Government of **Western Australia**
Department of **Mines and Petroleum**

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 6900/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Tuma Holdings Pty Ltd**

1.3. Property details

Property: Mining Lease 70/836
Local Government Area: Shire of Northam
Colloquial name: Goods Road Sand Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
5		Mechanical Removal	Sand Extraction

1.5. Decision on application

Decision on Permit Application: Granted
Decision Date: 30 March 2017

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

Beard vegetation associations have been mapped for the whole of Western Australia. Two Beard vegetation associations have been mapped within the application area:

4: Medium Woodland; marri and wandoo; and
3003: Medium forest; jarrah & marri on laterite with wandoo in valleys, sandy swamps with teatree and Banksia.

A flora survey was undertaken of adjacent Mining Lease 70/1113 which also included areas of Mining Lease 70/836 immediately east of the application area (Bioscience, 2012). The vegetation within Mining Lease 70/836 was described as:

Jarrah Low Woodland: The majority of the site is covered by a low, very open woodland of *Eucalyptus marginata* subsp *thalassica*, with a generally sparse understory of scattered *Stirlingia latifolia*, *Banksia sessilis*, *Hibbertia heugelii*, *Xanthorrhoea gracilis* and *Mesomelaena tetragona*. This vegetation unit is associated with yellow sandy soil, and to the south, white sandy soil. In the white sandy soil *Desmocladus flexuosus* replaces *Mesomelaena* in the understorey.

The area of vegetation immediately to the west of the application area was surveyed in 1998 (Landform Research, 1998) and described the area as:

- Open Low Jarrah Woodland: Species comprised of scattered regrowth of *Eucalyptus marginata* with isolated *Banksia grandis* over an understorey dominated by *Stirlingia latifolia*, *Bossiaea eriocarpa*, *Dryandra lindleyana* with *Hibbertia huegelii*.

Clearing Description

Goods Road Sand Project
Tuma Holdings Pty Ltd proposes to clear up to 5 hectares of native vegetation within an application area of approximately 5.86 hectares for the purpose of sand extraction. The application area is located approximately 50 kilometres east of Perth within the Shire of Northam.

Vegetation Condition

Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).

Comment

The application area is located adjacent to an existing sand mining operation to the north and farmland to the south. The application area is bordered by native vegetation to the east. The vegetation is located within the Mundaring Weir Catchment Area.

The vegetation condition was assessed by botanists from Bioscience. The flora survey was conducted during October and as such, it is likely that early flowering species would not have been recorded (Bioscience, 2012).

Part of the application area was previously approved under CPS 4187/1 but was never cleared. The boundary was amended during amendment CPS 4187/3 to remove this area form the permit.

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 application area is located within the Northern Jarrah Forest subregion of the Jarrah Forest Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). The vegetation of the subregion comprises of Jarrah-Marri forest in the west with Bullich and Blackbutt in the valleys, grading to Wandoo and Marri woodlands in the east with Powderbark on breakaways (CALM, 2002).

The vegetation within the application area has been described as Jarrah Low Woodland (Bioscience, 2012; Landform Research, 1998). A site inspection by the Department of Environment and Conservation on 14 April 2005 of the vegetation adjacent to the application area determined the vegetation to be regrowth jarrah forest (Department of Environment and Conservation, 2007). None of the vegetation within the application area has been identified as a Threatened or Priority Ecological Community (Bioscience, 2012; Landform Research, 1998; GIS Database).

Bioscience (2012) has recorded a total of 71 flora species from an area on Mining Lease 70/836 adjacent to the application area and adjacent tenement Mining Lease 70/1113. Landform Research (2006) also recorded a total of 60 flora species from 39 genera within an area of Jarrah woodland on Mining Lease 70/836 adjacent to the application area. Given the similarity of vegetation types on Mining Lease 70/836, it is likely that the number and type of flora taxa recorded by these surveys would be comparable to the vegetation within the application area.

No species of Threatened or Priority flora have been recorded within the application area (Bioscience, 2012; Landform Research, 1998; GIS Database). There are several species of Priority flora recorded within 10 kilometres of the application area (GIS Database). None of these species have been recorded on Mining Lease 70/836 (Bioscience, 2012; Landform Research, 1998). Similar areas of habitat are present throughout the Mundaring State Forest so it is not likely that the proposed clearing will have a significant impact on Priority flora species (GIS Database).

The application area is located within a large tract of vegetation within the Mundaring State Forest. Given this large area of intact vegetation and the application area's location adjacent to an existing sand mine and agricultural land, it is not likely to contain a high level of faunal diversity (GIS Database).

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

Methodology

Bioscience (2012)
CALM (2002)
Department of Environment and Conservation (2007)
Landform Research (1998)

GIS Database:
- Dieback Occurrence
- IBRA Australia
- Imagery
- Threatened and Priority Flora

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposal is not likely to be at variance to this Principle

The habitat within the application area comprised of open woodland of primarily Jarrah, Wandoo and other *Eucalyptus* over *Xanthorrhoea* over grasses and various herbaceous plants (Bioscience, 2012). The application area is located within the Mundaring Weir Catchment Area, and Smith et al. (2007) confirm that virtually all the native forest within the catchment has been previously logged. Bioscience (2012) observed a number of trees in the adjacent areas that offered hollows suitable for nesting for a number of fauna species. However, the majority of these trees are too small to provide hollows large enough for Baudin's Cockatoo (*Calyptorhynchus baudinii* - Endangered), Carnaby's Cockatoo (*Calyptorhynchus latirostris* - Endangered) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso* - Vulnerable) (Bioscience, 2012). The presence of *Eucalyptus marginata* and *Banksia grandis* within and adjoining the application area indicates that the vegetation may provide suitable foraging habitat for these species.

The proposed clearing is located adjacent to an existing sand mining operation but is situated within the large expanse of native vegetation within the Mundaring State Forest covering an area in excess of 50,000 hectares. The application area is unlikely to provide an important ecological link or corridor for native fauna species.

Given that the application area is contiguous with large tracts of native vegetation which form part of the Mundaring State Forest and considering the disturbance associated with the existing sand mining operation it is not likely that the vegetation applied to be cleared comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

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

Methodology Bioscience (2012)
Smith et al. (2007)

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

Comments **Proposal is not likely to be at variance to this Principle**
According to available databases, there are no records of any Threatened flora species within the local area (10 kilometre radius) (GIS Database). No Threatened flora species have been recorded by flora surveys on Mining Lease 70/836 (Bioscience 2012, Landform Research, 1998).

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

Methodology Bioscience (2012)
Landform Research (1998)

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 no records of Threatened Ecological Communities (TECs) within the local area (10 kilometres radius). The nearest known TEC is located approximately 32 kilometres west of the application area (GIS Database).

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

Methodology GIS Database:
- Threatened and Priority Ecological Communities (TEC/PEC) - 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 falls within the Jarrah Forrest Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 53.76% of the pre-European vegetation remains (see table) (Government of Western Australia, 2015; GIS Database).

The vegetation of the application area has been mapped as Beard vegetation associations 4 and 3003. Beard vegetation 3003 is still well represented with over 50% remaining at a state and bioregional level (Government of Western Australia, 2015). Beard vegetation association 4 is considered to be vulnerable at a state and bioregional level with approximately 28% remaining (Government of Western Australia, 2015). This is below the 30% threshold level recommended in the National Objectives Targets for Biodiversity Conservation below which, species loss appears to accelerate exponentially at an ecosystem level (EPA, 2000). Within the Northern Jarrah Forrest subregion the representation is above the 30% threshold (see table). Approximately 1.4 hectares of the application area is comprised of Beard vegetation association 4 (GIS Database). Whilst this vegetation association is vulnerable to impacts from clearing, the proposed clearing of 1.4 hectares is not likely to have a significant impact on its existence.

The Shire of Northam has been extensively cleared with only approximately 24% of its pre-European vegetation extent remaining (Government of Western Australia, 2015). The application area forms part of a large expanse of native vegetation that is located in Mundaring State Forest in the west of the Shire. Whilst the application area is within an area that has been extensively cleared, it is not a significant remnant and the proposed clearing of 5 hectares is not likely to have a significant impact on the remnant in which it is located.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DPaW Managed Lands (and post clearing %)
IBRA Bioregion - Jarrah Forrest	4,506,660	2,422,782	53.76	Least Concern	39 (69)
IBRA Subregion - Northern Jarrah	1,898,780	1,110,305	58.47	Least Concern	43 (69)

Forrest					
Local Government – Shire of Northam	143,131	33,842	23.64	Vulnerable	6 (25)
Beard vegetation associations - State					
4	1,054,279	293,916	27.88	Vulnerable	7 (23)
3003	66,451	39,080	58.81	Least Concern	29 (46)
Beard vegetation associations - Bioregion					
4	1,022,712	286,845	28	Vulnerable	7 (23)
3003	66,451	39,080	58.81	Least Concern	29 (46)
Beard vegetation associations - subregion					
4	614,200	199,214	32.43	Depleted	10 (30)
3003	66,451	39,080	58.81	Least Concern	29 (46)

* Government of Western Australia (2015)
** 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)
EPA (2000)
Government of Western Australia (2015)

GIS Database:
- 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 is not likely to be at variance to this Principle**
According to available databases, there is a minor non-perennial watercourse that passes through the western edge of the application area (GIS Database). This drainage lines runs from agricultural land to the south of the application area and is intercepted by a dam and Goods Road before entering the application area and flowing into the existing quarry (GIS Database). Given this drainage line has already been highly altered, the proposed clearing is unlikely to have any significant impact. The vegetation within the application area has not been identified as being associated with any watercourses or wetlands (Bioscience, 2012).

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

Methodology Bioscience (2012)

GIS Database:
- Imagery
- 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 at variance to this Principle**
The soils on Mining Lease 70/836, within which the application area lies, consist of quartz sands with small but variable amounts of duricrust (Landform Research, 1998). The sand is very porous, with no surface water runoff and low levels of water retention through summer (Landform Research, 1998). The high porosity of the sandy soils is likely to minimise the risk of water erosion, however, due to the sandy nature of the soils there is a potential for wind erosion to occur should native vegetation be removed. The potential impacts of erosion may be minimised by the implementation of a staged clearing condition.

Given the high porosity of the soils within the application area it is likely that a high proportion of rainfall that

occurs on site will infiltrate to groundwater. Groundwater recharge and discharge influence the quality and flow of surface water that enters into the nearby Wariin Brook (situated approximately 210 metres north of the application) which is ultimately held by Mundaring Weir on the Helena River (Smith et al., 2007).

A seepage area is located approximately 1.2 kilometres west of the application area and this area is situated immediately adjacent to a previously mined area on Mining Lease 70/233. Topographic contour information demonstrates that the seepage area is located down slope from the application area (GIS Database). This area is clearly evident in aerial imagery and located approximately 80 metres from Wariin Brook (GIS Database). The salinity of the water at the seep has been measured at 950 milligrams per litre Total Dissolved Solids (MWES, 2009).

The proposed clearing of 5 hectares of native vegetation and mining of the underlying soils will increase groundwater recharge which will subsequently continue or increase brackish to saline groundwater discharge into Wariin Brook. With an increase in the volume of water discharged at the seep it is probable that there will be an increased risk of waterlogging to a larger area at this seepage site, and this may make the area prone to increased salinisation during summer due to increased capillary evaporation and resultant salt deposition (MWES, 2009).

However, advice provided by the Department of Water (2016a) identifies that any clearing salinity impact could be mitigated by pit rehabilitation (which is required under conditions placed upon the mining tenement in accordance with the *Mining Act 1978*) and the establishment of a vegetation offset. Tuma Holdings Pty Ltd have committed to expanding the previous offset which was established under adjacent clearing permit CPS 4187/4. The revegetation offset area lies within the very high salinity risk part of the Mundaring Weir Catchment. The Department of Water have identified that the siting of the revegetation area along a stream line degraded by clearing induced salinisation meets the Department of Water requirements of not increasing the salinity levels within the catchment (Department of Water, 2016a).

The proposed clearing of 5 hectares of native vegetation is likely to increase recharge and continue or increase waterlogging and salinisation to land down gradient from the application area, and in Wariin Brook. However, these land degradation impacts may be mitigated through the implementation of a revegetation condition requiring the development of a revegetation offset within the very high salinity risk part of the Mundaring Weir Catchment. Pit rehabilitation which is required under conditions placed upon the mining tenement in accordance with the *Mining Act 1978,* will also contribute to mitigating the longer term impacts of land degradation.

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

Methodology Department of Water (2016a)
Landform Research (1998)
MWES (2009)
Smith et al. (2007)

GIS Database:
- Hydrography, linear
- Imagery
- Topographic Contours, 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 may be at variance to this Principle**
The application area is located within the Mundaring State Forest which is vested by the Conservation Commission for the purpose of State Forest (GIS Database). Wandoo National Park is located approximately 3 kilometres east of the application area (GIS Database), and Woottating Nature Reserve, Beechina Nature Reserve, Beechina North Nature Reserve and Inkpen Road Nature Reserve are located within 10 kilometres of the application area (GIS Database).

The application area is located directly adjacent to an existing sand mining operation. The Mundaring State Forest covers an area in excess of 50,000 hectares and the proposed clearing will not impact on any ecological linkages to any of the surrounding conservation areas (GIS Database).

Phytophthora dieback is known within the Mundaring State Forest with areas of inferred infestation within 10 kilometres of the application area (GIS Database). A flora survey on Mining Lease 70/836 did not observe any indications of dieback in the area, however, the proposed clearing activities have the potential to introduce and spread dieback and weeds within the Mundaring State Forest (Bioscience, 2012). Potential impacts from the spread of dieback and weeds may be minimised by the implementation of a dieback and weed management condition.

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

Methodology Bioscience (2012)

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 at variance to this Principle

The application area is located within the Mundaring Weir Catchment Area. This catchment has been subject to *Country Areas Water Supply Act 1947* (CAWS Act) native vegetation clearing controls since December 1978. The application area is located in Zone A, a very high salinity risk part of the catchment (Department of Water, 2016a).

The Mundaring Weir is located approximately 17 kilometres south-west of the application area (GIS Database). The Mundaring Reservoir supplies the Goldfields and Agricultural areas. The reservoir has a desired potable saline limit of 500 milligrams per litre (Total Dissolved Solids) (Smith et al., 2007), and this resource has always been sensitive to even small areas of clearing. The small residual clearings within the catchment total only 3% but remain a significant concern for the salinity of inflow to the reservoir (Smith et al., 2007).

The application area is located within the Helena River sub-catchment of the Mundaring Weir Catchment. This sub-catchment is known to contribute 63% of the reservoirs salt load and only 30% of the inflow. The salinity of water entering the Mundaring Reservoir from the Helena River sub-catchment alone has been measured at approximately 1,500 milligrams per litre (Total Dissolved Solids). The Mundaring Reservoir inflow salinity, with a mean of 510 milligrams per litre (Total Dissolved Solids), is above the desired potable limit (Smith et al., 2007).

A seepage area is located approximately 1.2 kilometres west of the application area and this area is situated immediately adjacent to a previously mined area on Mining Lease 70/233. Topographic contour information demonstrates that the seepage area is located down slope from the application area (GIS Database). This area is clearly evident in aerial imagery and located approximately 80 metres from Wariin Brook (GIS Database). The salinity of the water at the seep has been measured at 950 milligrams per litre Total Dissolved Solids (MWES, 2009).

Tuma Holdings set up two groundwater monitoring bores in 2009 to measure the water level and salinity content of each bore. Both groundwater monitoring bores are located west and down gradient of the application area. Groundwater salinity from these bores was measured as 2,940 milligrams/Litre total dissolved solids (TDS) and 3,480 milligrams/Litre TDS (Department of Water, 2016b). Another monitoring bore was set up approximately 200 metres east of the existing quarry and measured groundwater salinity of 2,280 milligrams/Litre TDS (Department of Water, 2016b).

Tuma Holdings interpretation of flow and salt movement in the area is that salt load to the groundwater of the paleochannel aquifer appears to occur from lateral inflow from the cleared farmland area to the south of the application area and not from quarry activities (Department of Water, 2016b). Whilst it is only based on one site, the Department of Water (2016b) agrees with the interpretation.

The Department of Water (2016a) identify that the application area is located in Zone A of the Mundaring Weir Catchment area and would normally oppose any proposed clearing because there would be an increased salinisation of water resources following the removal of native vegetation. Taking into account the history of Tuma Holdings mining on Mining Lease 70/836, the Department of Water (2016a) considers that any salinity impact from clearing could be mitigated by pit rehabilitation and the establishment of a vegetation offset of an equivalent area.

An offset of revegetation planting was established for adjacent clearing permit CPS 4187/4. The proposed offset planting for this application will expand and incorporate the existing offset area for CPS 4187/4. The salinity impacts associated with the proposed clearing of native vegetation may be mitigated through the implementation of a revegetation condition requiring the development of a vegetation offset within the very high salinity risk part of the Mundaring Weir Catchment and pit rehabilitation which is required under conditions placed upon the mining tenement in accordance with the *Mining Act 1978.*

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

Methodology

Department of Water (2016a)
Department of Water (2016b)
MWES (2009)
Smith et al. (2007)

GIS Database:
- Country Area Water Supply Act Part IIA Clearing Control Catchments
- Hydrograpy, linear

- Imagery
- Topographic Contours, Statewide

(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

Topographic contour information indicates that the application area is not associated within any low-lying drainage area (GIS Database). The soils within the application area are characterised by deep, coarse quartz yellow or red sands which are considered to be well drained (Landform Research, 1998) and the proposed clearing is not considered likely to cause, or exacerbate, the incidence or intensity of flooding.

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

Methodology Landform Research (1998)

GIS Database:
- Topographic Contours, Statewide

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

Comments

The permit area is within the South West Native Title Settlement area (Department of Aboriginal Affairs, 2017). This settlement resolves Native Title rights and interests over an area of approximately 200,000 square kilometres within the south west of Western Australia. 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 is one registered Aboriginal Site of Significance within the application area (Department of Aboriginal Affairs, 2017). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment Regulation, Department of Parks and Wildlife and the Department of Water, to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

The clearing permit was advertised on 25 January 2016 by the Department of Mines and Petroleum inviting submissions from the public. Following changes to the application it was readvertised on 30 January 2017. No submissions were received during either comment period.

Methodology Department of Aboriginal Affairs (2017)

4. References

Bioscience (2012) ML70/836 & ML70/1113 Vegetation, Flora and Fauna Report & Dieback and Cockatoo Report. Report prepared for Action Sand Supplies, by Bioscience, November 2012.

CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Jarrah Forest 1 (JF1 - Northern Jarrah Forest subregion. Department of Conservation and Land Management, Perth, Western Australia.

Department of Aboriginal Affairs (2017) Aboriginal Heritage Inquiry System. Department of Aboriginal Affairs. http://maps.dia.wa.gov.au/AHIS2/ (Accessed on 25 March 2017).

Department of Environment and Conservation (2007) Advice received in relation to Clearing Permit Application CPS 365/1, Department of Environment and Conservation, Western Australia.

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.

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Department of Water (2016b) Advice received in relation to Mining Lease Application M 70/1113, Department of Water, Western Australia, March 2016.

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Government of Western Australia (2016) 2015 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of June 2015. WA Department of Parks and Wildlife, Perth.

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Landform Research (1998) Vegetation Study and Rehabilitation Plan, ML 70/836, The Lakes. Report prepared for Action Sand Supplies, by Landform Research, 21 July 1998.

MWES (2009) Action Sand Supply, Salinity Risk Assessment, Action Sand Quarry. Report prepared for Action Sand Supply, by Meyer Water Environmental Solutions, 12 October 2009.

Smith, R. A., Bari, M. A., Dixon, R. N. M. & Rowlands, D. W. (2007) Helena River Salinity Situation Statement, Western Australia Department of Water, Water Resource Technical Series, no WRT 34, 190p.

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)
DEE	Department of the Environment and Energy, Australian Government
DER	Department of Environment Regulation, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DRF	Declared Rare Flora
DoE	Department of the Environment, Australian Government (now DEE)
DoW	Department of Water, Western Australia
DPaW	Department of Parks and Wildlife, Western Australia
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DEE)
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.