
Mt Latham Flora, Vegetation and Targeted Fauna Survey, Millendon

Revision Number 0.00




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1 Introduction

Arc Infrastructure (Arc) aims to upgrade the radio tower located on Mount Latham in Wagin, Western Australia. The project will involve the decommissioning and removal of the existing structure and replacement with a new structure. These works are necessary as the existing structure has reached its end of life and cannot accommodate the additional antenna loads for future services.

In order to undertake the replacement work, a small area of vegetation will need to be cleared to facilitate crane access and the laydown of the new tower structure prior to installation. Therefore, a flora and vegetation survey was undertaken by Arc's Ecologists to establish the biological values of the vegetation present within the site.

1.1 Background

The radio tower located in Mt Latham is a 55m high, light-duty, self-supporting mast. The age of this structure is estimated at approximately 40 years, with many structural components showing evidence of deterioration. Ongoing maintenance to this structure and replacement of parts is no longer feasible as parts were custom manufactured at the time of construction and are no longer available, thus maintenance relies on those parts salvaged from other towers in the network during upgrades. Additionally, structural assessments undertaken have identified the inability of the current structure to support the additional antenna loads for future services. The proposed replacement will be a 68m high self-supporting mast, which will modernise the operation of the radio network, increase the capacity of the tower and reduce maintenance costs.

1.2 Site Location

The radio tower to be replaced is located in Mt Latham, which is approximately 6.4km west of Wagin town centre, in the Shire of Wagin. The survey area is situated over two lots:

- R 43890 - owned by the Public Transport Authority (PTA) and leased by Arc Infrastructure
- R27580 – managed by the City of Wagin.

Permission has been obtained by both the City of Wagin and the PTA to apply for the relevant approvals to undertake these clearing works.

The total survey area, which is the proposed clearing area required to undertake the works, is approximately 573m² in size (Plate 1).

1.3 Scope

The scope of this project included:

- Desktop assessment of the clearing area using ArcGIS.
- Flora and vegetation assessment within the clearing area as per the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority (EPA), 2016).
- Targeted fauna assessment for Black Cockatoo habitat and foraging sources within the clearing area as per the *Referral guideline for 3 WA threatened black cockatoo species* (Department of Agriculture, Water and the Environment (DAWE), 2022).
- Preparation of a report with the outcomes of the survey.
- Preparation of GIS shapefiles in IBSA format.



November 6, 2023



Radio Tower



Survey Area



Department of Water and Environmental Regulation, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Landgate / SLIP

Ngare Mulholland

Landgate / SLIP | Department of Water and Environmental Regulation | Arc Infrastructure | Department of Biodiversity, Conservation and Attractions | Department of Planning, Lands and Heritage |

Plate 1: Survey Area Location at Mount Latham, Wagin

2 Desktop Assessment

2.1 Climate

The climate experienced at the survey area is semi-arid Mediterranean with hot, dry summers, and cool, wet winters.

2.2 Geology and Soils

The survey area is located in close proximity to the crest of Mount Latham, at an elevation of 380m above sea level. To the west of the tower is a gradual rise to the peak at 385m and to the east is a gradual decrease in elevation downslope. One soil type is recorded to be present within the survey area, being the Dellyanine 1 subsystem (unit symbol 257De_1). It is described as having gravelly crests and upper slopes usually bounded by breakaways with mainly deep and moderately deep sandy gravels and significant areas of shallow gravels (Department of Primary Industry and Regional Development (DPIRD), 2023a). However, it is located in very close proximity to the transition to the Dellyanine 3 subsystem (unit symbol 257De_3), which is characterised by grey deep sandy duplex, gritty brown deep sands and red deep loamy and sandy duplex soils associated with outcrops of granite, adamellite and dolerite on hillslopes and less commonly hillcrests (DPIRD, 2023a).

2.3 Hydrology

The survey area does not occur within a Public Drinking Water Source Area, RIWI Act Groundwater area or RIWI Act Proclaimed Surface Water Area. Proposed works will not impact on the surface water or groundwater in the area, with no water to be taken during the works.

2.4 Remnant Vegetation

The survey area occurs within the Katanning subregion of the Avon Wheatbelt IBRA Region (AVW02). This subregion is described as a gently undulating landscape of low elevation characterised by species-rich proteaceous scrub-heaths on uplands and sandplains, and woodlands containing *Eucalyptus* species, Rock Sheoak (*Allocasuarina huegeliana*) and Jam (*Acacia acuminata*) on alluvial and eluvial soils (Department of Conservation and Land Management, 2003).

The survey area contains one pre-European vegetation system, being part of the Wagin system (WAGIN_1073) (DPIRD, 2023b). This system is described as a woodland associated with the Wheatbelt, containing characteristic species including Brown Mallet (*Eucalyptus astringens*) and Wandoo (*E. wandoo*) on laterite mesas and breakaways and York gum (*Eucalyptus loxophleba*) and Wandoo on undulating slopes (Grein, 1994). The total pre-European extent of this vegetation system remaining is 35.93% (Department of Water and Environmental Regulation (DWER), 2020).

2.5 Habitat Connectivity

The survey area is centrally located within a reserve containing approximately 254 ha of remnant native vegetation. The proposed clearing of approximately 0.057 ha of degraded vegetation in small patches is unlikely to impact upon the habitat connectivity or linkages of vegetation in this region.

2.6 Environmentally Sensitive Areas

The survey area is not located within an Environmentally Sensitive Area (DWER, 2023).

2.7 Heritage

The site is not located within, or in close proximity to, any Aboriginal or European Heritage sites (Department of Planning, Lands and Heritage (DPLH), 2023a; 2023b). A due diligence assessment undertaken in terms of the Aboriginal Cultural Heritage Act 2021 shows no known Aboriginal Heritage sites impacting on survey area.

3 Methodology

3.1 Desktop Survey

3.1.1 Flora and Vegetation

A desktop survey was undertaken to determine the potential for any conservation significant flora species or ecological communities to occur within the site by examining relevant literature and databases for records within 10km of the site. This was done using the following databases:

- Protected Matters Search Tool (Department of Climate Change, Energy the Environment and Water (DCCEE), 2023);
- DBCA Threatened and priority flora database (DBCA, 2023a); and
- DBCA Threatened and priority ecological communities database (DBCA, 2023a).

3.1.2 Fauna

Desktop assessment for Black Cockatoo habitat consisted of reviewing DBCA locational records and a range of publicly available datasets relevant to Black Cockatoo breeding, roosting and foraging areas. These included:

- Distribution maps for Black Cockatoos within the Referral Guidelines for Three Threatened Black Cockatoo Species (DAWE, 2022);
- Carnaby's Cockatoo Confirmed (DBCA_050; DBCA, 2023b) and Unconfirmed Roost Sites (DBCA_051; DBCA, 2023c);
- Carnaby's Cockatoo Confirmed (DBCA_52; DBCA, 2023d) and Unconfirmed Roost Sites Buffered 6km (DBCA-053; DBCA, 2023e);
- Black Cockatoo Breeding Sites - Buffered DBCA_063 (DBCA, 2023f); and
- Black Cockatoo Roosting Sites – Buffered DBCA_064 (DBCA, 2023g).

3.2 Field Survey

An on-ground flora and vegetation survey was undertaken on the 8th of August 2023 and a secondary targeted flora survey was undertaken on the 16th of October 2023. The entire site was traversed with the following parameters recorded:

- vegetation community (as per *Bush Forever Volume 2* (Government of Western Australia, 2000)) (Table 1);
- floristic species composition ;
- vegetation condition (as per Keighery (1994) scale); and
- trees present – including GPS location, species, diameter at breast height (DBH), photograph of each tree.

Table 1: Vegetation community structural units (Government of Western Australia, 2000)

Life Form/ Height Class	Canopy Cover			
	100 - 70%	70 – 30%	30 – 10%	10 – 2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10 – 30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2m	Closed Tall Scrub	Open Tall Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1 – 2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland

3.3 Limitations

An assessment of potential limitations was undertaken in accordance with the Environmental Protection Authority (EPA) document *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* (2016) (Table 2).

Limitations were all nil to minor in nature and did not affect the validity of results obtained from the survey.

Table 2: Assessment of potential survey limitations

Potential Limitation	Significance	Comment
Availability of contextual information	Nil	<p>Publicly available contextual information is available for the region. Database searches were also conducted through DBCA providing more comprehensive content.</p> <p>Two conservation significant flora species identified during the desktop survey are data deficient, inhibiting assessment of flowering period and likelihood of presence. During the survey, for any species present within the site bearing similarities, precautionary principles during identification were applied. One species, <i>Styphelia</i> sp. Dumbleyung is not considered to be present within the site as no members of the Ericaceae family were identified. The remaining species, <i>Tetratheca fasciculata</i>, is Presumed Extinct, and no members of this genus were identified.</p>
Experience of personnel	Nil	<p>Flora and vegetation surveys were undertaken by Arc's Ecologists Sharon Hynes and Shelley Hill. Sharon Hynes has over 14 years' experience conducting targeted, reconnaissance and detailed flora surveys and fauna habitat assessments within Western Australia, including the Avon Wheatbelt bioregion, and is competent in taxonomic identification and assessment of vegetation in these areas.</p> <p>Shelley Hill has over 2 years' experience conducting targeted, reconnaissance and detailed flora surveys and fauna habitat assessments within Western Australia, including the Avon Wheatbelt bioregion, and is competent in taxonomic identification and assessment of vegetation in these areas.</p>
Survey timing	Minor	<p>The flora and vegetation survey was undertaken in August, which is outside of the recommended survey timing (Spring) for the South-West Botanical Province (EPA, 2016). However, an additional targeted flora survey was undertaken in October, within this recommended timing, to capture the peak flowering periods of the conservation significant flora species identified within the desktop survey.</p> <p>Of the 13 conservation significant flora species identified during the desktop survey, the majority (9 species) exhibit flowering periods consistent with the time of survey. None were observed within the survey area. Only one species, <i>Caladenia integra</i>, is an annual herb species. This was extensively searched for during the October survey, with</p>

Potential Limitation	Significance	Comment
		<p>no individuals being identified within the survey area. Individuals were identified in nearby less-disturbed vegetation, indicating that detection within the survey area would have been possible if individuals had been present.</p> <p>Four species identified in the desktop survey exhibit flowering periods which are either unknown or inconsistent with the survey timing. These species are all shrubs or perennial herbs, for which sufficient diagnostic characteristics would have been present despite the absence of flowers.</p>
Survey effort and extent	Nil	The entirety of the site was traversed on foot, with all species observed being recorded. The total area of the site is approximately 573 m ² and therefore quadrats were not established as the basic survey was sufficient to capture all species.
Access restrictions	Nil	No access restrictions were encountered during the survey.
Proportion of flora identified	Nil	All flora on site was identified to species level at the time of the survey. A low species diversity was observed as it was a highly disturbed site, with minimal native understorey present.
Disturbances that may affect results	Nil	No recent disturbances have occurred within the survey area which could have affected the results of the survey. All disturbances within the area are historical and continuous relating to the infrastructure owned and managed by multiple stakeholders and are unlikely to have created any limitations in detection of species during the survey period.

4 Results

4.1 Desktop Survey

4.1.1 Threatened and Priority Flora

A desktop survey of online databases indicated the potential for a total of 13 conservation significant species to occur within 10 km of the survey area (Table 3). A review of the Protected Matters Search Tool (PMST) (DCCEE, 2023) indicated six significant flora species listed under the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) as potentially occurring within a 10 km radius of the survey area (Appendix 1). A review of the DBCA (2018) threatened and priority flora database indicated that one priority species has been recorded within 10 km of the survey area.

As the desktop survey area was much larger than the specific survey area, it may include species that are unlikely to occur within the survey area due to a lack of suitable habitat. These databases also contain very old records of species that may have since become locally or regionally extinct. Of the conservation significant species potentially found within the area, it was determined that the site conditions (soil type, drainage, location) may be suitable for nine (highlighted green) of these species (Table 3).

A summary of conservation significant flora with the potential to occur within the site was created for reference during the survey (Appendix 2). Conservation code descriptions are provided in Appendix 3.

Table 3: Threatened and Priority Flora species identified in desktop survey

Species Name	Cons. Code	PMST	DBCA	WA Herbarium
<i>Acacia grisea</i>	P4			X
<i>Andersonia gracilis</i>	Endangered	X		
<i>Banksia oligantha</i>	Endangered	X		X
<i>Caladenia integra</i>	P4		X	X
<i>Calectasia pignattiana</i>	Vulnerable	X		
<i>Conostylis drummondii</i>	Endangered	X		
<i>Gastrolobium stipulare</i>	P4			X
<i>Roycea pycnophylloides</i>	Endangered	X		
<i>Stylidium lepidum</i>	P3			X
<i>Styphelia</i> sp. <i>Dumblebung</i>	P3			X
<i>Tetradlea fasciculata</i>	Presumed Extinct			X
<i>Verticordia fimbriolepis</i> subsp. <i>fimbriolepis</i>	Endangered	X		
<i>Xanthorrhoea brevistyla</i>	P4			X

4.1.2 Threatened and Priority Ecological Communities

A review of both the Protected Matters Search Tool (DCCEEW, 2023) and DBCA's Threatened and priority communities database (DBCA, 2023a) indicated the potential for only one Threatened Ecological Community (TEC) to exist within 10km of the survey area. This was the Eucalypt Woodlands of the Western Australian Wheatbelt, which is listed as Critically Endangered under the Environmental Protection and Biodiversity Conservation Act (1999). The survey area itself is recorded as being within the extent of this TEC.

4.1.3 Threatened and Priority Fauna

The results of the desktop survey indicated that the survey area does not contain any confirmed or unconfirmed areas of Black Cockatoo breeding or roosting (DBCA, 2023b; 2023g). However, the PMST identified the potential for both the Carnaby's Black Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptrorhynchus banksii naso*) to occur within the survey area (DCCEEW, 2023). No data are available for the desktop determination of the presence of potential foraging habitat.

4.2 Field Survey

4.2.1 Floristic Composition and Vegetation Community

One vegetation type was present within the survey area, being an *Allocasuarina huegeliana* low open woodland over *Acacia microbotrya* and an understorey of invasive grasses and herbs. The survey area shows evidence of historical clearing and disturbance, with a high understorey coverage of invasive grasses and herbs, including Annual Veldt Grass (*Ehrharta longiflora**), Bearded Oat (*Avena barbata**) and Cape Weed (*Arctotheca calendula**), and a dense midstorey of juvenile Rock Sheoak (*Allocasuarina huegeliana*). Sparse native understorey species were identified, being predominantly *Austrostipa flavescens* and Kerosene Grass (*Aristida contorta*). The overall vegetation type and vegetation composition are shown in Plates 2 and 3.



Plate 2: Aerial image of vegetation within the survey area



Plate 3: Vegetation community within the survey area

Whilst the desktop survey identified the presence of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC within the survey area, this was not confirmed through the survey results. No *Eucalyptus* species were identified within the survey area, therefore not satisfying the key diagnostic characteristics for listing. Additionally, the dominant tree cover was identified to be *Allocasuarina huegeliana*, which is noted as a contra-indicator for the presence of this TEC (Department of the Environment, 2015).

A total of 20 species from 11 families were identified within the survey area, comprised of seven introduced species and 13 native species. All species were able to be identified and a complete species list is provided in Table 4 below. No species of conservation significance were identified. One Declared Pest and Weed of National Significance, Bridal Creeper (*Asparagus asparagoides*), was identified at one location within the survey area.

Table 4: Flora species identified within the survey area

Family	Species Name	Common Name
Asparagaceae	<i>Asparagus asparagoides</i> *	Bridal Creeper
Asteraceae	<i>Arctotheca calendula</i> *	Cape Weed
Asteraceae	<i>Hypochaeris radicata</i> *	Flatweed
Casuarinaceae	<i>Allocasuarina huegeliana</i>	Rock Sheoak
Cyperaceae	<i>Lepidosperma costale</i>	
Fabaceae	<i>Acacia acuminata</i>	Jam
Fabaceae	<i>Acacia microbotrya</i>	Manna Wattle
Fabaceae	<i>Gastrolobium bilobum</i>	Heart Leaf Poison
Fabaceae	<i>Jacksonia sternbergiana</i>	Stinkwood
Haloragaceae	<i>Glischrocaryon aureum</i>	Common Popflower
Hemerocallidaceae	<i>Dianella revoluta</i>	Blueberry Lily
Hemerocallidaceae	<i>Stypantra glauca</i>	Nodding Blue Lily
Montiaceae	<i>Calandrinia calyptata</i>	Pink Purslane
Oxalidaceae	<i>Oxalis pes-caprae</i> *	Soursob
Poaceae	<i>Aristida contorta</i>	Kerosene Grass
Poaceae	<i>Austrostipa flavescens</i>	
Poaceae	<i>Avena barbata</i> *	Bearded Oat
Poaceae	<i>Ehrharta longiflora</i> *	Annual Veldt Grass
Poaceae	<i>Lolium rigidum</i> *	Rye Grass
Rutaceae	<i>Diplolaena graniticola</i>	

Note: * Denotes introduced species

4.2.2 Vegetation Condition

The entirety of the vegetation within the site was recorded to be in a Degraded condition, as per Keighery (1994) scale, containing a high density of invasive introduced species and exhibiting signs of previous clearing and recolonisation.

4.2.3 Trees and Fauna Habitat

No trees with the potential to provide nesting or roosting habitat for Black Cockatoo species were identified. No suitable foraging habitat for Black Cockatoos was identified.

5 Discussion

5.1 Vegetation, Threatened and Priority Flora and Ecological Communities

The vegetation within the site was observed to be an *Allocasuarina huegeliana* low open woodland, over *Acacia microbotrya* and an understorey of invasive grasses and herbs. The area shows evidence of historical clearing and disturbance, likely as a result of the initial installation of the signal tower. As no overstorey *Eucalyptus* species were observed, the survey area is not considered to form part of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC.

No conservation significant flora was identified at the time of survey. Of the 13 conservation significant flora species identified during the desktop survey, the majority (9 species) exhibit flowering periods consistent with the time of survey. Two survey events were conducted in order to adequately survey the site within the peak flowering season (Spring) and determine the presence of *Caladenia integra*, which was the only annual species identified in the desktop survey and was deemed to be likely to occur within the survey area due to potentially consistent habitat characteristics. This species was identified approximately 500m to the north of the survey area in less-disturbed vegetation, however not within the survey area. Four species identified in the desktop survey exhibit flowering periods which are either unknown or inconsistent with the survey timing. These species are all shrubs or perennial herbs, for which sufficient diagnostic characteristics would have been present despite the absence of flowers.

One Declared Pest and Weed of National Significance, Bridal Creeper (*Asparagus asparagoides*), was identified within the site. Declared Pests are listed under the Biosecurity and Agriculture Management Act 2007 (WA), a classification which requires the landowner/land manager to control the population to limit damage as a result of the presence of these species. It is recommended that the control of these species be undertaken prior to any clearing activity to prevent the spread of vegetative material including seeds and rhizomes through the site.

5.2 Tree Assessment

No suitable breeding, roosting or foraging habitat for Black Cockatoos was identified. All trees were below the minimum DBH to be considered as potential habitat trees in the Avon Wheatbelt (DAWE, 2022) and none of the flora species identified provide foraging resources (Department of Environment and Conservation (DEC), 2011).

5.3 Referral and Approvals

As native vegetation is proposed to be cleared for the development site, it is recommended that a native vegetation clearing referral as regulated under the WA Environmental Protection Act 1986 is undertaken prior to disturbance. The clearing for this site is considered necessary as the age and deterioration of the signal tower infrastructure is leading to reduced structural integrity, and the current structure is considered unable to support the additional antenna loads for future services.

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Appendix

Appendix 1 – Protected Matters Search Tool



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 27-Nov-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	15
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	5
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species

[\[Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding likely to occur within area	In feature area

MAMMAL

SCIENTIFIC NAME	Threatened Category	Presence Text	Buffer Status
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Myrmecobius fasciatus Numbat [294]	Endangered	Species or species habitat may occur within area	In feature area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat known to occur within area	In feature area

PLANT

Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In buffer area only
Banksia oligantha Wagin Banksia [20697]	Endangered	Species or species habitat may occur within area	In feature area
Calectasia pignattiana Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Conostylis drummondii Drummond's Conostylis [5885]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Verticordia fimbrialepis subsp. fimbrialepis Shy Featherflower [24631]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species

[[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Migratory Terrestrial Species

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands

[\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52139]	WA	In feature area
Commonwealth Land - [51395]	WA	In buffer area only
Commonwealth Land - [51000]	WA	In buffer area only

Listed Marine Species

[\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

SCIENTIFIC NAME**Threatened Category****Presence Text****Buffer Status**[Actitis hypoleucos](#)

Common Sandpiper [59309]

Species or species
habitat known to
occur within area

In feature area

[Apus pacificus](#)

Fork-tailed Swift [678]

Species or species
habitat likely to occur
within area overfly
marine area

In feature area

[Bubulcus ibis as Ardea ibis](#)

Cattle Egret [66521]

Species or species
habitat may occur
within area overfly
marine area

In feature area

[Calidris acuminata](#)

Sharp-tailed Sandpiper [874]

Species or species
habitat known to
occur within area

In feature area

[Calidris ferruginea](#)

Curlew Sandpiper [856]

Critically Endangered

Species or species
habitat known to
occur within area
overfly marine area

In feature area

[Calidris melanotos](#)

Pectoral Sandpiper [858]

Species or species
habitat may occur
within area overfly
marine area

In feature area

[Chalcites osculans as Chrysococcyx osculans](#)

Black-eared Cuckoo [83425]

Species or species
habitat likely to occur
within area overfly
marine area

In feature area

[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle [943]

Species or species
habitat may occur
within area

In feature area

[Merops ornatus](#)

Rainbow Bee-eater [670]

Species or species
habitat may occur
within area overfly
marine area

In feature area

[Motacilla cinerea](#)

Grey Wagtail [642]

Species or species
habitat may occur
within area overfly
marine area

In feature area

SCIENTIFIC NAME**Threatened Category****Presence Text****Buffer Status**[Thinornis cucullatus as Thinornis rubricollis](#)

Hooded Plover, Hooded Dotterel [87735]

Species or species habitat known to occur within area overfly marine area

In buffer area only

[Tringa nebularia](#)

Common Greenshank, Greenshank [832]

Species or species habitat may occur within area overfly marine area

In buffer area only

Extra Information

State and Territory Reserves[\[Resource Information \]](#)

Protected Area Name	Reserve Type	State	Buffer Status
Casuarina	Nature Reserve	WA	In buffer area only
North Wagin	Nature Reserve	WA	In buffer area only
Parkeyerring	Nature Reserve	WA	In buffer area only
Unnamed WA02087	Nature Reserve	WA	In buffer area only
Wagin Lake	Nature Reserve	WA	In buffer area only

EPBC Act Referrals[\[Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

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Department of Climate Change, Energy, the Environment and Water



GPO Box 3090

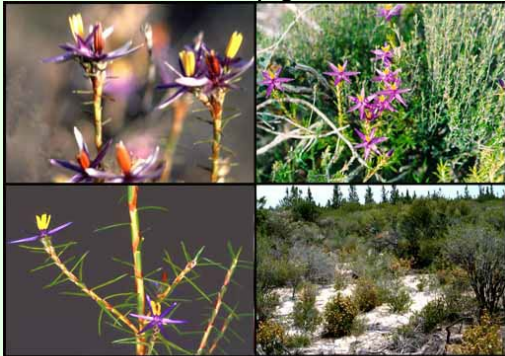

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Appendix 2 – Conservation Significant Flora Field Guide

Species	Cons. Code	Description	Flowering Period	Habitat	Likelihood
<p><i>Acacia grisea</i></p>  <p><i>Acacia grisea</i> Photo: L. Strahan</p>	P4	Spreading or compact shrub, 0.1-0.6 m high. Fl. Yellow.	Jun-Aug	Lateritic gravelly loamy soils. Undulating plains, slopes.	Possible
<p><i>Andersonia gracilis</i></p>  <p><i>Andersonia gracilis</i> Photos: K. Atkins & M. Hislop</p>	E	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple.	Sep-Nov	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely

Species	Cons. Code	Description	Flowering Period	Habitat	Likelihood
<p data-bbox="421 272 658 300"><i>Banksia oligantha</i></p>  <p data-bbox="286 659 427 676"><i>Banksia oligantha</i></p> <p data-bbox="573 659 790 676">Photos: S.D. Hopper & B. & B. Wells</p>	E	Non-lignotuberous shrub, to 3 m high. Fl. red & cream/orange-brown.	Oct-Nov	Yellow or yellow-brown sand.	Possible
<p data-bbox="421 687 658 715"><i>Caladenia integra</i></p>  <p data-bbox="286 1074 427 1091"><i>Caladenia integra</i></p> <p data-bbox="450 1074 790 1091">Photos: G. Brunnbauer, W.M. Cusack, I. & M. Greeve & S.J. Patrick</p>	P4	Tuberous, perennial, herb, 0.2-0.5 m high. Fl. green & red.	Sep-Oct	Clayey loam. Granite outcrops, rocky slopes.	Possible

Species	Cons. Code	Description	Flowering Period	Habitat	Likelihood
<p><i>Calectasia pignattiana</i></p>  <p><i>Calectasia pignattiana</i> Photos: W.M. Cusack & K.W. Dixon</p>	V	Rhizomatous, prickly herb, to 0.5 m high. Fl. blue-purple.	Aug-Oct	Sand to sandy clay over granite or laterite, gravel. Plains and gentle slopes.	Possible
<p><i>Conostylis drummondii</i></p>  <p><i>Conostylis drummondii</i> Photos: S.D. Hopper</p>	E	Rhizomatous, tufted perennial, grass-like or herb, 0.1-0.3 m high. Fl. Yellow.	Oct-Nov	White, grey or yellow sand, gravel.	Possible
<i>Gastrolobium stipulare</i>	P4	Erect, leafy shrub, to 0.5 m high. Fl. Yellow & red & brown.	Sep	Yellow-grey sand, gravelly clay loam, laterite. Slopes, ridges.	Possible

Species	Cons. Code	Description	Flowering Period	Habitat	Likelihood
<p><i>Roycea pycnophylloides</i></p>  <p><i>Roycea pycnophylloides</i> Photos: P. Roberts & L. Sweedman</p>	E	Perennial, herb, forming densely branched, silvery mats to 1 m wide.	Sep	Sandy soils, clay. Saline flats.	Unlikely
<p><i>Stylidium lepidum</i></p>  <p><i>Stylidium lepidum</i> Photos: J. Wege</p>	P3	Spreading, rosetted perennial, herb, ca 0.05 m high, forming densely packed colonies. Fl. pink-orange.	Oct-Nov	Gravelly sand or loam, clay. Winter-wet depressions.	Possible
<i>Styphelia</i> sp. Dumbleyung	P3	Unknown	Unknown	Unknown	Unknown
<i>Tetratheca fasciculata</i>	EX	Compact shrub, less than 0.2 m high. Fl. pink.	Unknown	Unknown	Unlikely

Species	Cons. Code	Description	Flowering Period	Habitat	Likelihood
<p><i>Verticordia fimbrilepis</i> subsp. <i>fimbrilepis</i></p>  <p><small><i>Verticordia fimbrilepis</i> subsp. <i>fimbrilepis</i> Photos: E.A. George, N.J. Stevens & R. Smith</small></p>	E	Shrub, 0.3-0.7 m high. Fl. pink-white.	Oct-Jan	Gravelly sandy or clayey soils. Flats, road verges.	Possible
Xanthorrhoea brevistyla	P4	Perennial tree-like monocot, to 3.5 m high, usually no trunk, scape length 0.8-1.25 m, spike length 0.24-0.96 m. Fl. White.	Oct-Dec	Sand, clay, laterite.	Possible

Appendix 3 – Conservation Code Definitions

Table A3.1: Conservation code definitions for flora and fauna as listed as Threatened or specially protected

Threat Category	Definition
Threatened – Vulnerable (V)	Facing a high risk of extinction in the wild in the medium-term future.
Threatened – Endangered (E)	Facing a very high risk of extinction in the wild in the near future.
Threatened – Critically Endangered (CR)	Facing an extremely high risk of extinction in the wild in the immediate future.
Threatened – Extinct in the Wild (EW)	Species is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form.
Threatened – Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Specially Protected Species – Migratory Species (MI)	<p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth.</p> <p>Includes 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 fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p>
Specially Protected Species – Conservation Dependent (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Specially Protected Species – Other specially protected species (OS)	Fauna otherwise in need of special protection to ensure their conservation.

Table A3.2: Conservation code definitions for flora and fauna as listed as Priority

Threat Category	Definition
Priority 1: 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.
Priority 2: 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.
Priority 3: 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.
Priority 4: Rare, Near Threatened and other species in need of monitoring	<p>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.</p> <p>(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.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

Table A3.3: Conservation code definitions for ecological communities listed as threatened (TEC)

Threat Category	Definition
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its

Threat Category	Definition
	range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table A3.4: Conservation code definitions for ecological communities listed as priority (PEC)

Threat Category	Definition
Priority One (P1)	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha), and appear to be under immediate threat.
Priority Two (P2)	Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation.
Priority Three (P3)	(i)Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii)communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii)communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.
Priority Four (P4)	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
Priority Five (P5)	Conservation Dependent ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.