Narrogin Wind Farm

Port to Site Ecology Assessment

Final

May 2026

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Port to Site Ecology Assessment

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Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Pty Ltd

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Date: May 2026

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Document Status

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Executive Summary

Neoen Australia Pty Ltd (Neoen) is developing the Narrogin Wind Farm (the Project), located approximately 160 km south-east of Perth in the Shires of Williams and Narrogin. Delivery of wind turbine infrastructure from Bunbury port to the Project site will potentially require the clearing of native vegetation at two areas of road intersections to compensate for vehicle overhangs during turning manoeuvres. Flora, vegetation and fauna surveys were undertaken at these two areas to inform final design and understand ecological values. The following two areas were surveyed:

- Western Survey Area: Intersection of Forrest Highway and Raymond Road, in Roelands Western Australia.
- Eastern Survey Area: Intersections of Raymond Road and South West Highway, in Roelands Western Australia.

The flora, vegetation and black cockatoo field survey of the two Survey Areas were undertaken in March 2026, outside of the most appropriate time to survey in the South West province. The Survey Areas were accessed by foot transects and sampled via flora and vegetation survey vegetation mapping notes. A Targeted black cockatoo survey was conducted at both Survey Areas.

A total of 28 discrete vascular flora taxa representing 11 families and 19 genera were recorded in the Survey Areas by the survey. No Declared Pests listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) were recorded in the Survey Areas. No significant flora taxa were recorded; although the survey was undertaken outside of the Spring period, it is unlikely that significant flora taxa which require particular Spring or Winter survey (for example, geophytes) are present due to the nature of the condition of the vegetation and historical disturbances.

A total of one Vegetation Type (VT1) was mapped within the Survey Areas over a total area of 0.30 ha (14.78%), and a total of two Highly Modified Areas were mapped within the Survey Areas (1.78 ha, 85.22%). The VT was of either Degraded or Completely Degraded condition vegetation. The Highly Modified Areas were mapped as Cleared (CL) and Planted (PL), and were both mapped as Completely Degraded. No significant vegetation was recorded.

A total of 17 potential black cockatoo nest-trees were recorded across the Survey Areas (eight in the Western Survey Area, and nine in the Eastern Survey Area, all Bamford Rank 5). The Survey Areas are within the known distribution of all three black cockatoo taxa. The overall weighted foraging habitat quality score for the Western Survey Area was ranked 2 out 10 (very low) for all three black cockatoo taxa, and the Eastern Survey Area was ranked 1 out of 10 (negligible). No night-roosting is currently known to occur in the Survey Areas, however it is possible that the taller trees of VT1 and PL would provide night-roosting habitat.

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1.0 Introduction

1.1 Project Overview

Neoen Australia Pty Ltd (Neoen) is developing the Narrogin Wind Farm (the Project), located approximately 160 km south-east of Perth in the Shires of Williams and Narrogin. Delivery of wind turbine infrastructure from Bunbury port to the Project site will potentially require the clearing of native vegetation at two areas of road intersections to compensate for vehicle overhangs during turning manoeuvres.

As a result, Umwelt was commissioned to undertake a Desktop assessment, Reconnaissance level flora and vegetation assessment, and a Targeted black cockatoo habitat assessment within these road intersections to determine the extent of native vegetation and black cockatoo values present.

1.2 Survey Area Definitions

Two road intersections were investigated as part of the ecological assessment, hereby known as the Western Survey Area and Eastern Survey Area. Collectively, these are referred to as the 'Survey Areas'. These Survey Areas are summarised in **Table 1.1** and presented on **Figure 1.1.**

For the purpose of the desktop assessment, including interrogation of databases and searches for relevant literature, a Desktop Study Area was defined. The Desktop Study Area consists of a 5 km buffer around the Survey Areas. This boundary is also displayed on **Figure 1.1**.

Table 1.1 Survey Areas of the Project

Survey Area	Description	Area (ha)
Western Survey Area	Swept Path Area and road reserve of Forrest Highway and Raymond Road, Roelands Western Australia.	0.93
Eastern Survey Area	Swept Path Area and road reserve of Raymond Road and South West Highway, Roelands Western Australia.	1.15
Desktop Study Area	A 5 km buffer on the collective Survey Areas outlined above.	5 km buffer on the Survey Areas

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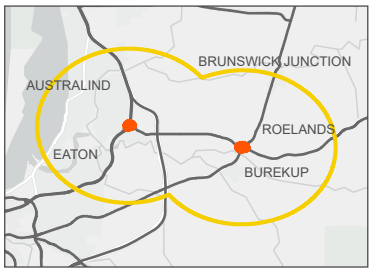
Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Desktop Study Area
- Survey Area
- Railway
- Road
- Watercourse



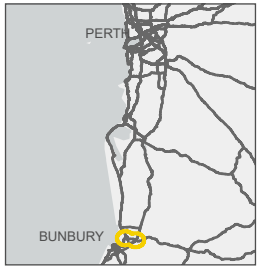


FIGURE 1.1

Survey Areas and Project Location

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Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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1.3 Aims and Objectives

The primary aim of this assessment was to define the key ecological values of the Survey Areas. The specific objectives of the assessment were to:

- Undertake a desktop assessment of all relevant databases and literature to identify key flora, vegetation and black cockatoo values potentially present within the Survey Areas, and use this information to inform the field survey and report design (as per section 3.0 of Environmental Protection Authority (EPA) (2016b) and section 2 of EPA (2020)).
- Identify, map and describe Vegetation Types (VTs) (as per section 8.0 of EPA (2016b)) and fauna habitats (as per section 6 of EPA (2020)) that occur within the Survey Areas.
- Map the condition of the vegetation in accordance with EPA Technical Guidance (section 5.6 of EPA, 2016c).
- Identify and map the potential black cockatoo breeding trees within the Survey Areas (as per Bamford (2022).
- Map the black cockatoo Foraging Habitat Quality Score (FHQS) for all three Threatened black cockatoo taxa (as per Bamford (2020)).
- Assess the likelihood of the following occurring within the Survey Areas:
    - **Significant flora**: flora taxa that belong to one of the following categories as defined by EPA (2016a, 2016b) (note that conservation codes used by Department of Biodiversity, Conservation and Attractions (DBCA) for significant flora taxa in Western Australia (WA) are presented in DBCA (DBCA, 2023a)):
        - Taxa identified as a Threatened (T) or Priority (P) species (formally listed significant taxa – includes taxa listed under both State (*Biodiversity Conservation Act 2016* (BC Act)) and Commonwealth (Cth) (*Environment Protection Biodiversity Conservation Act 1999* (EPBC Act)) legislation, and classified as Priority by DBCA);
        - locally endemic taxa or taxa associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems (GDEs));
        - new species or taxa having anomalous features that indicate a potential new species;
        - representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
        - unusual species, including restricted subspecies, varieties or naturally occurring hybrids;
        - having a relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.
    - **Significant vegetation**: vegetation communities that belong to one of the following categories as defined by EPA (2016a, 2016b) (note that definitions, categories and criteria used by DBCA for significant vegetation in WA are presented in DBCA (2023b)):
        - being identified as a Threatened Ecological Community (TEC) or Priority Ecological Community (PEC) (formally listed significant vegetation – includes vegetation listed under State or Commonwealth legislation, or classified as a PEC by DBCA);
        - having a restricted distribution;

- having a degree of historical impact from threatening processes;
- playing a role as a refuge;
- providing an important function required to maintain ecological integrity of a significant ecosystem.

Note that this assessment did not attempt to record a full census of vascular flora taxa that occur in the Survey Areas of the Project.

1.4 Level of Assessment

The flora and vegetation survey of the Survey Areas was comprised of a Reconnaissance survey as defined in sections 4.1 of the Environmental Protection Authority (EPA) *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (2016b). This level of survey is considered appropriate considering the likelihood of occurrence of significant flora and vegetation (from the desktop assessment), the high degree of historical impacts to vegetation, and the likely limited impacts of the Project to flora, vegetation and fauna values.

The Reconnaissance flora and vegetation survey and reporting works comply with the following documents:

- Environmental Factor Guideline – Flora and Vegetation (EPA, 2016a);
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

A Targeted black cockatoo habitat assessment was also conducted to assess the specific habitat requirements of all three Threatened black cockatoo taxa, and was undertaken in line with the Commonwealth Referral guideline for three threatened black-cockatoo species (DAWE, 2022).

2.0 Background

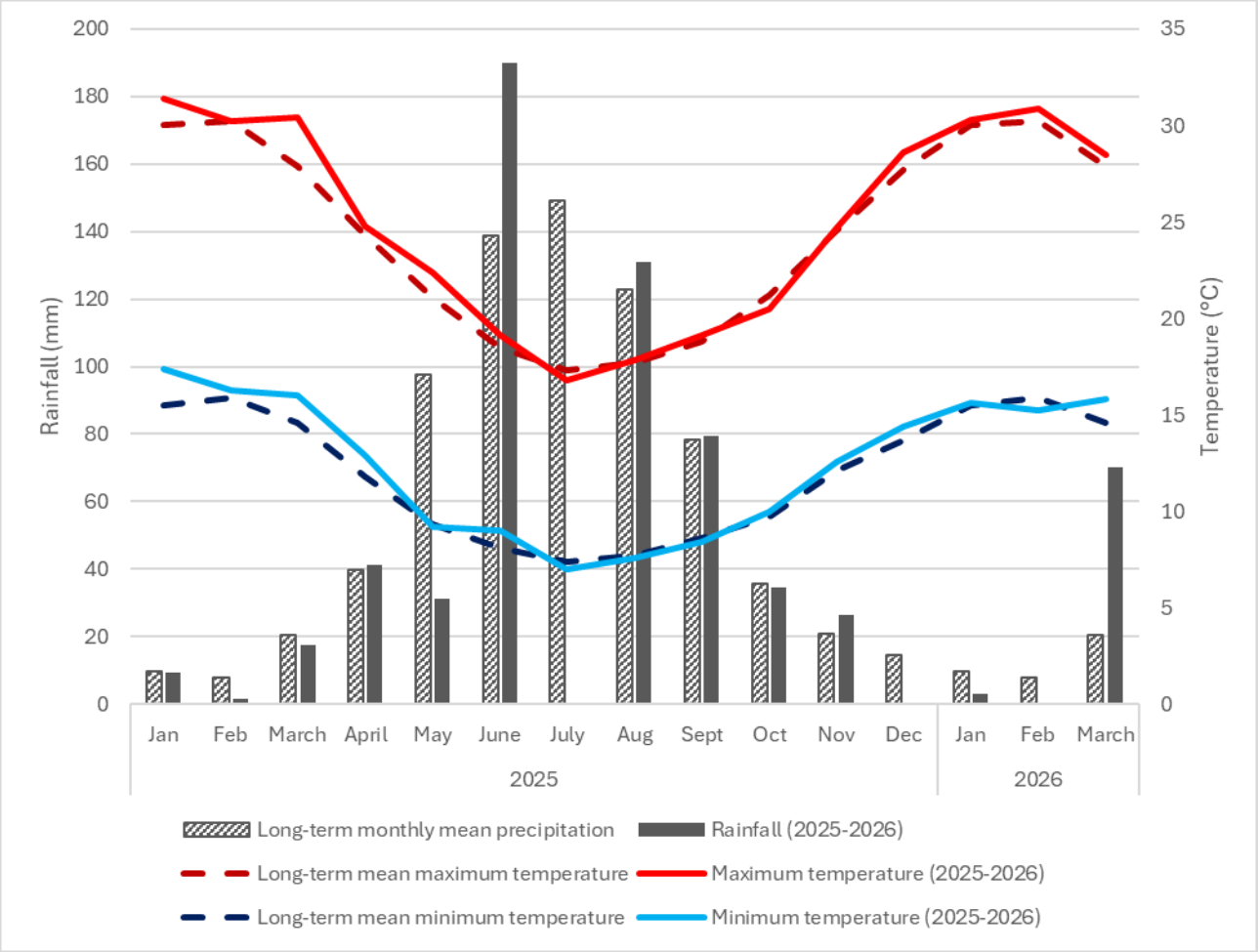
2.1 Climate

The Survey Areas are located in the Swan Coastal Plain (SCP) Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (DCCEEW, 2023) and within the Southwest Botanical Province of the SCP region (Darling Botanical District) defined by Beard (2015). The climate of the SCP region is classified as warm Mediterranean, with predominantly winter precipitation (600–1,000 millimetres (mm)) and five to six dry months per year (Beard, 2015).

The closest meteorological station with long-term climate data is Bunbury Weather Station (Station No. 009965) situated approximately 30 km southwest of the Survey Areas. **Graph 2.1** displays monthly precipitation totals and maximum and minimum temperature statistics for the 12-month period preceding the survey conducted in March 2026. In addition to recent data, the graph includes long-term average monthly precipitation, minimum and maximum temperature records for Bunbury Weather Station (Station Number 009965, BoM, 2026a). Maximum monthly average temperatures recorded at Bunbury Station generally occur from November to March, with long-term maximum temperatures ranging between 17.3°C and 30.2°C. The coolest months occur between April and October when long-term minimum temperatures range between 7.4°C and 15.9°C (**Graph 2.1**).

Rainfall occurs predominantly from June to August but can be variable across years. The long-term annual average rainfall for Bunbury Weather Station (1996-2026) is 737.3 mm/year (**Graph 2.1**).

The 2025 to 2026 minimum and maximum temperatures remain relatively consistent with long-term averages. The greatest difference in maximum temperatures was recorded in March 2025, with the maximum temperature exceeding the long-term average by 2.5°C. The most significant difference in minimum temperatures was recorded in January 2025, with the minimum recorded temperature exceeding historical records by 1.9°C. The rainfall of 2025 to 2026 was overall consistent with the long-term average, however the rainfall in the month of the survey (March 2026) was above average by 45 mm. It must be noted that BoM (2026a) did not provide rainfall data for July 2025.



Graph 2.1 Climatic Conditions of Bunbury Weather Station (Station no. 009965)

2.2 Geology, Soils and Landscape

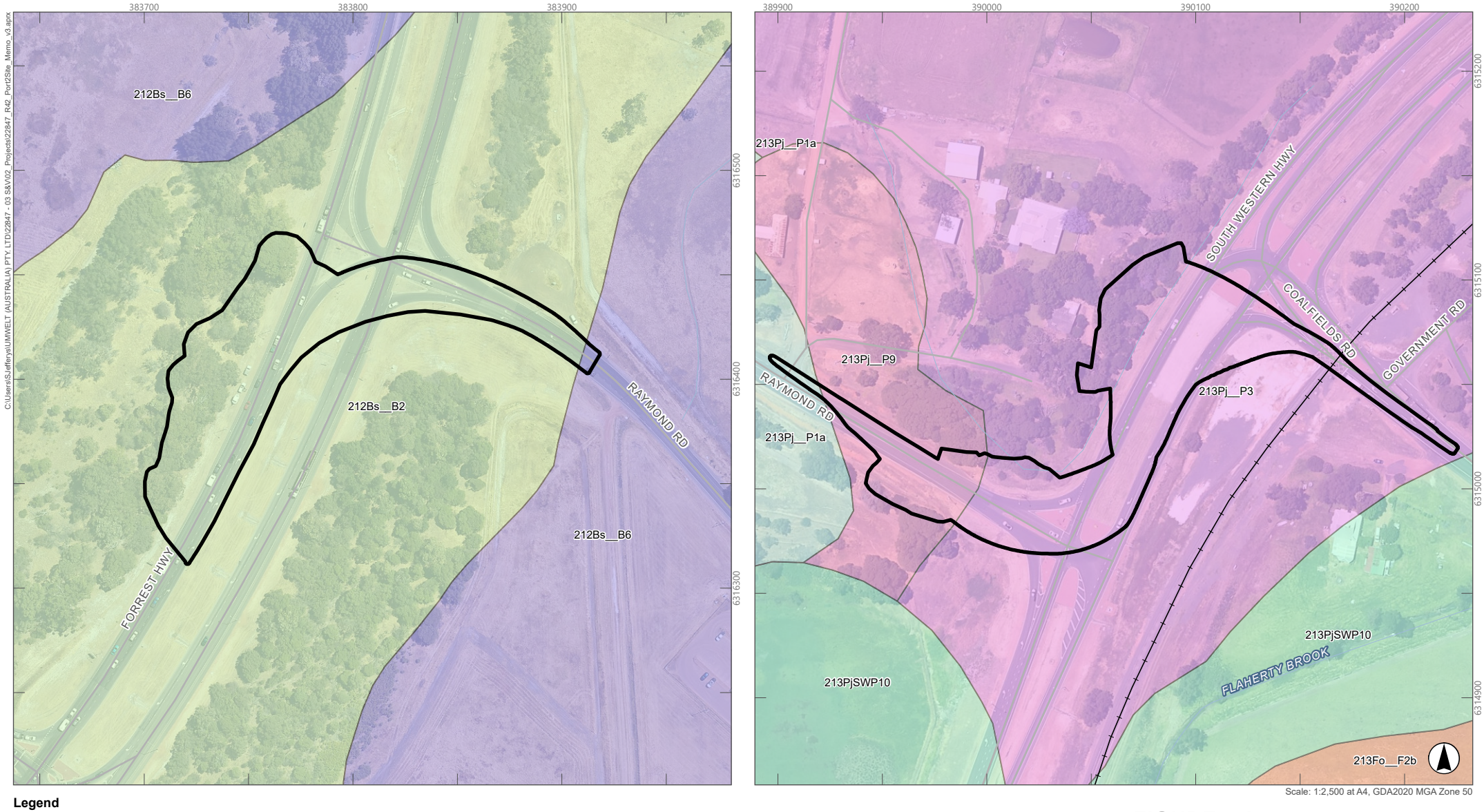
The Survey Areas are located in the Swan Coastal Plain (SCP) region (Beard, 2015), which is broadly equivalent to the SCP IBRA bioregion; specifically, within the Perth (SWA02) IBRA subregion (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023). The geology of the region is Mesozoic to recent sediments of the Perth Basin. The SCP subregion consists of a coastal plain of low-lying, often swampy areas and sandhills, with soils consisting of sands or swamp deposits as well as dissected country rising the duricrusted Dandaragan Plateau on mesozoics consisting of mainly yellow sandy soils (Beard, 2015).

Soil landscape mapping has been compiled across southwest WA by the Department of Primary Industries and Regional Development (DPIRD, 2025). This mapping is based on a compilation of the results of a variety of soil and soil-landscape surveys, considering general ecological information, vegetation physiognomy and composition, patterns of variation, conservation status, gradational association and land system representation. The Survey Areas occur over two soil landscape systems comprising a total of five soil landscape units as summarised in **Table 2.1**and presented in **Figure 2.1**.

Table 2.1 Soil Landscape Mapping of the Survey Areas

Soil Unit	Description^	Mapped Extent (ha)	
		Western Survey Area	Eastern Survey Area
Bassendean B2 phase	Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1–2 m.	-	0.93
Bassendean B6 phase	Sandplain and broad extremely low rises with imperfectly drained deep or very deep grey siliceous sands.	-	0.01
Pinjarra P1a phase	Flat to very gently undulating plains with deep acidic mottled yellow duplex soils. Shallow pale sand to sandy loam over clay; imperfect to poorly drained and generally not susceptible to salinity.	0.01	-
Pinjarra P3 phase	Flat to very gently undulating plain with deep, imperfect to poorly drained acidic gradational yellow or grey-brown earths and mottled yellow duplex soils, with loam and clay loam surface horizons.	0.95	-
Pinjarra P9 phase	Shallowly incised stream channels of minor creeks and rivers with deep acidic mottled yellow duplex soils.	0.19	-
Grand Total		**1.15**	**0.93**

^Source: DPIRD (2025).



Legend

- Survey Area
- Road
- Railway
- Watercourse

Soil Landscape Mapping

- 212Bs__B2
- 212Bs__B6
- 213Fo__F2b
- 213PjSWP10
- 213Pj__P1a
- 213Pj__P3
- 213Pj__P9

Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

FIGURE 2.1

Soil Landscape Mapping of the Survey Areas

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Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), DPIRD (2025), Umwelt (2026)

2.3 Hydrology Values

2.3.1 Surface Water

The Survey Areas lie within the Leschenault Estuary – Lower Collie groundwater catchment, within the Collie River basin.

More than half of the basin remains uncleared, however, many of the rivers present are brackish due to clearing for agriculture and mining (DWER, 2026). The Collie River basin features two major rivers; the Collie and the major tributary of the Brunswick River in the south. No watercourses intersect the Survey Areas, with the Collie River running parallel to the Survey Areas in the south (approximately 0.9 km south of the Western Survey Area and 0.3 km south of the Eastern Survey Area) (**Figure 2.2**).

The search of the DCCEEW SPRAT Database with regard to MNES listed under the EPBC Act (DCCEEW, 2026b) identified no Nationally Important Wetlands or RAMSAR sites within the Desktop Study Area (**Appendix A**).

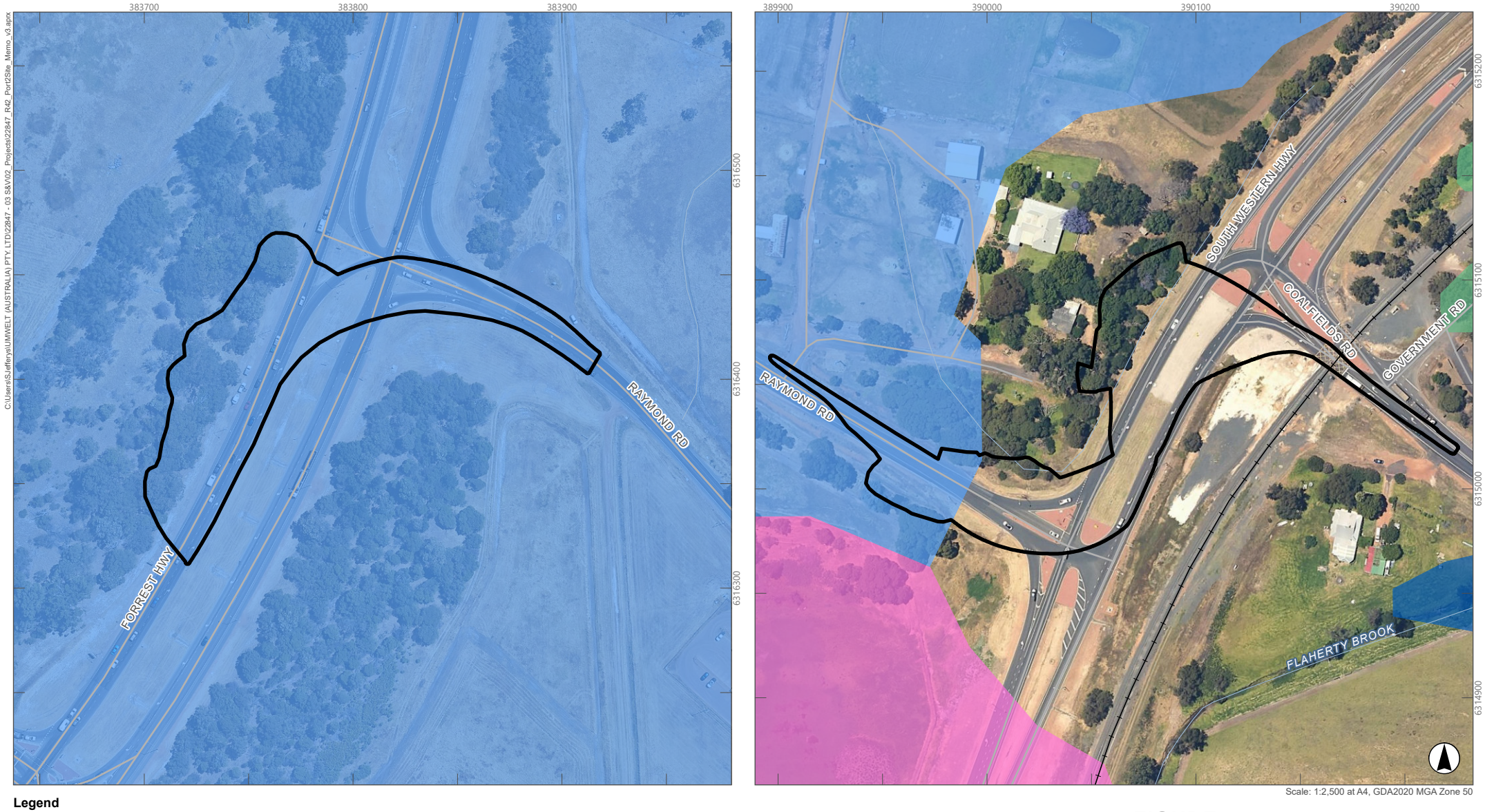
2.3.2 Groundwater Systems

The Bureau of Meteorology (BoM) Groundwater Dependent Ecosystem (GDE) Atlas is a national dataset of Australian GDEs that can be used to inform groundwater planning and management (BoM, 2026b). The Atlas was interrogated using both Survey Area boundaries to obtain locations and information of two GDE types:

- **Aquatic GDEs**: ecosystems that rely on the surface expression of groundwater – this includes surface water ecosystems that may have a groundwater component, such as rivers, wetlands and springs. Note that marine and estuarine ecosystems can also be groundwater dependent, but these are not mapped in the Atlas.
- **Terrestrial GDEs**: ecosystems that rely on the subsurface presence of groundwater – this includes all vegetation ecosystems.

The Western Survey Area has been mapped as 'Palusplain' in the aquatic GDE dataset (BoM, 2026b). The Eastern Survey Area has a small portion mapped as Palusplain (**Figure 2.2**).

No known terrestrial GDEs occur in the Survey Areas (BoM, 2026b).



Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse

GDE – Aquatic

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

GDE – Terrestrial

- Moderate potential GDE - from national assessment

FIGURE 2.2

Hydrology Values of the Survey Areas

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Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), DPIRD (2025), Umwelt (2026)

2.4 Regional Vegetation

2.4.1 Pre-European Vegetation

The vegetation of WA as it was presumed to have existed prior to European settlement has been mapped at a scale of 1:250,000 as vegetation system associations (VSAs) (DBCA, 2019), with the pre-European Vegetation spatial database subsequently created (Beard et al., 2013; DPIRD, 2019). The Survey Areas occurs across two VSAs (one each). **Table 2.2** presents the current extent of these VSAs in relation to their pre-European extents within the Perth (SWA02) IBRA subregion, and the percentage of the current extents of the VSAs currently protected for conservation in all DBCA-managed land (as a proportion of the current extents) within the Perth IBRA subregion (DBCA, 2019). Note that as per DBCA's Statewide Vegetation Statistics Report (DBCA, 2019), protected areas in this context are considered to be any areas listed in DBCA-Legislated Lands and Waters dataset as either Crown reserves or lands managed under Section 8A of the *Conservation and Land Management Act 1984* that have an International Union for Conservation of Nature (IUCN) category of I to IV.

2.4.2 Vegetation Complexes

The vegetation within the Perth Metropolitan region and surrounds has been mapped as the pre-1750 distribution of vegetation complexes, characteristic of various combinations of landforms, soils and rainfall along the SCP south of Lancelin (DBCA, 2018). For the majority of this area, the vegetation complexes are those defined by DBCA (1980) at the scale of 1:250,000 and include some minor attribution corrections undertaken in 2015.

The Survey Areas occur across two vegetation complexes of the Swan Coastal Plain Aeolian Deposits landform; Bassendean Complex-Central and South and Guildford Complex. Key statistics for these vegetation complexes are summarised in **Table 2.3**. **Table 2.3** also includes the current extent of the vegetation complexes in relation to their pre-European extents in the SCP region (DBCA, 2018).

Table 2.2 Pre-European Vegetation

Vegetation System Association and Survey Area	Description	Current Extent (ha)	Pre-European Extent Remaining (%)	Current Extent Protected for Conservation (%)	Mapped Area (ha)
Western Survey Area Bassendean_1000	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree (Melaleuca spp.)	23,647.51	26.85	1.90	0.93
Eastern Survey Area Pinjarra_968	Medium woodland; jarrah, marri & wandoo	8,996.33	6.61	1.19	1.15

Table 2.3 Vegetation Complexes

Complex	Description	Current Extent (ha)	Pre-European Extent Remaining (%)	Mapped Area (ha)
Western Survey Area Bassendean Complex-Central and South	Vegetation ranges from woodland of Eucalyptus marginata (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* (Jarrah) to *Eucalyptus todtiana* (Pricklybark) in the vicinity of Perth.	23,506.61	26.91	0.93
Eastern Survey Area Guildford Complex	A mixture of open forest to tall open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) - *Eucalyptus marginata* (Jarrah) and woodland of *Eucalyptus wandoo* (Wandoo) (with rare occurrences of *Eucalyptus lane-poolei* (Salmon White Gum)). Minor components include *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark).	4,607.18	5.09	1.15

2.5 Fire History

The DBCA-060 Fire History dataset was interrogated for past fire history within and in the surrounds of the Survey Area. Note that this dataset contains records of fire events (prescribed burns; bushfire) on DBCA managed lands, or fire events which otherwise have incurred costs borne by the DBCA. It is therefore not a complete dataset of fire activity throughout the State.

A single fire event has been recorded within the Survey Areas, where the southern boundary of the Western Survey Area was burnt in 2008. No fires have been recorded in the Eastern Survey Area.

2.6 Land Tenure, Special and Protected Areas

The Survey Areas comprise of Main Roads WA road reserve tenure (Landgate, 2025).

No DBCA Lands of Interest reserves occur within the Survey Areas (DBCA, 2025b). An interrogation of the DBCA Legislated Lands and Waters database returned three nature reserves within the Desktop Study Area, with the closest being Eaton Nature Reserve (R 54422), located 2.1 km west of the Western Survey Area.

There is one Environmentally Sensitive Area (ESA) located 0.7 km south of the Western Survey Area (DWER, 2021). The details of this ESA are unknown.

3.0 Methods

3.1 Desktop Assessment

A review of flora, vegetation and vertebrate fauna data relevant to the Desktop Study Area was undertaken for the desktop assessment. This included obtaining and reviewing copies of reports of previous biological surveys carried out within the vicinity of the Survey Areas (including interrogation of the Index of Biodiversity Surveys for Assessments (IBSA) database), and interrogation of relevant regional databases and other sources within the Desktop Study Area, as listed in **Table 3.1**.

Table 3.1 Data Sources of the Desktop Assessment

Source	Search Attributes	Search Purpose
DCCEEW Species Profile and Threats (SPRAT) Database (interrogated using the Protected Matters Search Tool (DCCEEW, 2026b))	Database interrogated using Desktop Study Area. 22 April 2026.	Identify Matters of National Environmental Significance (MNES), including Threatened flora and TECs listed under the EPBC Act, that occur or have the potential to occur within the Desktop Study Area.
DBCA Dandjoo Database (DBCA, 2026)	Database interrogated using Desktop Study Area boundary. Website database accessed 22 April 2026.	Obtain records of significant flora taxa within the Desktop Study Area.
DBCA Black-cockatoo Breeding Sites (DBCA, 2025a)	Desktop Study Area boundary.	Obtain records of Black Cockatoo Breeding sites within the Desktop Study Area.
Great Cocky Count Database (BirdLife Australia, 2024)	Desktop Study Area boundary.	Obtain records of Black Cockatoo Roost sites within the Desktop Study Area.
IBSA Database (DWER, 2025)	Approximate Desktop Study Area boundary.	Obtain copies of reports and associated spatial data (where available) to identify records of significant flora and vegetation, and significant and introduced fauna, in the vicinity of the Survey Areas. Characterise vegetation units and flora assemblages relevant to the Survey Areas and surrounds.

3.2 Survey Timing and Personnel Information

A single site visit was conducted within the Survey Areas on 31 March 2026 and included a Reconnaissance flora and vegetation survey and a Targeted black cockatoo assessment. The Survey Areas were accessed and traversed by vehicle and on foot. Although the survey was undertaken outside of the optimal timing to conduct flora and vegetation surveys (ie. spring, as per EPA, 2016b), the majority of the significant flora returned by the database searches are identifiable while sterile (see **Section 5.2.2**).

Table 3.2 lists the personnel involved in the 2026 ecological assessment. The field team has significant experience in conducting similar surveys across various environments along the Swan Coastal Plain.

Table 3.2 Personnel Information

Personnel	Experience	Flora Collecting Permit (BC Act/WC Act)	Role
Kyler Rowson Bsc (Marine Biology and Biological Sciences)	4.5 years	FB62000399 TFL 2223-0139	Field lead, data management, reporting
Erryn Sinclair-Buckley Bsc (Environmental Sciences)	1 year	NA	Field team member, reporting

3.3 Nomenclature

Taxon nomenclature generally follows Florabase (WA Herbarium, 1998-), with all names checked against the current DBCA Max database to ensure their validity. The conservation status of each taxon was checked against Florabase, which provides the most up-to-date information regarding the conservation status of flora taxa in WA.

3.4 Flora and Vegetation Field Survey Methods

3.4.1 Reconnaissance Survey

Field data was collected in the form of vegetation mapping notes, suitable for the condition of the vegetation assessed in the Survey Area. Aspects recorded at each vegetation mapping note included dominant flora taxa, GPS (Global Positioning System) coordinates, vegetation condition (as per the scale presented in **Section 3.4.2**) and site photograph.

Although targeted survey for significant flora taxa was not undertaken as part of the survey, the ecologists were provided with a list of significant flora taxa likely to be encountered, for opportunistic records, if applicable.

Intact native vegetation was traversed on foot, with traverses recorded as track logs. If populations of known significant flora taxa were identified, the abundance and spatial distribution (using GPS coordinates) of individuals within each population was recorded, with an attached reference image and species description. Plant taxa were also recorded opportunistically to develop a list of the common taxa present within the Survey Areas. Observations on the extent of vegetation present and the condition of the vegetation was also recorded.

A total of 75 vegetation mapping notes were surveyed within the Survey Areas. The locations of all vegetation mapping notes, as well as survey track logs, are illustrated on **Figure 3.1**.

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Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Vegetation Mapping Note
- Track Log

FIGURE 3.1
Survey Effort

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Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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3.4.2 Vegetation Type and Vegetation Condition Definition

Floristic and vegetation structural data recorded in vegetation mapping notes across the Survey Areas was utilised to define VTs. Locations of vegetation mapping notes were used in conjunction with aerial photograph interpretation to generate discrete VT polygons in a Geographic Information Systems (GIS) environment. Mapping boundaries were developed at a scale of 1:2,500 and reflected changes in vegetation patterns visible at this scale.

VT descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 7.0 (NVIS Technical Working Group, 2017). This model follows nationally agreed guidelines to describe and represent VTs and produces data that is comparable and consistent nationwide. VTs were defined and described using the structural vegetation classification technique as outlined in EPA (2016b). This technique uses vegetation structure and dominant species to describe VTs with information provided on the height of strata, foliage cover, and dominant species, as well as substrate and landscape factors.

Vegetation condition was described using the vegetation condition scale presented by EPA (2016b) for the Southwest and Interzone Botanical Provinces (**Table 3.3**). Notes on vegetation condition were taken during the survey at all vegetation mapping note locations. Vegetation condition ratings were applied to the mapped VTs by either categorising whole polygons where the condition was uniform throughout or dividing existing VT polygons where a change in condition was observed.

Table 3.3 Vegetation Condition Scale as Described in EPA (EPA, 2016b) for the Southwest and Interzone Botanical Provinces

Vegetation Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

3.4.3 Definitions

3.4.3.1 Significant Flora

As per EPA (2016b), flora taxa may be significant for a range of reasons, as outlined in **Section 1.3**.

Significant flora taxa recorded within the Survey Areas are discussed in **Section 5.2.1** with reference to the above categories. Note that a population in the context of this survey is defined as a discrete group of individuals of a taxon separated by more than 500 m from the nearest discrete group of individuals (DBCA, 2017); however, this definition can only be tentatively applied if the intervening 500 m has not been surveyed.

3.4.3.2 Significant Vegetation

As per EPA (2016b), vegetation may be significant for a range of reasons, as outlined in **Section 1.3**.

To determine the presence of TECs and PECs defined from quadrat-derived data, EPA Technical Guidance (2016b) requires comparison of quadrat data with that of the survey from which the TEC or PEC was originally described. However, limited information is often available for TECs and PECs; generally, only broad descriptions are provided in the respective TEC and PEC lists to allow for diagnosis. Furthermore, sampling of vegetation via quadrats was outside the scope of this assessment. The vegetation of the Survey Areas was therefore manually compared to such descriptions to determine whether any vegetation may represent a TEC or PEC; specifically, comparisons of dominant taxa, soils, topography and geographical distribution of VTs were made to those of any relevant TEC or PEC. A similar process was followed for TECs listed under the EPBC Act, with comparisons made to the appropriate listing and conservation advice for any TECs likely to occur in the Survey Areas. The DBCA publication '*Methods for survey and identification of Western Australian threatened ecological communities'* (DBCA, 2024a) was also reviewed for TECs listed under the BC Act. The remaining significant vegetation criteria other than "being identified as a TEC and PEC" were applied to VTs mapped in the Survey Areas to determine whether a VT was significant in a local or regional context.

3.4.4 Likelihood of Occurrence Assessment

This assessment evaluated the likelihood of such significant flora and vegetation occurring within the Survey Areas based on the results of the survey, including the type and condition of vegetation and flora habitats present. The post-survey review of likelihood of occurrence assessment considered whether a taxon or community was identifiable at the time of survey, the known range of the taxon or community, if suitable habitat was present in the Survey Areas, proximity of known records to the Survey Areas, and the extent of survey undertaken within the Survey Areas, when determining the potential for a taxon or community to occur (**Table 3.4**).

Table 3.4 Categories for Likelihood of Occurrence Assessment

Likelihood Category	Description
Present	Species or community known to occur in the Survey Areas, either through historical records or through the findings of this assessment.
Likely	Species or community known to occur in close proximity to the Survey Areas; suitable habitat present in the TSA; however, survey intensity and/ or timing was not sufficient/ appropriate to reduce post-survey ranking.
Possible	Species or community known to occur in close proximity to the Survey Areas (<10 km); suitable habitat present in the Survey Areas; adequate survey intensity; however, survey timing was not appropriate to reduce post-survey ranking to Unlikely.
Unlikely	Species or community have no known location in proximity to the Survey Areas (>0 km); no suitable habitat present in the Survey Areas; and/or adequate survey intensity and appropriate survey timing for identification reducing post-survey ranking.

3.5 Black Cockatoo Field Survey Methods

3.5.1 Guidelines

Guidelines for the referral of actions that may result in impact to Black Cockatoos (for assessment under the EPBC Act) are provided by DAWE (2022). The survey was conducted with strong reference to both the existing guidelines as well as the previous guidelines (DoEE, 2017). Survey methodology also followed the recommendations listed on the DCCEEW's SPRAT Database for all three Black Cockatoo taxa (DCCEEW, 2026c, 2026d, 2026a). Ecological values for Black Cockatoos within the Survey Areas were based on the definitions of breeding, foraging and roosting habitat as per the EPBC Act referral guidelines for black cockatoos (DAWE, 2022).

The Referral Guideline for WA Threatened Black Cockatoo Species (DAWE, 2022) provides guidance on assessing breeding habitat, including the identification of known nesting trees, suitable nesting trees (those with hollows), and potential nesting trees (those with a minimum diameter at breast height (DBH) of 300–500 mm that may develop hollows in the future). However, when assessing the significance of potential Black Cockatoo trees, the practical application of these guidelines can be challenging.

DBCA has advised that the methodology developed and applied by Bamford (e.g. Bamford, 2020) is an acceptable approach for assessing breeding value and foraging habitat. This method provides a structured approach to classifying trees based on their potential to support breeding. The current assessment has chosen to employ the Bamford ranking system (Bamford, 2022) to assess Black Cockatoo nest-trees, and foraging habitat incorporating published data on black cockatoo nesting preferences (further explained below).

3.5.2 Breeding

The Referral Guideline for WA Threatened Black Cockatoo Species (DAWE, 2022) noted that while typical breeding habitat comprises woodland and forests, it can also include partially cleared areas, including isolated trees. All three Threatened Black Cockatoo taxa are known to nest in both live and dead trees, with many eucalypt species providing suitable sites. Nesting occurs in large hollows of mature eucalypts, with preferred species including Salmon Gum (*Eucalyptus salmonophloia*), Wandoo (*E. wandoo*), Tuart (*E. gomphocephala*), Jarrah (*E. marginata*), Flooded Gum (*E. rudis*), York Gum (*E. loxophleba*), Powderbark (*E. accedens*), Karri (*E. diversicolor*), and Marri (*Corymbia calophylla*) (DAWE, 2022).

Potential nest-trees were systematically assessed within the Survey Areas through ground-based observations. Trees considered potentially suitable for Black Cockatoo nesting were systematically evaluated. For each suitable tree, the following attributes were recorded:

- tree location
- tree species
- life status (alive or dead)
- diameter at breast height (DBH)
- number of visible hollows
- aspect and estimated height of the most suitable hollow
- evidence of use, including chew marks or other signs of breeding activity
- trees were then given a nest-tree ranking in accordance with the Bamford ranking system described in **Table 3.5**.

Table 3.5 Bamford (2020) Black-cockatoo Nest-tree Ranks

Rank	Description of Tree and Hollows/Activity
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10 m).
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows are not vertical or near-vertical; thus, a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by black cockatoos.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

The terms adopted by DAWE (2022) to categorise Black Cockatoo breeding habitat (especially 'suitable' and 'potential') can be confusing to use in practice. Therefore, Umwelt uses the term "potential nest-tree" to define any tree that meets the nest-tree criteria of DAWE (DAWE, 2022; DCCEEW, 2026c, 2026d, 2026a), unless explicitly stated otherwise. The above ranks can then be pooled, within reason, to align with DAWE's (2022) categories:

- Known nesting trees: Rank 1

- Suitable nesting trees: Rank 2 and Rank 3
- Potential nesting trees: Rank 4 and Rank 5.

It is noted that some trees that are assessed as Rank 3 are unlikely to support breeding (for example, because the internal dimensions – not assessed from ground level – are unsuited to Black Cockatoo nesting; and this may be strongly related to tree species and the propensity to form hollows). Therefore, consideration of a sub-ranking of these trees (to identify those which are considered to be of 'greatest' potential) is sometimes made, where applicable, when undertaking field investigations. This may be of practical importance if further assessment of hollows (e.g. by pole camera or drone) is required.

In assessing the value of breeding trees, the following are considered:

- Height of nest entrance. For Carnaby's Black Cockatoo, a study by Saunders (1979) found that the minimum height of a known nest entrance was approximately 3 m and while nests as low as 2 m (in Wandoo or Salmon Gum) were recorded, 95% of nests were above 3 m. Therefore, 3–4 m absolute minimum threshold seems a pragmatic "general" approach to use for the purpose of field work where multiple species are likely to occur (and breed), and multiple tree species are under consideration. It should be noted, however, that this can vary considerably depending on site (and species) context.
- Tree species. In the Jarrah forest, Marris are strongly favoured as breeding trees, with more than 90% of black cockatoo nests recorded in Marri in a study by Johnstone et al. (2013). While nests in Jarrah are known, these are relatively rare because the heartwood is resistant to termites and, thus, it is uncommon for this species to form the internal hollows of suitable dimensions for black cockatoo nesting. Smooth, white-barked eucalypts (such as Wandoo and Powderbark Wandoo) have a much greater propensity to form large internal hollows, even in trees that have relatively narrow DBH. Nests in other species such as Flooded Gum, Karri, Tuart and Yarri are known and it is generally considered that a tree of any species may be a breeding site if hollow height, dimensions, and orientation are adequate.
- Hollow entrance dimensions. Johnstone *et al*. (2013) recorded the minimum nest entrance dimensions as 100 x 120 mm but noted that this was an extreme case. On 'average', hollow entrance dimensions were 300 x 340 mm and, in many cases the nest entrance was very much greater.
- Hollow entrance orientation. Johnstone *et al*. (2013) defined a number of hollow entrance types (based on their orientation and location within the tree's structure). These can be condensed to the following categories:
    - chimney
    - elbow
    - spout
    - side entrance (to main trunk).

Black Cockatoos mainly nested in chimneys, elbows and side entrances and, in virtually every case, the hollow entrance needed to be oriented vertically (chimneys, elbows), near-vertically (some spouts) or outwards (side entrances). Horizontal or downward-facing hollow entrances (even of suitable height and diameter) are undesirable to black cockatoos.

3.5.3 Foraging

Bamford (2020) has also developed a foraging value assessment, that was designed to provide the sort of information needed by DCCEEW, Department of Water and Environmental Regulation (DWER) and EPA to assess impact significance and offset requirements. This document is presented in **Appendix B**. The foraging value of the Survey Areas was assessed by calculating a foraging score for areas of similar vegetation type/condition following the rationale laid out by Bamford (2020). The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The Bamford foraging habitat quality score (HQS) system has three components as detailed by Bamford (2020). These three components are drawn from the DCCEEW offset calculator but with the scoring approach developed by Bamford (as presented in **Appendix B)**:

- a score out of six for the vegetation composition, condition and structure
- a score out of three for the context of the site
- a score out of one for species density

Foraging value can thus be assigned a score out of six, based upon site vegetation characteristics, or a score out of 10 if context and species density are also considered. A higher score represents better foraging value. The approach to assigning scores for vegetation, context and species density incorporates a range of considerations and circumstances, and these are outlined and discussed by Bamford (2020). It should be noted that foraging HQSs are calculated differently for each of the three conservation significant Black Cockatoo taxa that occur in WA; thus a separate score is generally given for each FHT (see **Section 5.3.3**) for each taxon when multiple taxa are potentially present in an area.

Vegetation composition, density and health/quality vary within all of the FHT types assessed and this can influence the Black Cockatoo FHQS. FHQS scoring was undertaken for both Survey Areas.

Black Cockatoo foraging signs were also opportunistically recorded as part of the field survey, within the Survey Area. When observed, the following details were recorded:

- location
- Black Cockatoo species, based on nut chew assessments, or known preferred forage species
- forage plant species
- approximate age of the foraging evidence.

Foraging evidence categories are outlined in **Table 3.6**.

Table 3.6 Foraging Evidence Categories

Category	Description
Active	Where birds were observed in the act of foraging.
Recent	Foraging signs (e.g. chewed nuts or vegetation) were 'fresh' (i.e. foraging was likely to have occurred within days to weeks). Recent foraging signs were typically green and/or with very little sign of weathering. Approximately less than four weeks old.
Intermediate	Foraging was likely to have occurred within weeks to months previously. Approximately one to six months old.
Old	Foraging was likely to have occurred months to years previously. Approximately more than six months old.

3.5.4 Night Roosting

As per the guidance of DAWE (2022), areas likely to be used as night roosting sites were noted based on the topographical, physical and vegetation characteristics present (such as sites adjacent to watercourses with large trees) and/or indirect evidence of roosting (e.g. guano deposits, discarded feathers).

The BirdLife Australia Great Cocky Count (GCC) database of roost sites was searched for relevant local records prior to the field survey as per **Section 3.1**.

3.5.5 Watering Points

Black cockatoos generally choose roost locations within approximately 2 km of a watering point (DAWE, 2022) therefore the presence (or absence) of water sources can influence the suitability of a site for use by black cockatoos or the manner in which they may use that site. The Survey Areas were assessed (directly during the field investigations and through the inspection of satellite imagery) for the presence of water sources that may provide potential watering points for black cockatoos.

4.0 Limitations

Table 4.1 presents an assessment of the potential limitations of the 2026 Reconnaissance flora and vegetation survey, as well as the Targeted black cockatoo survey, in accordance with EPA Technical Guidance (2016a, 2020).

Table 4.1 Limitations of the 2026 Survey

Limitation	Limitation of Survey	Comment
Effort and extent	No	A Reconnaissance flora and vegetation survey was undertaken across the entirety of both Survey Areas. The Survey Areas were sampled via 75 vegetation mapping notes, with the vegetation described via structural classification; sampling was undertaken across the variety of vegetation areas as noted during aerial photography interpretation. Systematic Targeted survey for black cockatoos was within the Survey Areas. No constraints prevented appropriate sampling techniques being employed within the Survey Areas. All areas were accessible via foot transects. Data reliability is therefore considered to be high.
Competency/experience of the team carrying out the survey	No	The Project Manager and flora field lead has 4.5 years previous experience in conducting flora and vegetation surveys in the Perth bioregion, as well as conducting systematic sampling and analysis. Information relating to identifying characteristics, flowering period and habitat of significant flora taxa identified by the desktop assessment as potentially occurring in the Survey Areas were available prior to undertaking the 2026 field survey.
Proportion of flora recorded and/or collected and identified	No	Given the level of survey undertaken, provision of a full census of the flora and fauna of the Survey Areas was beyond the scope of this assessment. All flora taxa were identified on site, with collections taken.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	No	Good contextual information for the Survey Areas was available prior to the survey. Sources of information used included government databases (DBCA, DCCEEW), as well as numerous general sources pertaining to the climate, geomorphology, flora, vegetation and fauna of the region, and ecological surveys previously conducted in the Desktop Study Area.
Survey timing and weather/season/cycle	No	The field survey was conducted in March 2026. This does not correspond to the optimum survey timing for the flowering period of the Swan Coastal Plain bioregion (Spring). However, as this survey was Reconnaissance level only, and given the vegetation condition of the Survey Areas, this is not considered a limitation. Most significant flora taxa that were identified as potentially occurring within the Survey Areas can be reliably identified outside of the optimal flowering period. The Targeted black cockatoo habitat assessment can be conducted at any time of year.

Limitation	Limitation of Survey	Comment
Disturbances (e.g. fire, flood, accidental human intervention etc.) that may have affected results of survey	No	There was evidence of significant impact to vegetation composition and structure throughout the Survey Areas as a result of human activities, including clearing and very high levels of introduced (weed) taxa. However, these disturbances did not affect the results of the survey, with the vegetation able to be confidently described and mapped, and flora taxa mature enough to be easily identified or collected. The black cockatoo investigations were unimpacted by disturbance.
Remoteness and/or access restrictions	No	The Survey Areas were accessed via roads or on foot. Access was not a limitation of this assessment.

5.0 Results and Discussion

5.1 Desktop Assessment

5.1.1 Literature Review

A number of flora and vegetation surveys have been undertaken within the Desktop Study Area, with key findings summarised in **Table 5.1**. This includes records of key flora and vegetation identified during these assessments, such as significant flora taxa, significant vegetation communities, Declared Pests, and Weeds of National Significance (WoNS). Where necessary, the nomenclature and conservation status of significant flora and vegetation presented in **Table 5.1** have been updated to reflect current classifications.

Table 5.1 Literature Review

Report and Author	Parameters and Survey Date	Key Findings – Flora	Key Findings - Vegetation
Southern Ports Bunbury – Ecological Investigations. **GHD Pty Ltd (GHD) - 2018**	Flora and fauna assessment of the study area. Survey date 1 – 2013 Survey date 2 - 2017	Likely presence of one Threatened Ecological Community (TEC) and three Priority Ecological Communities (PECs) within the study area. No EPBC Act or WC Act listed flora were recorded. No DBCA Priority-listed flora species were recorded.	Nine vegetation types, open water and areas of infrastructure/roads/rail were identified within the study area. Majority of the study area was in Degraded to Completely Degraded condition and had either been previously cleared for pasture and replanted or have been significant affected by weed invasion and disturbances associated with historical clearing. 21 Geomorphic Wetlands are within or intersect the study area. Two of these wetlands are Conservation Category Wetlands with the remainder (19) Multiple Use Wetlands.
Flora and Vegetation Survey Report (v0.2) – Lot 43 Stanley Road, Wellesley. **Lundstrom Environmental Consultants Pty Ltd - 2019**	Single-phase detailed flora and vegetation assessment of the proposed expansion area, as well as a targeted search for threatened and priority flora (in particular *Caladenia huegelii* and *Caladenia speciosa*). Survey date – September 2018	A total of 70 taxa were identified, including 56 native species. No Threatened flora under the WC Act or under the EPBC Act were recorded. One Priority species as listed by DBCA, *Acacia semitrullata* (P4) was observed from one location. A total of 14 introduced species (20% of the total taxa) were recorded with no species listed as Declared Pests under the BAM Act or WONS.	One vegetation type was described for the entire Survey Area. Vegetation of the Survey Area was determined to be part of the "Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region" TEC (Banksia Woodlands TEC), gazetted in September 2016. Vegetation was in a 'Good' to 'Very Good' condition, based on a relatively disturbed native understorey altered structure.

Report and Author	Parameters and Survey Date	Key Findings – Flora	Key Findings - Vegetation
Targeted and Reconnaissance Flora Survey – Estate Drive, City of Bunbury. **Ecoedge - 2019**	Reconnaissance and Targeted Flora and Vegetation Survey along approximately 1 km of road reserve vegetation along Estuary Drive. Survey date 1 – January 2019 Survey date 2 – April 2019	Thirty-one flora taxa were found including 13 introduced species. No Threatened flora was found in the Survey Area; however the Priority 4 taxon *Eucalyptus rudis* subsp. *cratyantha* (Flooded Gum) is common in the southern part of the Survey Area. No other flora of conservation significance was found.	Three vegetation units across survey area with three vegetation conditions. There was an area of 'Subtropical and Temperate Coastal Saltmarsh' (Priority 3 ecological community) that is protected under the EPBC Act.
Bunbury Harvey Regional Council Flora, Vegetation and Fauna Assessment – Stanley Road Waste Management Facility – Lot 45 Stanley Road, Australind. **JBS&G Australia Pty Ltd T/A Strategen-JBS&G - 2019**	Detailed flora, vegetation, and fauna surveys, including a targeted black cockatoo habitat survey. Survey date – September 2019	A total of 50 native vascular plant taxa from 16 plant families and 39 genera were recorded from quadrats within the Survey Area. No Threatened flora species as listed under section 178 of the EPBC Act or section 19(1) of the BC Act were recorded within the Survey Area. No priority flora species as listed by DBCA were recorded within the survey area. A total of 16 introduced (exotic) taxa were recorded within the Survey Area.	Habitat with the potential to support three threatened species and three priority species was recorded within the survey area. No conservation significant flora species were recorded during this search. Potential habitat for the remaining two threatened flora species (undetectable at time of survey) identified as having potential to occur within the survey area was also recorded within the survey area (*Drakaea elastica*, and *Drakaea micrantha*). One vegetation type recorded, as well as cleared land. Vegetation condition with the survey area ranged from Completely Degraded to Very Good.

Report and Author	Parameters and Survey Date	Key Findings – Flora	Key Findings - Vegetation
Supplementary targeted flora survey for *Drakaea elastica* – Stanley Road Waste Facility. **JBS&G Australia Pty Ltd T/A Strategen-JBS&G - 2020**	Flora, vegetation, and fauna surveys to be conducted within the Stanley Road Waste Management Facility. Targeted flora survey for potential habitat for the Threatened orchid species *Drakaea elastica* was recorded within the eastern portion of the proposal area. Survey date – August 2020	The survey conducted did not locate any individuals of the Threatened species *Drakaea elastica* within the Proposal area. No other species of conservation significance were recorded during this survey.	Potential habitat for threatened species.
City of Bunbury – Flora and Fauna Survey – Harris Road, Bunbury. **Natural Area Holdings Pty Ltd/Natural Area Consulting Management Services - 2021**	Detailed flora and vegetation, and a basic fauna survey within a portion of Harris Road reserve. Identify location of declared rare or priority flora, fauna and/or ecological communities, and potential habitat trees for threatened Black Cockatoos and the threatened Western Ringtail Possum. Survey date - 2021	A total of 41 flora taxa from 22 families. No threatened or priority flora species were recorded.	One vegetation type Marri, Jarrah and Peppermint Woodland. Vegetation condition ranged from Degraded to Completely Degraded with the majority (97%) of the site Completely Degraded. No threatened or priority ecological communities were recorded.

5.1.2 Significant Flora Taxa

The search of the DCCEEW SPRAT Database (DCCEEW, 2025b) with regard to MNES listed under the EPBC Act identified 19 flora taxa listed as Threatened species, or habitat for such species, that may occur in the Desktop Study Area (**Table 5.2**). The full results of the DCCEEW Database search are presented in **Appendix A**.

An additional search was undertaken of Dandjoo (DBCA, 2026), which returned an additional 23 significant flora taxa that occur within the Desktop Study Area. A paid database search of the DBCA Threatened and Priority Flora Database was not part of the scope of this assessment.

A total of 42 significant flora taxa (19 Threatened taxa and 23 DBCA-classified Priority flora) potentially occur or are known to occur (based on presence of potential habitat) within the Desktop Study Area, as presented in **Table 5.2**.

No publicly available spatial records are available for the records presented in **Table 5.2**.

Table 5.2 Significant Flora Taxa of the Desktop Study Area

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^
Andersonia gracilis	T	T - EN	August to November	Winter-wet areas, near swamps. White-grey sand, sandy clay and gravelly loam.	DCCEEW
Aponogeton hexatepalus	P4		February to July	Seasonally inundated wetlands.	Dandjoo
Banksia mimica	T	T - EN	September to January	Flats or gentle slopes with grey sand.	DCCEEW
Banksia squarrosa* subsp. *argillacea	T	T - VU	August to December	Floodplains. Sandy loam over ironstone.	DCCEEW
Bolboschoenus medianus	P1		February	Inundated areas, waterways along river banks with brown clay silt or loam.	Dandjoo
Brachyscias verecundus	T	T - CR	October to December	Near outcrops. Sand over laterite/Ironstone/granite.	DCCEEW
Caladenia huegelii	T	T - EN	September to October	Plains or swamps. Grey or brown sand.	Dandjoo, DCCEEW
Caladenia speciosa	P4		Late August to October. Latest record is 25 October	Flats, swampy areas with black sand; clay pans. Also grey sand.	Dandjoo
Caladenia swartsiorum	P2		September to October. Latest record 10 October	Winter wet creeklines or plains with grey sand.	Dandjoo
Carex tereticaulis	P3		September to November	Grey or brown loam or sandy clay with laterite. Edges of drainage lines.	Dandjoo
Chamaescilla gibsonii	P3		August to November	Brown or grey sandy clay. Winter-wet clay pans and flats.	Dandjoo
Chamelaucium erythrochlorum	P4		November to February	Riverbanks, gullies and ridges with sandy loam, sometimes over laterite.	Dandjoo
Chamelaucium roycei	T	T - VU	September to November	Winter wet depressions or flats. Sandy clay over ironstone.	DCCEEW
***Craspedia* sp. Waterloo (G.J. Keighery 13724)**	P2		August to November	Seasonally wet flats and claypans, grey to brown clay, sometimes sandy, over clay. Wandoo woodland.	Dandjoo
Dillwynia dillwynioides	P3		August to January	Saline flats, winter-wet depressions and wetlands. Grey, brown or black sandy loam, sometimes peaty.	Dandjoo

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^
Diuris drummondii	T	T - VU	November to January	Floodplains, winter-wet depressions and swamps. Brown loam, sometimes peaty.	Dandjoo, DCCEEW
Diuris micrantha	T	T - VU	September to October	Winter-wet depressions. Brown loamy clay. Winter wet swamps, in shallow water.	Dandjoo, DCCEEW
Diuris purdiei	T	T - EN	September to October	Floodplains, swamps, winter-wet depressions and flats. Moist grey sand.	DCCEEW
Drakaea elastica	T	T - EN	October to November	Winter-wet depressions. Grey sand in low-lying areas.	Dandjoo, DCCEEW
Drakaea micrantha	T	T - VU	September to October	Edge of swamps, often found in clearings and tracks. White-grey sand.	Dandjoo, DCCEEW
Drosera bulbigena	P2		August to January	Saline flats, winter-wet depressions and wetlands. Grey, brown or black sandy loam, sometimes peaty.	Dandjoo
Eleocharis keigheryi	T	T - VU	August to November	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Dandjoo, DCCEEW
Gastrolobium whicherense	P2		August to November	Ridges with quartz or laterite, valleys and river banks with brown-white clayey sand. Gravel.	Dandjoo
Gonocarpus keigheryi	P2		December to February	Creeks, valleys and watercourses with brown clayey sand.	Dandjoo
Grevillea rosieri	P2		June to October	Slopes, hills and flats with yellow-brown clay loam. Laterite and sometimes granite.	Dandjoo
Lambertia echinata* subsp. *occidentalis	T	T - EN	October to December	Flats or gentle slopes. Sandy loam over laterite/ironstone.	DCCEEW
Lasiopetalum membranaceum	P3		September to December	Slopes and plains with grey sand over limestone, sometimes over laterite.	Dandjoo
Loricobbia skinneri	P4		September to November	White or grey sand on winter wet depressions or drainage lines.	Dandjoo
Morelotia australiensis	T	T - VU	September to December	Brown sandy loam or grey sand. Winter damp areas.	DCCEEW
Ornduffia submersa	P4		September to November	Aquatic herb, floating in water.	Dandjoo

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^
Pterostylis frenchii	P2		November. Latest record is 15 November	White sand, yellow brown sand on limestone.	Dandjoo
Puccinellia vassica	P1		November	Salt marshes and saline areas with grey soil. Tidal flats.	Dandjoo
Rumex drummondii	P4		August to November	Creeklines with black peaty sandy clay over limestone; winter wet depressions.	Dandjoo
Schoenus capillifolius	P3		September to October	seasonally inundated wetlands.	Dandjoo
Stylidium acuminatum subsp. ***acuminatum***	P2		November to December	Slopes and road verges, Red brown loam over laterite. Sometimes yellow sand.	Dandjoo
Synaphea odocoileops	P1		September to November	Winterwet flat/depression with brown-grey clay loam or clayey sand.	Dandjoo
Synaphea **sp. Fairbridge Farm (D.Papenfus 696)**	T	T - CR	September to October	Seasonally wet areas or low rises. Clayey sand/loam over laterite.	DCCEEW
Synaphea **sp. Pinjarra Plain (A.S.George 17182)**	T	T - EN	September to December	Brown clay loam, flats.	DCCEEW
Synaphea **sp. Serpentine (G.R.Brand 103)**	T	T - CR	September to November	Flats, seasonally damp areas.	DCCEEW
Synaphea stenoloba	T	T - EN	September to November	Flood plains or swamps. Sandy or sandy clay soils.	DCCEEW
Thelymitra variegata	T	T - CR	August to October	Brown clay loam or sand, in clearings amongst low shrubs, rushes and grass tussocks in freely draining deep sandy soil.	DCCEEW
Verticordia attenuata	P3		December or January to May	Winter-wet depressions or flood plains. White or grey sand.	Dandjoo

^Sources are: Dandjoo (DBCA, 2026), DCCEEW (2026b).

5.1.3 Significant Vegetation

The search of DCCEEW's SPRAT Database (DCCEEW, 2025) identified six Commonwealth-listed TEC as 'known', 'likely', or 'may' occur within the Desktop Study Area. These communities are summarised in **Table 5.3**. The full results of the DCCEEW Database search are presented in **Appendix A**.

A manual review of current DBCA TEC and PEC lists (DBCA, 2025c) did not identify any additional significant vegetation communities within, or having the potential to occur within, the Survey Areas. Similarly, a review of DBCA's TEC and PEC records spatial database (DBCA-038; DBCA, 2024b) did not identify any additional significant vegetation communities within the Desktop Study Area.

In summary, six significant vegetation communities have records within the Desktop Study Area, as presented in **Table 5.3**. Five of the significant vegetation communities returned by the desktop assessment are listed also listed as TECs or PECs by DBCA.

Table 5.3 Significant Vegetation of the Desktop Study Area (DCCEEW, 2025)

Community (EPBC)	Community (WA)	Description	PMST Comment^
Banksia Woodlands of the Swan Coastal Plain ecological community TEC - EN	Banksia Woodlands of the Swan Coastal Plain PEC - P3	Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are *B. prionotes* or *B. ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Community 'likely' to occur within Desktop Study Area
Clay Pans of the Swan Coastal Plain TEC - CR	-	The clay pan communities occur where clay substrate is low in the landscape and forms an impermeable layer close to the surface. These wetlands that rely on rainfall and local surface drainage to fill are considered unlikely to be connected to groundwater. The clay pans then dry out to form a relatively impervious substrate in summer. A suite of perennial plants that propagate by underground bulbs, tubers or corms (geophytes), and annual herbs flower sequentially as the clay pans dry out. The clay pans are the most diverse of the SCP wetlands and contain a number of local endemic flora.	Community 'likely' to occur within Desktop Study Area
***Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain** TEC - EN	SCP3c: *Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain TEC - Endangered	The community occurs on heavy soils of the eastern side of the southern SCP, generally between Bullsbrook and Stratham. The community is usually dominated by *Corymbia calophylla* (marri) and *Xanthorrhoea preissii* (balga). It also occasionally includes *Eucalyptus wandoo* (wandoo). The more common shrubs include *Gompholobium marginatum*, *Hypocalymma angustifolium* (white myrtle) and *Banksia dallanneyi* (couch honeypot), with herbs, grasses and sedges including *Burchardia congesta* (milkmaids), *Cyathochaeta avenacea*, *Neurachne alopecuroidea* (foxtail mulga grass), *Caesia micrantha* (pale grass-lily), *Mesomelaena tetragona* (semaphore sedge), *Morelotia octandra*, *Desmocladus flexuosus, Opercularia vaginata* (dog weed), *Sowerbaea laxiflora* (purple tassels), *Lepidosperma* spp. and *Drosera menziesii* (pink rainbow) also common.	Community 'known' to occur within Desktop Study Area

Community (EPBC)	Community (WA)	Description	PMST Comment^
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion TEC - CR	SCP26a: *Melaleuca huegelii – M. systena* shrublands of limestone ridges TEC – Critically Endangered	The community is known from shallow soils over limestone or massive limestone ridges of Tamala Limestone between Yanchep north of Perth, and south of Perth near Lake Clifton. The community generally comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii* (chenille honeymyrtle), *Melaleuca systena* (coastal honeymyrtle) and *Banksia sessilis* (parrot bush), commonly over *Grevillea preissii* (spider net grevillea), *Spyridium globulosum* (basket bush), and *Acacia lasiocarpa* (pajang). A suite of herbs commonly occurs under the shrub layer.	Community 'may' occur within Desktop Study Area
Subtropical and Temperate Coastal Saltmarsh TEC - VU	Subtropical and Temperate Coastal Saltmarsh PEC – P3	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23°S latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Community 'likely' to occur within Desktop Study Area
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community TEC - CR	Tuart (*Eucalyptus gomphocephala*) Woodlands of the Swan Coastal Plain PEC - P3	Mostly confined to Quindalup Dunes and Spearwood Dunes but can also occur on the Bassendean dunes and Pinjarra Plain. It can occur on the banks of rivers and wetlands. Tuart is the key upper canopy species although it may co-occur with trees of other species. Trees commonly co-occurring with Tuart include *Agonis flexuosa*, *Banksia grandis*, *Banksia attenuata*, *Eucalyptus marginata*; and less commonly, *Corymbia calophylla*, *Banksia menziesii* and *Banksia prionotes*. An understorey of native plants is typically present, which may include grasses, herbs and shrubs. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Community 'likely' to occur within Desktop Study Area

^Comment taken from **Appendix A**.

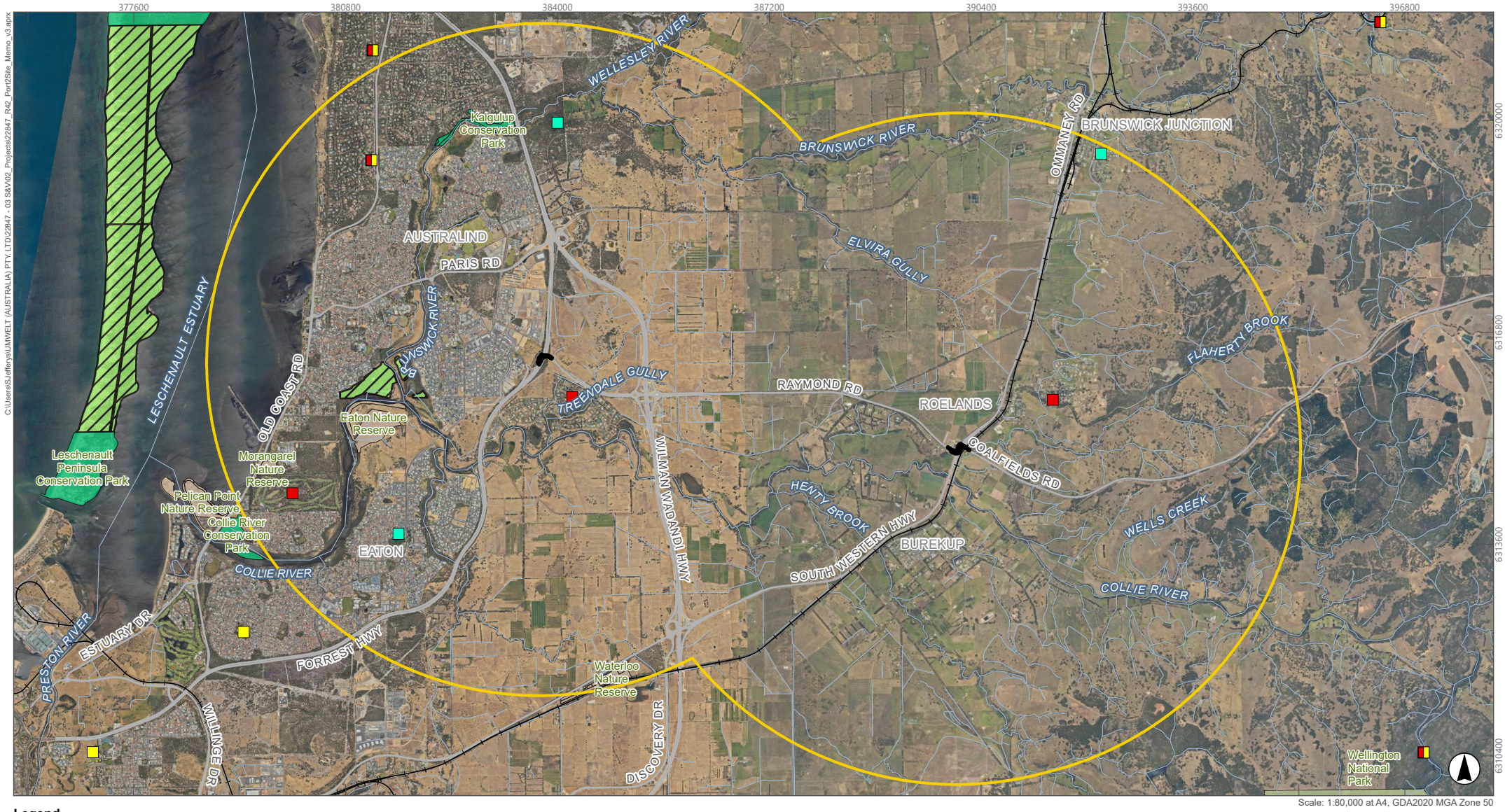
5.1.4 Black Cockatoo Values

The Great Cocky Count is a long-term citizen science survey and the biggest single survey for Carnaby's, Baudin's and Forest Red-tailed Black Cockatoos in Western Australia. It takes place annually over one night in autumn where volunteers monitor known roosts and count black cockatoos as they return to their evening roosts. The Great Cocky Count provides a snapshot of black cockatoo populations from across the southwest and assists in quantifying changes in their numbers. The Survey Areas are within the known distribution of all three black cockatoo taxa.

There are seven records of roosts within the Desktop Study Area (BirdLife Australia, 2024). The closest roost to the Survey Areas is located 0.7 km southeast of the Western Survey Area and recorded five Forest Red-tailed Black Cockatoos in 2023. The closest roost to the Eastern Survey Area is located 1.5 km northeast, recording eight Forest Red-tailed Black Cockatoos in 2024.

No black cockatoo breeding sites have been recorded within the Desktop Study Area.

The known roosting sites of the Desktop Study Area are presented in **Figure 5.1**.



Scale: 1:80,000 at A4, GDA2020 MGA Zone 50

Legend

- Desktop Study Area
- Survey Area
- Road
- Railway
- Watercourse
- Crown Freehold - Dept Interest
- Conservation Park
- National Park
- Nature Reserve

Great Cockatoo Count Recorded Roosts (2024)

- Forest Red-tailed Black Cockatoo
- White-tailed Black Cockatoo
- Joint
- Unconfirmed Roost

FIGURE 5.1

Black Cockatoo Roost Sites of the Desktop Study Area

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0 1.6 3.2 km

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), DBCA (2026), Birdlife (2024), Umwelt (2026)

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5.2 Flora and Vegetation Field Survey Results

5.2.1 Vascular Flora Inventory

A total of 28 discrete vascular flora taxa were recorded across the Survey Areas, across 11 families and 19 genera. Of the 28 taxa, eight taxa are introduced (as indicated by * in **Table 5.4**), and eight taxa are considered native to Western Australia, but planted outside of their natural distribution (as indicated by ^ in **Table 5.4**). The most represented families were Myrtaceae (14 taxa) and Fabaceae (four taxa). Many of the extant native taxa are disturbance specialists, or hardy perennial shrub taxa that have persisted through extensive clearing and subsequent grazing.

No listed significant flora taxa were recorded during the 2026 survey. No additional flora taxa recorded are considered to be significant for other reasons as outlined by **Section 1.3**.

None of the eight introduced flora taxa of the Survey Area are listed as Weeds of National Significance (WoNS) (Weeds Australia, 2026). Additionally, none of the introduced flora taxa are Declared Pests (DPIRD, 2026).

A full list of vascular flora taxa recorded in the Survey Areas is presented in **Table 5.4**. Note that as discussed in **Section 1.3** this was a reconnaissance assessment and therefore a full census of all vascular flora taxa that occur in the Survey Areas was not undertaken.

The raw vegetation mapping note data are presented in **Appendix C**.

Table 5.4 Vascular Flora Taxa Recorded During 2026 Survey

Family	Taxon
Anacardiaceae	**Schinus terebinthifolia*
Bignoniaceae	**Jacaranda mimosifolia*
Casuarinaceae	*Allocasuarina fraseriana*
Cupressaceae	*^Callitris columellaris*
Fabaceae	**Acacia baileyana*
	Acacia saligna
	Acacia sp.
	Hardenbergia comptoniana
Lamiaceae	*^Westringia* sp.
Myrtaceae	*Agonis flexuosa*
	^Callistemon viminalis
	^Calothamnus graniticus
	^Calothamnus sp.
	Corymbia calophylla
	**Eucalyptus botryoides*
	**Eucalyptus grandis*
	^Eucalyptus lehmanniana
	Eucalyptus marginata
	Eucalyptus wandoo

Family	Taxon
	^*Eucalyptus* sp.
	Kunzea sp.
	Melaleuca preissiana
	^*Melaleuca* sp.
Nyctaginaceae	**Bougainvillea* sp.
Proteaceae	**Grevillea robusta*
	Hakea trifurcata
Scrophulariaceae	**Eremophila* sp.
Xanthorrhoeaceae	*Xanthorrhoea* sp.

*Indicates Introduced flora taxa, either from other states or international.
^Indicated Introduced flora taxa that are native to Western Australia however have been planted outside of their known distribution.

5.2.2 Likelihood of Occurrence of Significant Flora Taxa

As discussed in **Section 5.1.2**, a total of 42 significant flora taxa were identified as occurring (or potentially occurring) within the Desktop Study Area prior to the 2026 survey. Although not all significant flora taxa were identifiable during the 2026 survey, due to the Reconnaissance survey being conducted outside of optimal flowering time (i.e.. spring) or outside the timing where above-ground parts are available (e.g. for geophytes), all significant flora taxa identified by the desktop assessment are considered Unlikely to occur in either Survey Area. This is largely due to either the Survey Areas being outside of the taxon's known distribution, lack of suitable habitat within the Survey Areas, or condition of the vegetation. **Appendix D** presents the likelihood of each taxon occurring within each Survey Area. The likelihood of occurrence assessments were undertaken following review of species' habitats and distributions.

It should be noted that suitable habitat has predominantly been determined utilising details recorded from known locations of specimens lodged with the WA Herbarium (WA Herbarium, 1998-). However, for many taxa known within the general vicinity of the Survey Areas, suitable habitat is difficult to define as the available information is often vague or very broad and difficult to interpret. Therefore, a precautionary approach has been adopted when assessing whether suitable habitat for the taxon is present in the Survey Areas.

5.2.3 Vegetation Types of the Survey Areas

The vegetation of the Survey Areas was mapped and described via structural classification from floristic and structural data recorded at vegetation mapping notes. The vegetation of the Survey Areas has been highly modified since European settlement and largely consists of a tree overstorey over introduced (planted or weed) flora taxa.

The vegetation of the Western Survey Area is considered remnant (mapped as VT1), with interspersed planted trees (mapped as PL). The remnant vegetation within the Western Survey Area provides habitat for birds and refuge for small mammals and lizards. The presence of naturally occurring *Agonis flexuosa* (Peppermint) provides potential habitat for Western Ringtail Possum (listed as Critically Endangered by both BC and EPBC Acts).

The vegetation of the Eastern Survey Area is considered to be regenerated native vegetation. This road verge has been historically cleared of native vegetation and replaced with planted introduced flora taxa. As this vegetation has matured, native vegetation has regenerated from the existing seed bank (namely *Corymbia calophylla* and *Xanthorrhoea* sp.), which is found interspersed with the planted vegetation (PL) at this site. Note that no *Agonis flexuosa* is located within the Eastern Survey Area.

A total of one VT was mapped within the Survey Areas over a total area of 0.30 ha (14.78% of the Survey Areas), and a total of two Highly Modified Areas were mapped within the Survey Areas (1.78 ha, 85.22%) (**Figure 5.2**). **Table 5.5** presents a description of the VT and Highly Modified Areas mapped in each Survey Area, including area mapped. **Figure 5.2** presents the mapped distribution of the VT and Highly Modified Areas within the Survey Areas including locations of vegetation mapping observations. Raw mapping note data is presented in **Appendix C**.

No vegetation recorded in the Survey Areas is considered to be significant vegetation for reasons listed in **Section 1.3.**

Table 5.5 Vegetation Types of the Survey Areas

VT	Description	Photo
Native Vegetation		
VT1	Mid isolated trees to open woodland of *Corymbia calophylla* and/or *Eucalyptus marginata* and/or *Allocasuarina fraseriana* occasionally over tall isolated shrubs of *Agonis flexuosa*[#] over low tussock grassland of pasture weeds. Mapped extent in Western Survey Area: 0.27 ha (29.29%) Mapped extent in Eastern Survey Area: 0.03 ha (2.95%)	
Highly Modified Areas – not Native Vegetation		
PL	Planted trees, exotic in nature. Mapped extent in Western Survey Area: 0.05 ha (5.69%) Mapped extent in Eastern Survey Area: 0.17 ha (14.74%)	
CL	Areas completely cleared of vegetation, including roads and infrastructure. Mapped extent in Western Survey Area: 0.61 ha (65.02%) Mapped extent in Eastern Survey Area: 0.95 ha (82.45%)	No photo available.

[#]Note that the Eastern Survey Area does not contain the mid-stratum of *Agonis flexuosa*.

Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Vegetation Mapping Note

Vegetation Type

- VT1 Mid isolated trees to open woodland of *Corymbia calophylla* and/or *Eucalyptus marginata* and/or *Allocasuarina fraseriana* occasionally over tall isolated shrubs of *Agonis flexuosa* over low tussock grassland of pasture weeds
- PL Planted trees, exotic in nature
- CL Areas completely cleared of vegetation, including roads and infrastructure

FIGURE 5.2

Vegetation Types of the Survey Areas

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0 50 100 m

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

5.2.4 Vegetation Condition of the Survey Areas

The area of each VT and corresponding condition rating (as per EPA (EPA, 2016b)) mapped during the 2026 survey in the Survey Areas is presented in **Table 5.6**. The vegetation condition mapping of the Survey Areas is presented in **Figure 5.3**.

The Survey Areas have been mapped as either 'Degraded' or 'Completely Degraded' (**Figure 5.3**). VT1 has been mapped as 'Degraded' in the Western Survey Area, where historical clearing and infrastructural activities have impacted the condition of the remnant vegetation. VT1 has been mapped as Completed Degraded within the Eastern Survey Area, as only single regenerated trees or shrubs are present. All other areas that are mapped as 'Completely Degraded' are the Highly Modified Areas (Cleared (CL) and Planted (PL) areas), in which the land has been cleared for tracks, paddocks and infrastructure. No native vegetation remains in these areas.

Due to the history of clearing in the Survey Areas, no vegetation was considered to be in 'Pristine', 'Excellent', 'Very Good' or 'Good' condition (**Table 5.6**, **Figure 5.3**).

Table 5.6 Vegetation Condition of the Survey Areas

VT	Vegetation Condition		
	Degraded	Completely Degraded	Total
Western Survey Area			
VT1	0.27 ha 29.29%	-	0.27 ha 29.29%
PL	-	0.05 ha 5.68%	0.05 ha 5.69%
CL	-	0.61 ha 65.02%	0.61 ha 65.02%
Total	**0.27 ha** **29.29%**	**0.66 ha** **70.7%**	**0.93 ha** **100%**
Eastern Survey Area			
VT1	-	0.03 ha 2.95%	0.03 ha 2.95%
PL	-	0.17 ha 14.74%	0.17 ha 14.74%
CL	-	0.95 ha 82.45%	0.95 ha 82.45%
Total	**-**	**1.15 ha** **100%**	**1.15 ha** **100%**

Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Vegetation Mapping Note

Vegetation Condition

- Degraded
- Completely Degraded

FIGURE 5.3

Vegetation Condition of the Survey Areas

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0 50 100 m

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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5.2.5 Likelihood of Occurrence of Significant Vegetation

As discussed in **Section 5.1.3**, six listed significant vegetation communities were identified as potentially occurring in the Desktop Study Area. No significant vegetation communities returned by the desktop assessment are considered to occur within the Survey Areas. **Appendix E** presents an assessment of the potential presence of the six significant vegetation communities in the Survey Areas.

In summary, all six listed significant vegetation communities are considered Unlikely to occur in the any of the Survey Areas (**Appendix E**).

5.3 Black Cockatoo Field Survey Results

5.3.1 Presence

As discussed, the Survey Areas are within the known distribution of all three listed Black Cockatoo taxa (DAWE, 2022; DCCEEW, 2026c, 2026d, 2026a). No Black Cockatoos were recorded by direct observation during the 2026 survey. However, Forest Red-tailed Black Cockatoo presence was indicated by one record of old foraging evidence in the Western Survey Area (**Table 5.7, Photo 5.1**). There was no active or recent foraging debris recorded (see **Section 3.5.3**). The foraging record from the 2026 survey is presented on **Figure 5.4**. Foraging evidence was recorded within VT1 only.

Table 5.7 Forest Red-tailed Black Cockatoo Foraging Evidence Location

Date	Easting^	Northing^	Forage Species	Age	Survey Area
31/03/2026	383748.4	6316398.1	*Corymbia calophylla*	Old	Western Survey Area

^Data presented in GDA2020, Zone 50.

Photo 5.1 Forest Red-tailed Black Cockatoo Foraging (Photo: Umwelt)

5.3.2 Breeding Habitat

A total of 17 trees that met the criteria for potential nest-trees were recorded within the Survey Areas during the 2026 survey (eight in the Western Survey Area, and nine in the Eastern Survey Area). None of these trees contained hollows and therefore were assessed as Bamford Rank 5 (suitable size DBH, but with no hollows present). These trees were recorded in both VT1 and PL. The potential nest-trees within the Survey Areas are presented on **Figure 5.4**, and a full list, including location and tree species is presented in **Appendix F**.

Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Black Cockatoo Foraging Evidence

Potential Black Cockatoo Nest-trees

- Bamford Rank 5

FIGURE 5.4

Potential Nest-tree Locations and Foraging Evidence

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0 50 100 m

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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5.3.3 Foraging Habitat

An assessment for the Western Survey Area concluded:

- The remnant vegetation (i.e.. VT1) provides moderate value foraging habitat for all three Black Cockatoo taxa; a total of 0.27 ha (29.29%) scored a Foraging Habitat Quality Score (HQS) of 6 out of 10 for Red-tailed Black-Cockatoos and Baudin's Black Cockatoo, and a 5 out of 10 for Carnaby's Black Cockatoo (see **Table 5.8** and **Table 5.9**);
- The remaining planted (PL) vegetation is considered to have nil foraging value (0 out of 10) for all three taxa.
- Overall, the Western Survey Area has been ranked a weighted foraging HQS of 2 out of 10 (very low) for all three Black Cockatoo taxa.

An assessment for the Eastern Survey Area concluded:

- The regenerated vegetation (i.e.. VT1) of the Eastern Survey Area provides negligible foraging value (1 out of 10) for all three Black Cockatoo taxa;
- The planted (PL) vegetation provides moderate foraging value (5 out of 10) to Carnaby's Black Cockatoo (see **Table 5.8** and **Table 5.9**), due to the presence of **Grevillea robusta*, a known forage taxon of Carnaby's Black Cockatoo;
- Overall, the Eastern Survey Area has been ranked a weighted foraging HQS of 1 out of 10 (negligible) for all three Black Cockatoo taxa.

The Bamford foraging HQS for Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo within the Survey Areas is presented in **Figure 5.5**, and Carnaby's Black Cockatoo is presented on **Figure 5.6**. A summary of the areas of each foraging HQS category across each Survey Area is presented in **Table 5.8**. A breakdown of the foraging HQS by VT and a weighted overall site foraging HQS for each Survey Area, and for each black cockatoo taxon is provided in **Table 5.9**.

5.3.4 Night-roosting Habitat

The area around the Survey Areas is known to support Black Cockatoo night-roosting, with the closest roost to the Survey Areas located 0.7 km southeast of the Western Survey Area (see **Section 5.1.4**). No evidence of Black Cockatoo night-roosting within the Survey Areas was noted during the 2026 field investigation, however it is possible that Black Cockatoos could utilise the taller trees in both VT1 and PL to roost.

5.3.5 Watering Points

Several man-made dams occur in the vicinity of the Survey Areas and may be potential watering points for black cockatoos. The quality of the water in these locations is unknown and it is uncertain whether these watering points provide a year-around water source. The Collie River is present within the Desktop Study Area, located 0.9 km and 0.3 km south of the Survey Areas, and is likely to provide water sources for black cockatoos for at least some of the year.

Table 5.8 Bamford Foraging HQS Breakdown for All Three Black Cockatoo Taxa

FHQS	Mapped Extent			
	Western Survey Area		Eastern Survey Area	
	Area (ha)	%	Area (ha)	%
Forest Red-tailed Black Cockatoo				
10: Pristine	-	-	-	-
9: Very high	-	-	-	-
8: High	-	-	-	-
7: Moderate to High	-	-	-	-
6: Moderate	0.27	29.29	-	-
5: Moderate	-	-	-	-
4: Low to Moderate	-	-	-	-
3: Low	-	-	-	-
2: Very Low	-	-	-	-
1: Negligible	-	-	0.03	2.84
0: Nil	0.66	70.71	1.12	97.16
Total	**0.93**	**100**	**1.15**	**100**
Baudin's Black Cockatoo				
10: Pristine	-	-	-	-
9: Very high	-	-	-	-
8: High	-	-	-	-
7: Moderate to High	-	-	-	-
6: Moderate	0.27	29.29	-	-
5: Moderate	-	-	-	-
4: Low to Moderate	-	-	-	-
3: Low	-	-	-	-
2: Very Low	-	-	-	-
1: Negligible	-	-	0.03	2.84
0: Nil	0.66	70.71	1.12	97.16
Total	**0.93**	**100**	**1.15**	**100**
Carnaby's Black Cockatoo				
10: Pristine	-	-	-	-
9: Very high	-	-	-	-
8: High	-	-	-	-
7: Moderate to High	-	-	-	-
6: Moderate	-	-	-	-
5: Moderate	0.27	29.29	0.12	10.43
4: Low to Moderate	-	-	-	-
3: Low	-	-	-	-
2: Very Low	-	-	-	-
1: Negligible	-	-	0.03	2.94
0: Nil	1.61	70.71	0.99	86.67
Total	**0.93**	**100**	**1.15**	**100**

Table 5.9 Bamford Black Cockatoo Foraging HQS for each VT all Three Black Cockatoo Taxa

VT	Western Survey Area						Eastern Survey Area					
	Area (ha)	%	Vegetation (out of 6)	Context (out of 3)	Density (out of 1)	FHQS (out of 10)	Area (ha)	%	Vegetation (out of 6)	Context (out of 3)	Density (out of 1)	FHQS (out of 10)
Forest Red-tailed Black Cockatoo												
VT1	0.27	29.29	4	1	1	5	0.03	2.94	0 or 1	0	0	0 or 1
PL	0.05	5.69	0	0	0	0	0.17	14.74	0	0	0	0
CL	0.61	65.02	0	0	0	0	0.95	82.45	0	0	0	0
Total	**0.93**	**100**	**Weighted Score**			**2**	**1.15**	**100**	**Weighted Score**			**1**
Baudin's Black Cockatoo												
VT1	0.27	29.29	4	1	1	5	0.03	2.94	0 or 1	0	0	0 or 1
PL	0.05	5.69	0	0	0	0	0.17	14.74	0	0	0	0
CL	0.61	65.02	0	0	0	0	0.95	82.45	0	0	0	0
Total	**0.93**	**100**	**Weighted Score**			**2**	**1.15**	**100**	**Weighted Score**			**1**
Carnaby's Black Cockatoo												
VT1	0.27	29.29	3	1	1	4	0.03	2.94	1	0	0	0 or 1
PL	0.05	5.69	0	0	0	0	0.17	14.74	0 or 3	0 or 1	0 or 1	0 or 5
CL	0.61	65.02	0	0	0	0	0.95	82.45	0	0	0	0
Total	**0.93**	**100**	**Weighted Score**			**2**	**1.15**	**100**	**Weighted Score**			**1**

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Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse

BCE Foraging Habitat Quality Score

10	Pristine
9	Very High
8	High
7	Moderate to High
6	Moderate
5	Moderate
4	Low to Moderate
3	Low
2	Very Low
1	Negligible
0	Nil

FIGURE 5.5

Bamford FHQS for Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo

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0 50 100 m

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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Scale: 1:2,500 at A4, GDA2020 MGA Zone 50

Legend

- Survey Area
- Road
- Railway
- Watercourse

BCE Foraging Habitat Quality Score

10	Pristine
9	Very High
8	High
7	Moderate to High
6	Moderate
5	Moderate
4	Low to Moderate
3	Low
2	Very Low
1	Negligible
0	Nil

FIGURE 5.6

Bamford FHQS for Carnaby's Black Cockatoo

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0 50 100 m

Image Source: Landgate (2024) | **Data Source:** Landgate (2022, 2026), Umwelt (2026)

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6.0 Conclusions

A Reconnaissance flora and vegetation assessment and a Targeted black cockatoo assessment was undertaken for both the Western and Eastern Survey Areas of the Project.

A total of 28 discrete vascular flora taxa representing 11 families and 19 genera were recorded in the Survey Areas by the survey. No Declared Pests listed under the BAM were recorded in the Survey Areas. No significant flora taxa were recorded; although the survey was undertaken outside of the Spring period, it is considered unlikely that significant flora taxa would be present within either Survey Area, due to lack of habitat, or the Survey Areas are outside of the taxon's known distribution. condition.

A total of one VT (VT1) was mapped within the Survey Areas over a total area of 0.03 ha (14.78%), and a total of two Highly Modified Areas were mapped within the Survey Areas (1.78 ha, 85.22%). The VT was of either Degraded or Completely Degraded vegetation condition. The Highly Modified Areas were mapped as CL and PL, and were both mapped as Completely Degraded. No significant vegetation was recorded, and it is considered unlikely

A total of 17 potential black cockatoo nest-trees were recorded across the Survey Areas (eight in the Western Survey Area, and nine in the Eastern Survey Area, all Bamford Rank 5). The Survey Areas are within the known distribution of all three black cockatoo taxa. The overall weighted foraging habitat quality score for the Western Survey Area was ranked 2 out 10 (very low) for all three black cockatoo taxa, and the Eastern Survey Area was ranked 1 out of 10 (negligible). No night-roosting is currently known to occur in the Survey Areas, however it is possible that the taller trees of VT1 and PL would provide night-roosting habitat, due to the proximity to the Collie River (0.3 km and 0.9 km south of the Survey Areas).

No further flora, vegetation or black cockatoo survey is recommended for the Survey Areas, due to the Degraded to Completely Degraded nature of the vegetation, and the lack of black cockatoo nesting trees (no hollows recorded by the survey). It is considered unlikely for significant flora or vegetation to occur within the Survey Areas.

7.0 References

Bamford. (2020). *Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos*. Bamford Consulting Ecologists. https://ecologists.bamford.id.au/ecological-consulting/black-cockatoos

Bamford. (2022). *Appendix 1. Ranking system and methods for the assessment of potential nest trees for Black-Cockatoos (Bamford Consulting Ecologists)*. https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/App%209B%20Black%20cockatoo%20nesting%20foraging%20and%20roosting%20assessment%202022%20-%20Lots%2062%2063%2020%20507.pdf

Bamford, M., Bleby, K., & Chuk, K. (2020). *Byford Rail Extension Fauna Assessment; Spring 2020* (Prepared for GHD Pty Ltd Report prepared for ATA Environmental,). Bamford Consulting Ecologists.

Beard, J. S. (2015). *Plant Life of Western Australia* (A. S. George & N. Gibson, Eds.; 2nd ed.). Rosenberg Publishing. Kenthurst, New South Wales.

Beard, J. S., Beeston, G. R., Harvey, J. M., Hopkins, A. J. M., & Shepherd, D. P. (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second Edition. *Conservation Science Western Australia*, *9*(3), 1–152.

BirdLife Australia. (2024). *Great Cocky Count Dataset*. Spatial data. Last updated 18 June 2018. Department of Primary Industries and Regional Development (DPIRD).

BoM. (2026a). *Bureau of Meteorology Climate Data Online*. Commonwealth of Australia, Bureau of Meteorology (BoM). http://www.bom.gov.au/climate/data/

BoM. (2026b). *Groundwater Dependent Ecosystems Atlas*. Commonwealth of Australia, Bureau of Meteorology (BoM). http://www.bom.gov.au/water/groundwater/gde

DAWE. (2022). *Referral guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-cockatoo (Calyptorhynchus banksii naso)*. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.dcceew.gov.au/sites/default/files/documents/referral-guideline-3-wa-threatened-black-cockatoo-species-2022.pdf

DBCA. (2017). *Threatened and Priority Flora Report Form – Field Manual* (Version 1.3, August 2017). Department of Biodiversity, Conservation and Attractions (DBCA). https://www.dpaw.wa.gov.au/images/documents/plants-animals/monitoring/forms/threatened-priority-flora-field-manual.pdf

DBCA. (2018). *Vegetation Complexes—Swan Coastal Plain (DBCA-046)*. Spatial data. Last updated 24 August 2018. Department of Biodiversity, Conservation and Attractions (DBCA). https://catalogue.data.wa.gov.au/dataset/vegetation-complexes-swan-coastal-plain

DBCA. (2019). *2018 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis): Full Report*. Last updated 30 April 2019. Remote Sensing and Spatial Analysis Program, Department of Biodiversity, Conservation and Attractions (DBCA). https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

DBCA. (2023a). *Conservation Category Definitions for Western Australian Flora and Fauna*. 8 August 2023. Department of Biodiversity, Conservation and Attractions (DBCA). https://www.dbca.wa.gov.au/management/threatened-species-and-communities/nominations-listing

DBCA. (2023b). *Conservation Category Definitions for Western Australian Ecological Communities*. Government of Western Australia. https://www.dbca.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities

DBCA. (2024a). *Methods for survey and identification of Western Australian threatened ecological communities* (Draft version 4.3, 23 January 2024). Department of Biodiversity, Conservation and Attractions (DBCA), Species and Communities Program. https://www.dbca.wa.gov.au/management/threatened-species-and-communities/resources/threatened-ecological-community-monitoring-resources

DBCA. (2024b). *Threatened Ecological Communities (DBCA-038)*. Spatial data. Last updated 13 August 2024. Department of Biodiversity, Conservation and Attractions (DBCA). https://catalogue.data.wa.gov.au/dataset/threatened-ecological-communities

DBCA. (2025a). *Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)* [Data set]. https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-confirmed-breeding-areas

DBCA. (2025b). *DBCA - Lands of Interest (DBCA-012)*. Spatial data. Last updated: 15 July 2025. Department of Biodiversity, Conservation and Attractions (DBCA). https://catalogue.data.wa.gov.au/dataset/dbca-lands-of-interest

DBCA. (2025c). *Threatened and Priority Ecological Communities List—November 2025*. Department of Biodiversity, Conservation and Attractions (DBCA). https://www.dbca.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities/list-threatened-and-priority-ecological-communities

DBCA. (2026). *DBCA Dandjoo Database*. Database interrogation. Department of Biodiversity, Conservation and Attractions (DBCA). https://bio.wa.gov.au/dandjoo

DCCEEW. (2023). *Interim Biogeographic Regionalisation for Australia (IBRA) Version 7 (Subregions)*. Spatial data. Last updated 17 October 2023. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://fed.dcceew.gov.au/datasets/interim-biogeographic-regionalisation-for-australia-ibra-version-7-subregions/

DCCEEW. (2025). *Protected Matters Search Tool: Interactive Map*. Interrogation of Species Profile and Threats (SPRAT) Database Using Protected Matters Search Tool. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://pmst.awe.gov.au/

DCCEEW. (2026a). Calyptorhynchus banksii naso *in Species Profile and Threats Database*. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://www.environment.gov.au/sprat

DCCEEW. (2026b). *Protected Matters Search Tool: Interactive Map*. Interrogation of Species Profile and Threats (SPRAT) Database Using Protected Matters Search Tool. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://pmst.awe.gov.au/

DCCEEW. (2026c). Zanda baudinii *in Species Profile and Threats Database*. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://www.environment.gov.au/sprat

DCCEEW. (2026d). Zanda latirostris *in Species Profile and Threats Database*. Department of Climate Change, Energy, the Environment and Water (DCCEEW). https://www.environment.gov.au/sprat

DoEE. (2016). *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (p. 143). Department of the Environment and Energy (DoEE). Canberra, Australian Capital Territory. https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=131

DoEE. (2017). *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo*. Department of the Environment and Energy (DoEE). Canberra, Australian Capital Territory.

DPIRD. (2019). *Pre-European Vegetation (DPIRD-006)*. Spatial data. Last updated 23 July 2019. Department of Primary Industries and Regional Development (DPIRD). https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006

DPIRD. (2025). *Soil Landscape Mapping—Best Available (DPIRD-027)*. Spatial data. Last updated 12 February 2025. Department of Primary Industries and Regional Development (DPIRD). https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-best-available

DPIRD. (2026). *Western Australian Organism List*. Department of Primary Industries and Regional Development (DPIRD). https://www.dpird.wa.gov.au/online-tools/western-australian-organism-list/

DWER. (2021). *Clearing Regulations—Environmentally Sensitive Areas (DWER-046)* [Data set]. Spatial data. Last updated 9 November 2021. Department of Water and Environmental Regulation (DWER). https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046

DWER. (2025). *Index of Biodiversity Surveys for Assessments (IBSA)*. Department of Water and Environmental Regulation (DWER). https://biocollect.ala.org.au/ibsa/

DWER. (2026). *Collie River*. Department of Water and Environmental Regulation (DWER). https://rivers.dwer.wa.gov.au/basin/collie-river/

EPA. (2016a). *Environmental Factor Guideline—Flora and Vegetation* (p. 6). December 2016. Environmental Protection Authority (EPA). https://www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-flora-and-vegetation

EPA. (2016b). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (p. 42). December 2016. Environmental Protection Authority (EPA). https://www.epa.wa.gov.au/policies-guidance/technical-guidance-flora-and-vegetation-surveys-environmental-impact-assessment

EPA. (2020). *Technical Guidance—Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. June 2020. Environmental Protection Authority (EPA). https://www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-terrestrial-fauna

Heddle, E. M., Loneragan, O. W., & Havel, J. J. (1980). Vegetation of the Darling System. In *Atlas of Natural Resources, Darling system, Western Australia*. Department of Conservation and Environment. Perth, Western Australia.

Johnstone, R. E., Kirkby, T., & Sarti, K. (2013). The breeding biology of the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* Gould in south-western Australia. I. Characteristics of nest trees and nest hollows. *Pacific Conservation Biology*, *19*, 121–142.

Landgate. (2025). *Cadastre (Polygon) (LGATE-217)*. Spatial data, SLIP subscription service. Western Australian Land Information Authority. https://www0.landgate.wa.gov.au/business-and-government/land-data/cadastral-data

NVIS Technical Working Group. (2017). *Australian Vegetation Attribute Manual: National Vegetation Information System, Version 7.0*. Department of the Environment and Energy. Canberra, Australian Capital Territory.

Saunders, D. A. (1979). The availability of tree hollows for use as nest sites by White-tailed Black Cockatoos. *Australian Wildlife Research*, *6*(2), 205–216.

WA Herbarium. (1998-). *Florabase: The Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Western Australian Herbarium (WA Herbarium). https://florabase.dpaw.wa.gov.au/

Weeds Australia. (2026). *Weeds Profiles—Weeds of National Significance (WONS)*. Centre for Invasive Species Solutions (CISS). https://weeds.org.au/weeds-profiles/

Appendix A

Search Results of the DCCEEW PMST

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: 22-Apr-2026

Summary

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:	6
Listed Threatened Species:	62
Listed Migratory Species:	38

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	37
Whales and Other Cetaceans:	4
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:	7
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	19
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
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Community known to occur within area
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within 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
BIRD		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Thalassarche steadi](#)		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
[Zanda baudinii listed as Calyptorhynchus baudinii](#)		
Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area
[Zanda latirostris listed as Calyptorhynchus latirostris](#)		
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area
FISH		
[Nannatherina balstoni](#)		
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
MAMMAL		
[Bettongia penicillata ogilbyi](#)		
Woylie [66844]	Endangered	Species or species habitat may occur within area
[Dasyurus geoffroii](#)		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
[Myrmecobius fasciatus](#)		
Numbat [294]	Endangered	Species or species habitat may occur within area
[Neophoca cinerea](#)		
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
[Pseudocheirus occidentalis](#)		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
[Setonix brachyurus](#)		
Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
OTHER		

Scientific Name	Threatened Category	Presence Text
Westralunio carteri		
Carter's Freshwater Mussel, Ambiguus Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Banksia mimica		
Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area
Banksia squarrosa subsp. argillacea		
Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat may occur within area
Brachyscias verecundus		
Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia huegelii		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872)		
Royce's Waxflower [87814]	Vulnerable	Species or species habitat may occur within area
Diuris drummondii		
Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica		
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eleocharis keigheryi		
Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
Lambertia echinata subsp. occidentalis		
Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Morelotia australiensis listed as Tetraria australiensis		
Southern Tetraria [92784]	Vulnerable	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Pinjarra Plain (A.S.George 17182)		
[86878]	Endangered	Species or species habitat may occur within area
Synaphea sp. Serpentine (G.R.Brand 103)		
[86879]	Critically Endangered	Species or species habitat may occur within area
Synaphea stenoloba		
Dwellingup Synaphea [66311]	Endangered	Species or species habitat likely to occur within area
Thelymitra variegata		
Queen of Sheba [12582]	Critically Endangered	Species or species habitat may occur within area
REPTILE		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

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
Department of Home Affairs	
Lot1611 DP66487 [AGPR6114]	WA

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat may occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thinornis cucullatus as Thinornis rubricollis		
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat likely to occur within area overfly marine area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area
Mammal		
Neophoca cinerea		
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Reptile		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Species or species habitat may occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Collie River	Conservation Park	WA
Eaton	Nature Reserve	WA
Kalgulup	Conservation Park	WA
Morangarel	Nature Reserve	WA
NTWA Bushland covenant (0146)	Conservation Covenant	WA
Pelican Point	Nature Reserve	WA
Unnamed WA46108	Nature Reserve	WA

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State
South-West Forest Region of Western Australia	Western Australia

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Bluewaters Power Station Expansion Phases 3 & 4	2008/4113		Completed
Proposed Sand Extraction at Lot 601 Stanley Road, Wellesley, WA	2020/8635		Completed
Residential Development, Lot 522 Ditchingham Place Australind, WA	2019/8432		Completed
Controlled action			
Bunbury Outer Ring Road Northern and Central Section Project, WA	2019/8471	Controlled Action	Post-Approval
Yarragadee Water Supply Development	2005/2073	Controlled Action	Completed
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed
Industrial development, Lot 561 Paris Road, Australind, WA	2016/7712	Not Controlled Action	Completed
Residential Subdivision Lot 9000 Livingstone Heights	2011/6168	Not Controlled Action	Completed
Road alignment construction	2001/456	Not Controlled Action	Completed
Secondary School Campus Development at Lot 150 Leisure Drive, Australind	2013/6744	Not Controlled Action	Completed
South Western Highway Reconstruction between Waterloo and Hynes Roads, Waterloo	2010/5617	Not Controlled Action	Completed
South Western Highway - Wokalup to Brunswick Junction - Upgrade	2001/325	Not Controlled Action	Completed
Stanley Road waste management facility, Wellesley, WA	2014/7131	Not Controlled Action	Completed
Twin Rivers Residential Subdivision	2005/2168	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Western Extension to the Dardanup Mineral Sands Project	2008/4673	Not Controlled Action	Completed
Not controlled action (particular manner)			
Construction of new bridge (Bridge 5370) across the Collie River, Eaton, WA	2016/7657	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
Waterloo to Busselton 132kV Transmission Line	2002/816	Not Controlled Action (Particular Manner)	Post-Approval

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 is 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 on the contents of this report.

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 point locations and environmental data layers.

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 when time permits.

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 breeding sites; and
- 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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Appendix B

Bamford FHQS System for Black-cockatoos (Bamford, 2020)

umwelt

Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos. Revised 5th June 2020

Bamford Consulting Ecologists

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed above. These three components are drawn from the DAWE offsets guide but the scoring approach was developed by BCE and includes a fourth (moderation) component.

Calculating the total score (out of 10) requires the following steps:

A Site condition. Determining a score out of six for the vegetation composition, condition and structure; plus

B Site context. Determining a score out of three for the context of the site; plus

C Species stocking rate. Determining a score out of one for species density.

D Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

Calculation of scores and the moderation process are described in detail below.

A. Site condition. Vegetation composition, condition and structure scoring

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes. • Mown grass	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g. dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g. dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).
1	Negligible to low foraging value. Examples: • Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; • Paddocks that are lightly vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source; • Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; • Woodland with tree banksias 2-5% projected foliage cover; • Open eucalypt woodland/mallee of small-fruited species; • Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover; • Urban areas with scattered foraging trees.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover; • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.
3	Low to Moderate foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; • Woodland with tree banksias 5-20% projected foliage cover; • Eucalypt Woodland/Mallee of small-fruited species; • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; • Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover. • Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 40-60% projected foliage cover.
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Sheoak Forest with > 60% projected foliage cover.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Vegetation structural class terminology follows Keighery (1994).

B. Site context.

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Carnaby's are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with DEE, provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	**Percentage of the existing native vegetation within the 'local' area that the study site represents.**	
	'Local' breeding known/likely	**'Local' breeding unlikely**
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	1 - 5%
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (eg 0.5% of such habitat within 15km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it.

C. Species density (stocking rate).

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black-cockatoos. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site context. For example, a site with a moderate condition score that is part of a network of such habitat where a black-cockatoo species is

known would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

D. Moderation of scores for the calculation of a value out of 10.

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a Condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat ($\geq$3). The approach to calculating a score out of 10 can be summarised as follows:

vegetation composition, condition and structure score (out of 6)	context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special circumstances. Such as when very close to a major breeding area or if strategically located along a movement corridor.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.
- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott and Black 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.
- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black-Cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and three times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental, such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.
- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there

is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this.

- Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black-Cockatoos are not regularly present.

Keighery (1994).

Scott, J. K. and Black, R. (1981). Selective Predation by White-Tailed Black Cockatoos on Fruit of *Banksia attenuata* Containing the Seed-Eating Weevil *Alphitopis nivea*. *Australian Wildlife Research* **8(2)**, 421-430.

Stock, W.D., Finn, H., Parker, J. and Dods, K. (2013). Pine as Fast Food. Foraging Ecology of an Endangered Cockatoo in a Forestry Landscape. PlosOne 8: issue 4.

Appendix C

Raw Field Data

Waypoint	Comments	Status	Vegetation Height	Easting^	Northing^
1487	*Callistemon viminalis*, planted. No Carnaby's foraging potential. No hollows.	Planted	5 m	390077.75	6315102.16
1489	*Calothamnus graniticus*, planted. No BC foraging potential. No hollows.	Planted	4 m	390076.16	6315094.82
1499	Remnant Marri, *Corymbia calophylla*. Foraging potential for all three black cockatoos. No hollows, DBH too small.	Native	8 m	390068.88	6315079.99
1500	Remnant Marri, *Corymbia calophylla*. Foraging potential for all three black cockatoos. No hollows, DBH too small.	Native	8 m	390062.85	6315077.93
1501	2x *Xanthorrhoea* sp. Remnant native understorey.	Native	0.5 m	390066.65	6315079.75
1502	2x *Xanthorrhoea* and *Hakea trifurcata*. Remnant.	Native	0.5 m	390070.93	6315079.35
1503	2x remnant *Corymbia calophylla*. No hollows. BC foraging potential.	Native	10 m	390074.51	6315076.40
1506	*Hakea trifurcata*. Native understorey. *Corymbia calophylla*.	Native	8 m	390069.22	6315066.14
1507	*Corymbia calophylla*. Bamford Rank 5. 500 DBH. No hollows.	Native	12 m	390066.00	6315063.00
1508	*Corymbia calophylla*. Planted *Calothamnus* understorey.	Native	8 m	390063.24	6315059.86
1509	*Corymbia calophylla*. Bamford Rank 5. 500 DBH. No hollows.	Native	8 m	390065.13	6315057.55
1510	4 *Corymbia calophylla* saplings. 5 x *Xanthorrhoea* sp.	Native	0.5 m each	390062.65	6315062.18
1511	*Corymbia calophylla*	Native	8 m	390060.10	6315065.92
1516	Native remnant *Acacia* sp.	Native	1.5 m	390055.54	6315057.00
1517	*Hardenbergia comptoniana*	Native	0.5 m	390058.44	6315055.70
1518	*Corymbia calophylla*. Remnant. Trunk on boundary of SA.	Native	8 m	390061.34	6315054.51
1520	*Allocasuarina fraseriana*, native remnant.	Native	12 m	390031.16	6315006.27
1522	*Acacia saligna*, native.	Native	7 m	390008.36	6315004.79
1523	*Corymbia calophylla*. Category 5 Bamford Rank. Not in SA.	Native	15 m	389996.41	6315016.08
1528	*Allocasuarina fraseriana*. Remnant.	Native	6 m	390097.80	6315026.21
1532	Remnant *Corymbia calophylla*. BC foraging potential. Category 5 Bamford Rank. 700 DBH. No native understorey.	Native	15 m	383752.99	6316440.19

Waypoint	Comments	Status	Vegetation Height	Easting^	Northing^
1534	Peppermint tree, *Agonis flexuosa*. Ringtail Possum habitat. *Melaleuca preissiana*.	Native	Both 6 m	383743.92	6316427.22
1535	*Allocasuarina fraseriana*. Trunk in SA.	Native	8 m	383746.04	6316421.59
1536	*Allocasuarina fraseriana*. Trunk outside SA, canopy in SA to floor.	Native	5 m	383735.40	6316416.03
1537	Large *Eucalyptus marginata*. 900 DBH. No hollows. BC foraging potential all three species.	Native	25 m	383728.82	6316420.50
1538	*Corymbia calophylla* outside boundary.	Native	8 m	383723.03	6316414.66
1539	*Corymbia calophylla* outside boundary.	Native	8 m	383723.03	6316414.66
1541	*Corymbia calophylla*. Trunk inside SA boundary. Category 5 Bamford Rank. No hollows. 600 DBH.	Native	15 m	383738.77	6316406.76
1542	2x *Agonis flexuosa* in SA boundary. Ringtail possum habitat.	Native	12 m	383734.44	6316402.82
1543	2x *Agonis flexuosa* in SA boundary. Ringtail possum habitat.	Native	6 m	383734.02	6316398.49
1544	*Agonis flexuosa*. Canopy in SA boundary.	Native	6 m	383717.88	6316400.96
1545	Large *Eucalyptus marginata*. Category 5 Bamford Rank. No hollows. 900 DBH.	Native	20 m	383725.48	6316388.97
1546	*Allocasuarina fraseriana* within SA boundary.	Native	10 m	383727.39	6316384.44
1547	Large *Corymbia calophylla*. Category 5 Bamford Rank. 500 DBH.	Native	20 m	383725.44	6316376.55
1549	*Acacia saligna*.	Native	4 m	383717.91	6316375.01
1551	2x *Allocasuarina fraseriana*. Canopy in SA boundary.	Native	3 m	383718.21	6316366.04
1552	2x *Allocasuarina fraseriana*. Canopy in SA boundary.	Native	4 m	383718.20	6316366.81
1553	3x *Agonis flexuosa* in a line. Canopy in SA boundary.	Native	16 m	383716.32	6316368.12
1554	*Kunzea* sp. Outside SA..	Native	2 m	383713.11	6316364.20
1555	2x *Acacia saligna* outside SA.	Native	2 m	383713.11	6316364.20
1556	*Corymbia calophylla*. Outside SA. Canopy within SA boundary.	Native	8 m	383714.20	6316350.57
1557	*Eucalyptus wandoo*, canopy in SA boundary.	Native	12 m	383714.04	6316348.02
1558	*Melaleuca preissiana*. Outside SA boundary.	Native	6 m	383713.26	6316336.04

Waypoint	Comments	Status	Vegetation Height	Easting^	Northing^
1559	Foraging evidence of Forest Red-tailed Black Cockatoo on Marri nuts with SA.	Native	NA	383748.45	6316398.06
1484	4 x shrubs of Brazillian Peppercorn (**Schinus terebinthifolia*), planted. No hollow potential. No Carnaby's foraging potential.	Planted	~5 m	390097.45	6315105.71
1485	*Grevillea robusta*, planted. DBH 500. Potential foraging for Carnaby's Black Cockatoo. No hollows.	Planted	~8 m	390087.49	6315113.69
1486	**Bougainvillea* sp. and **Jacaranda* sp., planted.	Planted	3 m	390082.82	6315098.89
1487	Planted *Callitris columellaris*.	Planted	3 m	390077.75	6315102.16
1488	Planted ornamental tree. No BC foraging potential. No hollows.	Planted	~7 m	390076.16	6315094.82
1490	*Jacaranda mimosifolia*, planted. No BC foraging potential. No hollows.	Planted	~6 m	390085.12	6315092.93
1491	Planted ornamental.	Planted	~7 m	390072.41	6315088.68
1492	Line of *Grevillia robusta*, planted. Carnaby's Black Cockatoo foraging potential. No hollows.	Planted	10 m	390067.77	6315087.08
1493	Line of *Grevillia robusta*, planted. Carnaby's Black Cockatoo foraging potential. No hollows.	Planted	10 m	390067.77	6315087.08
1494	Line of *Grevillia robusta*, planted. Carnaby's Black Cockatoo foraging potential. No hollows.	Planted	10 m	390067.77	6315087.08
1495	Line of *Grevillia robusta*, planted. Carnaby's Black Cockatoo foraging potential. No hollows.	Planted	10 m	390060.67	6315081.56
1496	Line of *Grevillia robusta*, planted. Carnaby's Black Cockatoo foraging potential. No hollows.	Planted	10 m	390060.34	6315077.90
1497	*Westringia* sp. Planted.	Planted	1.2 m	390060.92	6315083.78
1498	Planted *Calothamnus*.	Planted	5 m	390068.88	6315079.99
1504	Planted *Calothamnus* sp. x2	Planted	3 m	390079.39	6315081.33
1505	Planted *Calothamnus*.	Planted	2 m	390069.33	6315073.35
1512	Planted *Eucalyptus* sp. Canopy partially in SA.	Planted	9 m	390055.50	6315069.42
1513	Planted *Eremophila* sp. And Westringia sp.	Planted	1.5 m	390056.70	6315069.65

Waypoint	Comments	Status	Vegetation Height	Easting^	Northing^
1514	Planted *Eucalyptus* sp. Canopy partially in SA.	Planted	4 m	390055.33	6315059.77
1515	*Eucalyptus lehmanniana*, planted. Canopy in SA, trunk out.	Planted	10 m	390053.78	6315056.09
1519	Planted *Calothamnus* and *Melaleuca* on boundary of SA.	Planted	3 m	390057.42	6315047.48
1521	*Eucalyptus lehmanniana*.	Planted	10 m	390019.86	6315008.80
1524	Planted *Eucalyptus lehmanniana*. Canopy over hanging in SA.	Planted	12 m	389989.09	6315012.45
1525	Canopy over hanging in SA. *Eucalyptus lehmanniana*, planted. X3.	Planted	~10 m	389972.19	6314991.85
1526	Planted understorey *Calistemon viminalis*. And *Calothamnus* sp.	Planted	1.6 m	389971.35	6314992.06
1527	*Acacia baileyana*, planted shrubs.	Planted	2.5 m	389954.94	6315002.52
1529	Planted *Eucalyptus botryoides*. Canopy potentially over hanging in SA. Trunk outside SA. Bottom of canopy 5m high.	Planted	20 m (tree), min height 5 m	383766.68	6316456.10
1531	Remnant Marri. BC foraging potential. Category 5 Bamford Rank. 700 DBH. No native understorey.	Planted	15 m	383756.20	6316444.67
1533	Planted *Calothamnus*.	Planted	1.5 m	383748.78	6316434.04
1540	Large *Eucalyptus grandis*, planted. Category 5 Bamford Rank. 900 DBH.	Planted	25 m	383727.47	6316409.28
1548	Planted *Eucalyptus botryoides*. No hollows. Category 5 Bamford Rank. 1m DBH.	Planted	25 m	383720.76	6316378.60

^Data presented in GDA2020, Zone 50

Appendix D

Likelihood of Occurrence of Significant Flora Taxa

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^	Likelihood of Occurrence
Andersonia gracilis	T	T - EN	August to November	Winter-wet areas, near swamps. White-grey sand, sandy clay and gravelly loam.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution.
Aponogeton hexatepalus	P4		February to July	Seasonally inundated wetlands.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Banksia mimica	T	T - EN	September to January	Flats or gentle slopes with grey sand.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/
Banksia squarrosa subsp. ***argillacea***	T	T - VU	August to December	Floodplains. Sandy loam over ironstone.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/
Bolboschoenus medianus	P1		February	Inundated areas, waterways along river banks with brown clay silt or loam.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Brachyscias verecundus	T	T - CR	October to December	Near outcrops. Sand over laterite/Ironstone/granite.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/
Caladenia huegelii	T	T - EN	September to October	Plains or swamps. Grey or brown sand.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Caladenia speciosa	P4		Late August to October. Latest record is 25 October	Flats, swampy areas with black sand; clay pans. Also grey sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Caladenia swartsiorum	P2		September to October. Latest record 10 October	Winterwet creeklines or plains with grey sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Carex tereticaulis	P3		September to November	Grey or brown loam or sandy clay with laterite. Edges of drainage lines.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^	Likelihood of Occurrence
Chamaescilla gibsonii	P3		August to November	Brown or grey sandy clay. Winter-wet clay pans and flats.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Chamelaucium erythrochlorum	P4		November to February	Riverbanks, gullies and ridges with sandy loam, sometimes over laterite.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Chamelaucium roycei	T	T - VU	September to November	Winter wet depressions or flats. Sandy clay over ironstone.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/
***Craspedia* sp. Waterloo (G.J. Keighery 13724)**	P2		August to November	Seasonally wet flats and claypans, grey to brown clay, sometimes sandy, over clay. Wandoo woodland.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Dillwynia dillwynioides	P3		August to January	Saline flats, winter-wet depressions and wetlands. Grey, brown or black sandy loam, sometimes peaty.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Diuris drummondii	T	T - VU	November to January	Floodplains, winter-wet depressions and swamps. Brown loam, sometimes peaty.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Diuris micrantha	T	T - VU	September to October	Winter-wet depressions. Brown loamy clay. Winter wet swamps, in shallow water.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Diuris purdiei	T	T - EN	September to October	Floodplains, swamps, winter-wet depressions and flats. Moist grey sand.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^	Likelihood of Occurrence
Drakaea elastica	T	T - EN	October to November	Winter-wet depressions. Grey sand in low-lying areas.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Drakaea micrantha	T	T - VU	September to October	Edge of swamps, often found in clearings and tracks. White-grey sand.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Drosera bulbigena	P2		August to January	Saline flats, winter-wet depressions and wetlands. Grey, brown or black sandy loam, sometimes peaty.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Eleocharis keigheryi	T	T - VU	August to November	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Dandjoo, DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Gastrolobium whicherense	P2		August to November	Ridges with quartz or laterite, valleys and river banks with brown-white clayey sand. Gravel.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Gonocarpus keigheryi	P2		December to February	Creeks, valleys and watercourses with brown clayey sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Grevillea rosieri	P2		June to October	Slopes, hills and flats with yellow-brown clay loam. Laterite and sometimes granite.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Lambertia echinata* subsp. *occidentalis	T	T - EN	October to December	Flats or gentle slopes. Sandy loam over laterite/ironstone.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^	Likelihood of Occurrence
Lasiopetalum membranaceum	P3		September to December	Slopes and plains with grey sand over limestone, sometimes over laterite.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Loricobbia skinneri	P4		September to November	White or grey sand on winter wet depressions or drainage lines.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Morelotia australiensis	T	T - VU	September to December	Brown sandy loam or grey sand. Winter damp areas.	DCCEEW	Unlikely. The Survey Areas are located outside of this taxon's known distribution/
Ornduffia submersa	P4		September to November	Aquatic herb, floating in water.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Pterostylis frenchii	P2		November. Latest record is 15 November	White sand, yellow brown sand on limestone.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Puccinellia vassica	P1		November	Salt marshes and saline areas with grey soil. Tidal flats.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Rumex drummondii	P4		August to November	Creeklines with black peaty sandy clay over limestone; winter wet depressions.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Schoenus capillifolius	P3		September to October	seasonally inundated wetlands.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Stylidium acuminatum* subsp. *acuminatum	P2		November to December	Slopes and road verges, Red brown loam over laterite. Sometimes yellow sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Synaphea odocoileops	P1		September to November	Winterwet flat/depression with brown-grey clay loam or clayey sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.

Taxon	WA Status	EPBC Status	Flowering	Habitat	Source^	Likelihood of Occurrence
***Synaphea* sp. Fairbridge Farm (D.Papenfus 696)**	T	T - CR	September to October	Seasonally wet areas or low rises. Clayey sand/loam over laterite.	DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
***Synaphea* sp. Pinjarra Plain (A.S.George 17182)**	T	T - EN	September to December	Brown clay loam, flats.	DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
***Synaphea* sp. Serpentine (G.R.Brand 103)**	T	T - CR	September to November	Flats, seasonally damp areas.	DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Synaphea stenoloba	T	T - EN	September to November	Flood plains or swamps. Sandy or sandy clay soils.	DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Thelymitra variegata	T	T - CR	August to October	Brown clay loam or sand, in clearings amongst low shrubs, rushes and grass tussocks in freely draining deep sandy soil.	DCCEEW	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.
Verticordia attenuata	P3		December or January to May	Winter-wet depressions or flood plains. White or grey sand.	Dandjoo	Unlikely. The Survey Areas are not considered to contain suitable habitat for this taxon.

Appendix E

Likelihood of Occurrence of Significant Vegetation

Community (EPBC)	Community (WA)	Description	PMST Comment	Likelihood of Occurrence
Banksia Woodlands of the Swan Coastal Plain ecological community TEC - EN	Banksia Woodlands of the Swan Coastal Plain PEC - P3	Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are *B. prionotes* or *B. ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Community 'likely' to occur within Desktop Study Area	Unlikely. No Banksia species were recorded within the Survey Areas. Additionally, the Survey Areas would not meet condition and patch requirements as per the Conservation Advice (DoEE, 2016).
Clay Pans of the Swan Coastal Plain TEC - CR	-	The clay pan communities occur where clay substrate is low in the landscape and forms an impermeable layer close to the surface. These wetlands that rely on rainfall and local surface drainage to fill are considered unlikely to be connected to groundwater. The clay pans then dry out to form a relatively impervious substrate in summer. A suite of perennial plants that propagate by underground bulbs, tubers or corms (geophytes), and annual herbs flower sequentially as the clay pans dry out. The clay pans are the most diverse of the SCP wetlands and contain a number of local endemic flora.	Community 'likely' to occur within Desktop Study Area	Unlikely. The Survey Areas are not considered to contain clay pans.

Community (EPBC)	Community (WA)	Description	PMST Comment	Likelihood of Occurrence
***Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain** TEC - EN	SCP3c: *Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain TEC - Endangered	The community occurs on heavy soils of the eastern side of the southern SCP, generally between Bullsbrook and Stratham. The community is usually dominated by *Corymbia calophylla* (marri) and *Xanthorrhoea preissii* (balga). It also occasionally includes *Eucalyptus wandoo* (wandoo). The more common shrubs include *Gompholobium marginatum*, *Hypocalymma angustifolium* (white myrtle) and *Banksia dallanneyi* (couch honeypot), with herbs, grasses and sedges including *Burchardia congesta* (milkmaids), *Cyathochaeta avenacea*, *Neurachne alopecuroidea* (foxtail mulga grass), *Caesia micrantha* (pale grass-lily), *Mesomelaena tetragona* (semaphore sedge), *Morelotia octandra*, *Desmocladus flexuosus, Opercularia vaginata* (dog weed), *Sowerbaea laxiflora* (purple tassels), *Lepidosperma* spp. and *Drosera menziesii* (pink rainbow) also common.	Community 'known' to occur within Desktop Study Area	Unlikely. Although *Corymbia calophylla* was present at both Survey Areas, and the Eastern Survey Area contains *Xanthorrhoea* sp. (too young to be identified, sterile specimen), no other taxa listed in the description were recorded during the field surveys. The patches of native vegetation in the Survey Areas is not large enough to support this community.
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion TEC - CR	SCP26a: *Melaleuca huegelii – M. systena* shrublands of limestone ridges TEC – Critically Endangered	The community is known from shallow soils over limestone or massive limestone ridges of Tamala Limestone between Yanchep north of Perth, and south of Perth near Lake Clifton. The community generally comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii* (chenille honeymyrtle), *Melaleuca systena* (coastal honeymyrtle) and *Banksia sessilis* (parrot bush), commonly over *Grevillea preissii* (spider net grevillea), *Spyridium globulosum* (basket bush), and *Acacia lasiocarpa* (pajang). A suite of herbs commonly occurs under the shrub layer.	Community 'may' to occur within Desktop Study Area	Unlikely. The Survey Areas are not located on limestone, and no species listed in the description were recorded during the field surveys.

Community (EPBC)	Community (WA)	Description	PMST Comment	Likelihood of Occurrence
Subtropical and Temperate Coastal Saltmarsh TEC - VU	Subtropical and Temperate Coastal Saltmarsh PEC – P3	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23°S latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Community 'likely' to occur within Desktop Study Area	Unlikely. The Survey Areas are not located on the coastal margin, along estuaries or coastal embayments. Additionally, the Survey Areas are not considered to contain saltmarsh or clay pans.
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community TEC - CR	Tuart (*Eucalyptus gomphocephala*) Woodlands of the Swan Coastal Plain PEC - P3	Mostly confined to Quindalup Dunes and Spearwood Dunes but can also occur on the Bassendean dunes and Pinjarra Plain. It can occur on the banks of rivers and wetlands. Tuart is the key upper canopy species although it may co-occur with trees of other species.	Community 'likely' to occur within Desktop Study Area	Unlikely. *Eucalyptus gomphocephala* was not recorded during the field surveys.

Community (EPBC)	Community (WA)	Description	PMST Comment	Likelihood of Occurrence
		Trees commonly co-occurring with Tuart include *Agonis flexuosa*, *Banksia grandis*, *Banksia attenuata*, *Eucalyptus marginata*; and less commonly, *Corymbia calophylla*, *Banksia menziesii* and *Banksia prionotes*. An understorey of native plants is typically present, which may include grasses, herbs and shrubs. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.		

Appendix F

Potential Nest-trees of the Survey Areas

Taxon	Tree Height	Status	Easting^	Northing^	Bamford Rank	Survey Area
Grevillea robusta	8 m	Planted	390087.5	6315113.7	5	Eastern Survey Area
Grevillea robusta	10 m	Planted	390067.8	6315087.1	5	Eastern Survey Area
Grevillea robusta	10 m	Planted	390067.8	6315087.1	5	Eastern Survey Area
Grevillea robusta	10 m	Planted	390067.8	6315087.1	5	Eastern Survey Area
Grevillea robusta	10 m	Planted	390060.7	6315081.6	5	Eastern Survey Area
Grevillea robusta	10 m	Planted	390060.3	6315077.9	5	Eastern Survey Area
Corymbia calophylla	12 m	Native	390066.0	6315063.0	5	Eastern Survey Area
Corymbia calophylla	8 m	Native	390065.1	6315057.6	5	Eastern Survey Area
Corymbia calophylla	15 m	Native	389996.4	6315016.1	5	Eastern Survey Area
Corymbia calophylla	15 m	Planted	383756.2	6316444.7	5	Western Survey Area
Corymbia calophylla	15 m	Native	383753.0	6316440.2	5	Western Survey Area
Eucalyptus marginata	25 m	Native	383728.8	6316420.5	5	Western Survey Area
Eucalyptus grandis	25 m	Planted	383727.5	6316409.3	5	Western Survey Area
Corymbia calophylla	15 m	Native	383738.8	6316406.8	5	Western Survey Area
Eucalyptus marginata	20 m	Native	383725.5	6316389.0	5	Western Survey Area
Corymbia calophylla	20 m	Native	383725.4	6316376.5	5	Western Survey Area
Eucalyptus botryoides	25 m	Planted	383720.8	6316378.6	5	Western Survey Area

^Data presented in GDA2020, Zone 50.

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