby's cockatoo, and therefore the area has the potential to be used for breeding and/or foraging. If hollow bearing trees are identified as being utilised by Carnaby's cockatoo, a buffer should be placed around the tree and clearing should take place outside of breeding season to minimise any disturbance (DPaW, 2016b).

DPaW (2016b) have advised that there are recent (2005 onwards) records of Malleefowl within the vicinity (20 kilometre radius) of the application area, therefore the application area has the potential to be used for nesting, foraging and/or traversing through the landscape. While the area proposed to be cleared is a very small proportion of the surrounding vegetation, if Malleefowl mounds are located, a buffer should be placed around the mound. If a mound is found to be active, then clearing should take place outside of breeding season to minimise any disturbance (DPaW, 2016b)

Potential impacts to the Numbat, Carnaby's cockatoo and Malleefowl as a result of the proposed clearing may be minimised by the implementation of fauna management conditions. In addition to fauna management conditions, it is recommended that clearing activities be conducted in a manner which allows any vertebrate fauna to move out of the area, and should be undertaken to avoid the breeding season of local fauna species such as the Chuditch to minimise disturbance (DPaW, 2016b).

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

Methodology

DPaW (2016a)
DPaW (2016b)
Keith Lindbeck and Associates (2010)

GIS Database:
- DPaW Tenure
- Imagery

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

Comments

Proposal may be at variance to this Principle

According to available databases, three species of Threatened flora have been recorded within the local area (20 kilometre radius) (DPaW, 2016a).

A Level 1 flora survey was conducted over the majority of the application area in 2010 by Keith Lindbeck and Associates and no Threatened flora were recorded; however the survey was undertaken 2 years after a fire event. This was noted as a limitation within the flora survey report, as species found regenerating in burnt areas were not able to be accurately identified (DPaW, 2016b; Keith Lindbeck and Associates, 2010).

The Threatened flora species *Coopernookia georgei* occurs in stony gullies and *Verticordia helichrysantha* is known from sandy soils over spongolite and is associated with coastal plains and cliffs. These habitat types have not been identified within the application area. *Grevillea maxwellii* (Threatened flora) prefers sandy clay or clay loam over granite. Sandy clay soils have been identified within the application area. The Threatened flora species identified as being the most likely to occur within the application area is *Eremophila denticulata* subsp. *denticulata* (DPaW, 2016b).

DPaW (2016b) have advised that Threatened flora species with the potential to persist within the application area, would not have been located during the 2010 flora survey due to the recent fire event. As it is now eight years since the fire event, sufficient time has passed for a survey to be undertaken where Threatened flora (if present) will be identifiable within the now regenerated vegetation (DPaW, 2016b). If any Threatened flora are proposed to be impacted, the extent of the local population should be recorded to enable an assessment of the proportional impact of the proposal to the local population (DPaW, 2016b)

Potential impacts to Threatened flora species as a result of the proposed clearing may be minimised by the implementation of a flora management condition.

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

Methodology DPaW (2016a)
DPaW (2016b)
Keith Lindbeck and Associates (2010)

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 at variance to this Principle**

According to available databases, there are no known Threatened Ecological Communities (TECs) within the application area (GIS Database) and no TECs were identified during a flora and vegetation survey of the application area (Keith Lindbeck and Associates, 2010).

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

Methodology Keith Lindbeck and Associates (2010)

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

(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 occurs within the Esperance Plains Interim Biogeographic Regionalisation of Australia bioregion, in which approximately 55.5% of the pre-European vegetation remains (see table below) (Government of Western Australia, 2014; GIS Database). One Beard vegetation association has been mapped within the application area (GIS Database). As the below table indicates, Beard vegetation 516 is well represented within the state and bioregion, retaining levels above the recommended 30% threshold of pre-European settlement levels of native vegetation (Commonwealth of Australia, 2001).

Large areas of native vegetation remain in the local area and region, including the Fitzgerald River National Park, which is situated approximately 10 kilometres south west and has an extent of over 280,000 hectares (GIS Database).

Given the small scale of the proposed clearing and large amount of connected native vegetaton in the local area and region (DPaW, 2016b; GIS Database), the native vegetation under application is not considered to be a remnant in a highly cleared area.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DPaW Managed Lands
IBRA Bioregion – Esperance Plains	2,899,941	1,495,049	~ 51.5	Least concern	~28.8
Beard veg assoc. - State					
516	607,434	332,982	~ 54.8	Least concern	~ 24.3
Beard veg assoc. -					

Bioregion					
516	319,890	220,102	~ 68.8	Least concern	~ 28.7

* 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 Commonwealth of Australia (2001)
Department of Natural Resources and Environment (2002)
DPaW (2016b)
Government of Western Australia (2014)

GIS Database:
- DPaW Tenure
- IBRA Australia
- Imagery
- 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 may be at variance to this Principle**

Several minor non-perennial watercourses intersect the application area and the vegetation described during the flora and vegetation survey consists of species representative of riparian vegetation (Keith Lindbeck and Associates, 2010). Given the relatively small scale and low impact nature of clearing activities, significant impacts to riparian vegetation are unlikely. Potential impacts to vegetation growing in association with a watercourse as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.

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

Methodology Keith Lindbeck and Associates (2010)

GIS Database:
- Hydrography, linear
- Hydrography, linear (hierarchy)

(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 proposed clearing of 2.89 hectares of native vegetation is to occur within a clearing permit boundary of approximately 48 hectares. Thirty five drill holes, three costeans and 3.5 kilometres of tracks are proposed.

The application area is mapped as being composed of undulating to hilly ridge and slope topography with flat to gently sloping crests to the ridges; rock outcrops are common on slopes: chief soils are hard alkaline yellow mottled and red mottled soils (Northcote *et al.* 1960-68; GIS Database).

Given that disturbance activities (tracks, drill holes and costeans) are to be spread throughout the clearing permit boundary area, the proposed clearing 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 Northcote *et al.* (1960-68)

GIS Database
- 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**

The application area is not located within an area designated for conservation (GIS Database). The nearest conservation area (Koornong Nature Reserve) is located approximately 7 kilometres west.

However the application area falls within the Cocanarup Reserve (Crown Reserve 30795) which is recognised as an Environmentally Sensitive Area (GIS Database), is known to be comprised of *Eucalytpus salmonophloia* over Acacia acuminata woodlands on red loams and is considered to be an ecosystem at risk (CALM, 2002). The Cocanarup Reserve was also previously used as a translocation site for the Numbat (*Myrmecobius fasciatus* - EN) and therefore has been managed or protected for the purposes of conservation. Potential impacts to the Numbat, as a result of the proposed clearing may be minimised by the implementation of a

fauna management condition.

Large areas of native vegetation remain in the local area and region, including the Fitzgerald River National Park, which is situated approximately 10 kilometres south west and has an extent of over 280,000 hectares (GIS Database).

The application area is connected to the Fitzgerald River National Park via relatively continuous vegetation (DPaW, 2016b). Given the relatively small scale and low impact nature of clearing activities and its proximity to extensive areas of remaining native vegetation, the proposed clearing is unlikely to result in significant impacts to adjacent or nearby conservation areas, or any areas used for the purpose of conservation.

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

Methodology DPaW (2016b)

GIS Database:
- DPaW Tenure
- Imagery

(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 is located within the Culham Inlet Phillips West Steere Catchment Area. No Public Drinking Water Source Areas (PDWSA) or RIWI Act Groundwater Areas are mapped over the application area (GIS Database).

Several minor non-perennial watercourses intersect the application area and it is possible that some minor increases in sedimentation may occur within these watercourses, should they hold water following a rain event. Potential impacts to surface water quality as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.

The groundwater salinity of the application area is considered saline (7000 to 14000 milligrams/Litre Total Dissolved solids) (GIS Database). The proposed clearing of 2.89 hectares of native vegetation is considered unlikely to result in a further deterioration in the quality of groundwater.

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

Methodology GIS Database:
- Groundwater Salinity, Satewide
- Hydrography, linear
- Public Drinking Water Source Areas (PDWSAs)
- RIWI Act, Groundwater 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**

Mean annual rainfall for Ravensthorpe is approximately 427 millimetres (BoM, 2016). The Esperance Plain region is typical of a Mediterranean climate, with the majority of rain falling in the winter months (BoM, 2016) and the minor non-perennial watercourses that intersect the application area will likely flow following significant rain events.

The proposed clearing of 2.89 hectares of native vegetation is to occur within a clearing permit boundary of approximately 48 hectares and will allow for a drilling program to be completed. Thirty five drill holes, three costeans and 3.5 kilometres of tracks are proposed. Given the relatively small scale and low impact nature of clearing activities, an increase in the incidence or intensity of flooding is unlikely to result.

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

Methodology BoM (2016)

GIS Database:
- Hydrography, linear

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Comments

There are three native title claims over the application area (WC2003/006, WC1996/109 and WC1998/070) (DAA, 2016). 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 datasets, there are no Sites of Aboriginal Significance located in the area applied to clear (DAA, 2016). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment Regulation, the 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 18 April 2016 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received in relation to this application.

Methodology DAA (2016)

4. References

BoM (2016) Climate Statistics for Australian Locations. A Search for Climate Statistics, Australian Government Bureau of Meteorology. <http://www.bom.gov.au> (Accessed May 2016).

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

Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.

DAA (2016) Aboriginal Heritage Inquiry System, Department of Aboriginal Affairs, Perth, Western Australia < http://maps.dia.wa.gov.au> (Accessed 01 May 2016).

DAFWA (2016) Western Australian Organism List (WAOL), Department of Agriculture and Food, South Perth, Western Australia < https://www.agric.wa.gov.au> (Accessed 18 May 2016).

DPaW (2016a) NatureMap, Department of Parks and Wildlife <http://naturemap.dec.wa.gov.au> (Accessed 27 April 2016).

DPaW (2016b) Flora and Fauna advice received in relation to Clearing Permit Application CPS 7017/1. Species and Communities Branch, Department of Parks and Wildlife, Western Australia, May 2016.

Government of Western Australia (2014) 2014 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of June 2014. WA Department of Environment and Conservation, Perth.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Keith Lindbeck and Associates (2010) Level 1 Flora Vegetation and Fauna Survey, November 2010. Supporting information for CPS 4081/1. Keith Lindbeck and Associates, Bullcreek, Western Australia.

Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68): 'Atlas of Australian Soils, Sheets 1 to 10, with explanatory data'. CSIRO and Melbourne University Press: Melbourne.

Western Australian Herbarium (1998–). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <https://florabase.dpaw.wa.gov.au> (Accessed May 2016).

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DPaW and DER)
DER	Department of Environment Regulation, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DRF	Declared Rare Flora
DotE	Department of the Environment, Australian Government
DoW	Department of Water, Western Australia
DPaW	Department of Parks and Wildlife, Western Australia
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DotE)
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 (2015) 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.

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.

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.