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ENVIRONMENTAL

**350 Neaves Road
Mariginiup**

Biological Surveys 2025

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350 Neaves Road Mariginiup

Biological Surveys 2025

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Within the limitations imposed by the scope of services, the field survey, data management and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. To the maximum extent permitted by law, no other warranty, express or implied, is made.

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Executive Summary

Western Environmental Approvals Pty Ltd (WEPL) was commissioned by Wayne Lawrence to undertake biological surveys to collect baseline flora, vegetation and fauna data within 350 (Lot 101) Neaves Road in Mariginiup (the Survey Area). The Survey Area comprises a total of 19.8 ha on the southern side of Neaves Road.

The biological surveys included a:

- Detailed flora and vegetation survey.
- Basic fauna survey.
- Targeted Black Cockatoo habitat assessment.

All surveys were conducted on the 8th and 9th of October 2025.

Flora and Vegetation Survey

Flora

A total of 78 vascular flora species, including 21 introduced species (26.9 %), were recorded from within the Survey Area from six quadrats, three relevés and opportunistic observations.

No Threatened or Priority flora species were identified during the survey or have previously been recorded within the Survey Area. The post-survey likelihood of occurrence assessments found that all threatened or priority flora species had low likelihood of occurring.

Vegetation

A total of six vegetation types were identified within the Survey Area. The majority of the vegetation was fragmented in patches within VT01 (Banksia woodland) and VT02 (open Jarrah woodland with scattered Banksias) exhibiting moderate to high species diversity.

Out of five PECs/TECs that was identified by the desktop assessment as having a medium or high likelihood of occurrence, two communities were found present within the Survey Area.

The TEC 'Banksia Woodlands of the Swan Coastal Plain' TEC was identified as present within the Survey Area, listed as Endangered under the EPBC Act and a Priority 3 PEC in WA. The four step process for identifying presence of the TEC outlined in the Conservation Advice was undertaken with results identifying a total of 0.544 ha of banksia woodland that aligns with the Banksia woodland TEC of the SCP within the Survey Area. At least 5 ha of the same connective TEC is on an adjacent property directly south of the Survey Area.

The results of the Floristic Community Type assignation of Q01, Q02, Q04 and Q06 quadrats using the Gibson et. al. (1994), Keighery et. al (2012) dataset and nearest neighbour analysis all strongly confirmed FCT 21c was present within representative vegetation types of those quadrats within the Survey Area. The result for

plot Q03 and Q05 was initially assigned FCTs other than FCT 21c, however, further analysis showed both mostly aligns with FCT 21c.

Therefore, the PEC "Low-lying *Banksia attenuata* woodland on shrubland" was also present within the Survey Area, listed as Priority 3 PEC in WA. A total of 3.79 ha of vegetation types VT01, VT04 and VT06 contained SCP 21c PEC within the Survey Area.

Basic Fauna and Targeted Black Cockatoo Survey

Basic Fauna Survey

The three species that had a high likelihood of occurrence were:

- *Zanda latirostris* (Carnaby's black cockatoo) - Endangered (EN).
- *Calyptorhynchus banksii naso* (Forest red-tailed black cockatoo) -Vulnerable (VU).
- *Isoodon fusciventer* (Quenda) - Priority four (P4).

The four species that had a medium likelihood of occurrence were:

- *Idiosoma sigillatum* (Swan Coastal Plain Shield-backed Trapdoor Spider) - P3
- *Neelaps colonotos* (Black-striped Burrowing Snake) - P3
- *Notamacropus irma* (Western Brush Wallaby) - P4
- *Falco peregrinus* (Peregrine falcon) - OS

Extent of core and supporting habitat present within the Survey Area by species is summarised below.

Species	Extent Core Habitat (ha)	Extent Supporting Habitat (ha)
<i>Calyptorhynchus banksia naso</i> (Forest red-tailed black cockatoo)	-	4.51
<i>Zanda latirostris</i> (Carnaby's black cockatoo)	-	4.51
<i>Isoodon fusciventer</i> (Quenda)	6.17	0.87
<i>Neelaps colonotos</i> (black-striped burrowing snake)	3.60	2.57
<i>Notamacropus irma</i> (Western brush wallaby)	3.60	4.21
<i>Idiosoma sigillatum</i> (Swan Coastal Plain Shield-backed Trapdoor Spider)	3.60	2.57
<i>Falco peregrinus</i> (Peregrine falcon)	-	19.78

Acronyms and Abbreviations

Abbreviation	Full Title
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
BC Act	<i>Biodiversity Conservation Act 2016</i>
°C	Degree Celsius
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DAWE	Department of Agriculture, Water and the Environment
DEWHA	Department of the Environment Water Heritage and the Arts
DPIRD	Department of Primary Industries and Regional Development
DRF	Declared Rare Flora
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EN	Endangered
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection Biodiversity and Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
FCT	Floristic Community Type
FHT	Fauna Habitat Type
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
km	Kilometres
m	Metres
MA	Marine
MI	Migratory
MNES	Matters of National Environmental Significance
NVIS	National Vegetation Information System
OS	Other Specially Protected
P	Priority
PEC	Priority Ecological Community
PF	Priority Flora

Abbreviation	Full Title
PMST	Protected Matters Search Tool
SCP	Swan Coastal Plain
T	Threatened
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora Database
TPFRF	Threatened and Priority Flora Report Forms
VU	Vulnerable
WA	Western Australia
WAH	Western Australian Herbarium
WEPL	Western Environmental Approvals Pty Ltd
WoNS	Weeds of National Significance

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1. Introduction

1.1 Project Background

Western Environmental Approvals Pty Ltd (WEPL) was commissioned by Parcel Property to undertake biological surveys to collect baseline flora, vegetation and fauna data within 350 (Lot 101) Neaves Road in Mariginiup (the Survey Area; Figure 1). The Survey Area comprises a total of 19.8 ha, located on the southern side of Neaves Road.

A Detailed flora and vegetation survey, Basic fauna survey and targeted black cockatoo habitat assessment were undertaken to determine the environmental values within the Survey Area.

1.2 Objectives and Scope of Work

Biological surveys were conducted to identify environmental values within the Survey Area. Specifically, these entailed:

- Desktop assessment of State and Commonwealth databases and other sources, including:
 - o *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Database Search.
 - o Department of Biodiversity, Conservation and Attractions (DBCAs) database searches
 - o Identification of any Environmentally Sensitive Areas (ESAs), Bush Forever Sites and Conservation Areas.
 - o Determining the environmental characteristics (topography, geology, hydrology including groundwater levels/surface water, presence of geomorphic wetlands) of the Survey Area and surrounding land.
- Detailed flora and vegetation survey consistent with the Environmental Protection Authority (EPA) (2016) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*.
- Basic fauna survey consistent with the EPA's (2020) *Technical Guidance - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.
- Assessment of Black Cockatoo habitat in accordance with *Commonwealth referral guidelines for Threatened Black Cockatoos* (Department of Climate Change, Energy, the Environment and Water [DAWE, 2022]).

This report presents the results of the field surveys undertaken to support the above objectives.

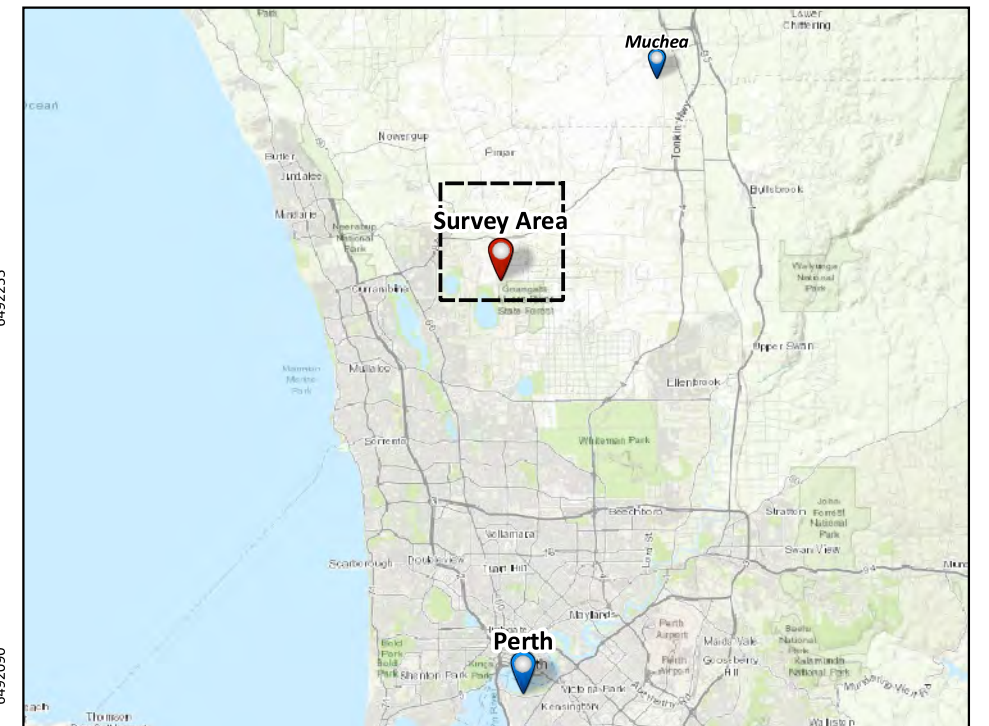
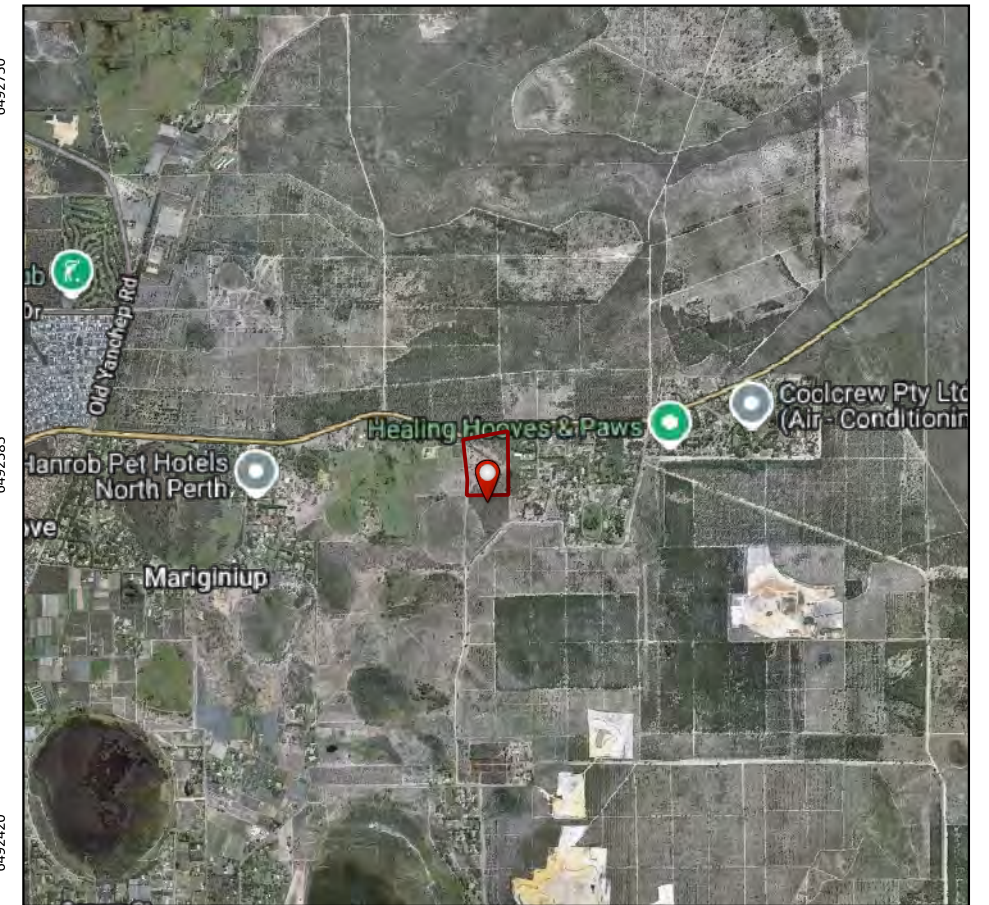
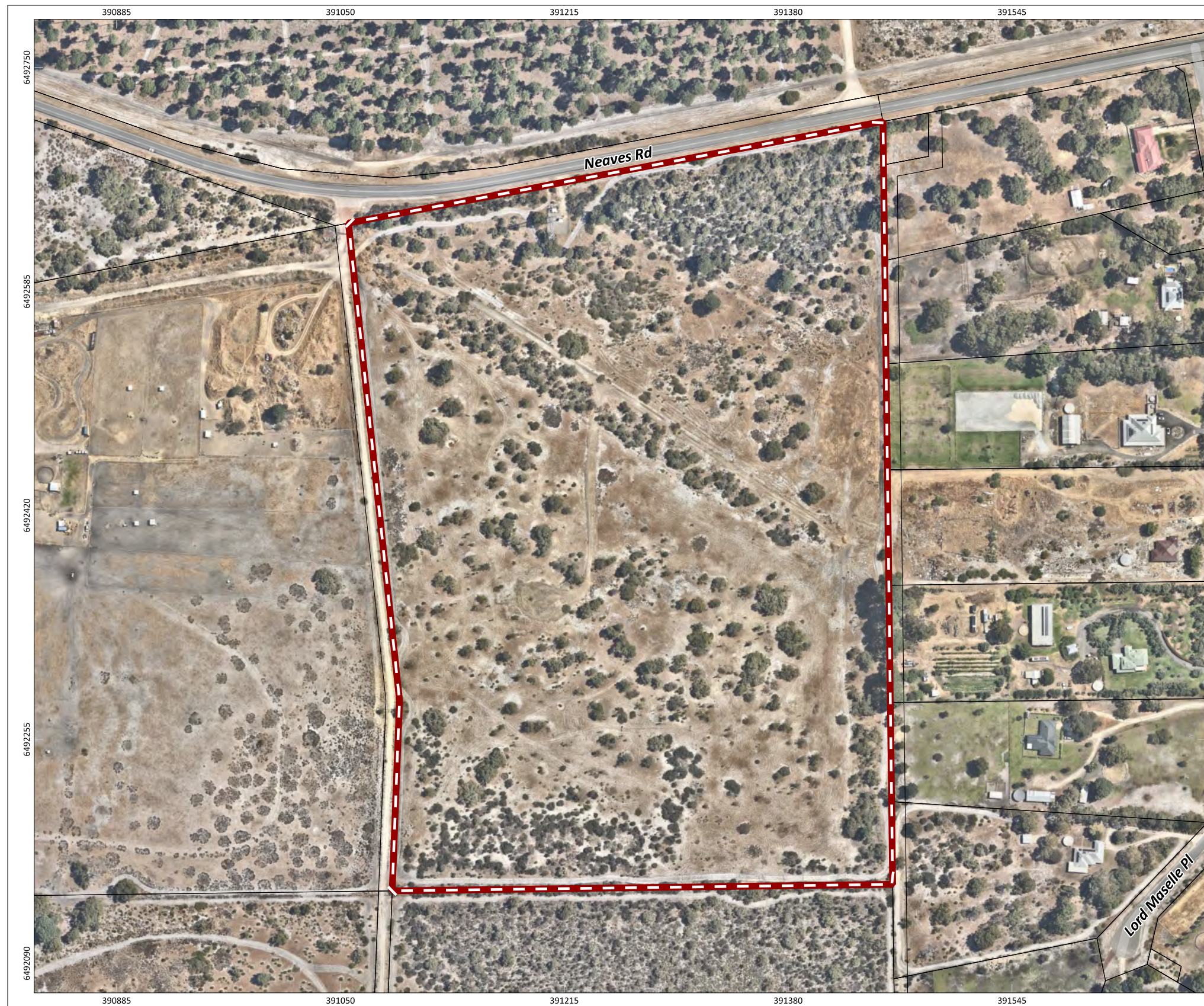


Figure 1: Survey Area

N

0

40

80

120

160 m

SCALE
1:3,300

SHEET SIZE
A3 COLOUR

COORDINATE REFERENCE SYSTEM
GDA2020 / MGA zone 50

DATA SOURCE
NEARMAPS

PROJECT/REPORT NAME
Biological Survey Technical Report
350 Neaves Road, Mariginuiup

CLIENT
Parcel Property

PROJECT NUMBER
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VERSION
0

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DATE
28/4/2026

Legend

Survey Area

Cadastre (No Attributes) (LGATE-001)

NOTES:

Cadastral boundary (LGATE-002). Base map ESRI Topo. Townsites (LGATE-248).

No	Description	Drawn	Approved	Date
A	Original issue	SC	ZL	28/4/2026

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1.3 Relevant Legislation and Guidance

This environmental assessment was conducted in accordance with Commonwealth and State legislation and guidelines:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Western Australian *Environmental Protection Act 1986* (EP Act).
- Western Australian *Biodiversity Conservation Act 2016* (BC Act).
- Western Australian Biodiversity Conservation Regulations 2018.
- Department of the Environment (DotE). (2013). *Matters of National Environmental Significance. Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*.
- Environmental Protection Authority. (2016). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*. Known herein as the ‘Flora and Vegetation Technical Guidance.’
- Department of Biodiversity Conservation and Attractions [DBCA] (2023) *Draft: Methods for survey and identification of Western Australian Threatened Ecological Communities*. Communities and Communities Program, DBCA.
- Department of Climate Change, Energy, Environment and Water (DCCEEW). (2022). *Referral Guidelines for 3 WA threatened black cockatoo species: Carnaby’s Cockatoo, Baudin’s Cockatoo and the Forest Red-tailed Black-cockatoo*.
- Department of the Environment Water Heritage and the Arts (DEWHA). (2010). *Survey Guidelines for Australia’s Threatened Birds*
- Environmental Protection Act. (2020). *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. Known herein as the ‘Fauna Technical Guidance’
- Department of Climate Change, Energy, Environment and Water (DCCEEW). (2020). *Commonwealth Survey Guidelines for Australia’s Threatened Orchids*.

A short description of key legislation is provided in Appendix A. Other definitions, including species and ecological community conservation categories, are provided in Appendix B.

1.4 Survey Limitations and Constraints

An assessment of limitations and constraints of the flora, vegetation and fauna surveys as outlined in the Flora and Vegetation and Fauna Survey Technical Guidance are detailed below in Table 1. No significant constraints were encountered.

Table 1: Limitations and Constraints of the Flora, Vegetation and Fauna Survey

Possible Limitation	Degree of Limitation (Significant, Moderate or Negligible)	Potential Constraints on Survey Outcomes
Survey Level/ Scope	Negligible	The surveys undertaken considered suitable based on species expected to be present and the extent and condition of vegetation/habitat present within the Survey Area. The level of information collected was suitable to provide information required to inform and support environmental assessment and approvals.
Availability of contextual information at a regional and local scale	Negligible	All data required to complete the scope of works including regional and local contextual information was available. DBCA data was requested as part of the desktop assessment.
Site Access	Negligible	All of the Survey Area was readily accessed by vehicle and on foot. See Figure 2 for survey coverage.
Survey Intensity and Extent	Negligible	Suitable survey effort by experienced ecologists was applied. Survey effort included: • Two (2) two-person day flora and vegetation assessment. • Six quadrats, three relevés and opportunistic observations. • One (1) one-person day basic fauna survey and black cockatoo assessment. All planned Survey Areas were adequately sampled in line with the project scope of works.
Experience	Negligible	The botanist leading the flora and vegetation field survey (Frank Obbens) has been conducting flora and vegetation surveys in Western Australia for over 20 years, with over 10 years' experience in the Swan Coastal Plain (SCP) bioregion. The ecologist leading the fauna field survey (Zirui Lin) has been conducting cockatoo targeted assessments in Western Australia for 3 years. Back-office support was provided by senior ecologist (Andrew Fry) who has worked in the region for over 10 years.
Timing, weather, season	Negligible	The recommended primary survey period for flora and vegetation surveys for the region as per the EPA Technical Guidance occurs during Spring (September through November). The flora and vegetation survey was completed in October 2025. Rainfall prior to the survey (August-October) was 113.9 mm above the long-term average. Observed conditions were fair with many species in fruit or flower, and annuals present.

Possible Limitation	Degree of Limitation (Significant, Moderate or Negligible)	Potential Constraints on Survey Outcomes
		The Targeted black cockatoo survey was undertaken in October 2025, which is within the recommended timing for foraging and breeding habitat for both Forest Red-tailed black cockatoo and Carnaby's black cockatoo, which can be undertaken year-round (DAWE, 2022) No hollows of a suitable size for breeding were present within the Survey Area and therefore this isn't considered a constraint. Targeted searches were undertaken for secondary evidence of the species presence (i.e. foraging evidence which can be done at any time of year) and to evaluate the potential suitability of the habitat. The temperatures and weather experienced during both field surveys was not considered a limitation to the survey and did not affect the ability to record fauna or habitats.
Proportion of the flora and fauna recorded and/or collected, and any identification issues	Negligible	A total of 78 flora species were recorded, including 21 introduced species. The number of species recorded was in proportion to the extent of area surveyed. Species sampling was in line with the technical guidance for a Detailed flora and vegetation, basic fauna and targeted black cockatoo habitat assessment.
Mapping Reliability	Negligible	The majority of the Survey Areas was traversed by foot and mapping reliability is considered high. Floristic Community Type (FCT) analysis was completed by specialist Dr. Shane Chalwell. Delineation of vegetation types was completed by Zirui Lin. Mapping accuracy and reliability was not considered a limitation.
Disturbances (fire, flood etc.)	Negligible	Areas of disturbance associated with historic clearing for agricultural purposes were not a constraint on the results of the survey.



Figure 2: Survey Effort and Sampling Location

0

20

40

60

80 m

↑

N

SCALE

1:2,100

SHEET SIZE

A3 COLOUR

PROJECT/REPORT NAME

Biological Survey Technical Report
350 Neaves Road, Mariginiup

CLIENT

Parcel Property

PROJECT NUMBER

A25.264

VERSION

0

DATA SOURCE

NEARMAPS

DRAWN BY / REVIEWED BY

SC/ZL

DATE

10/6/2026

Legend

Survey Area

Quadrat / Releve

Tracklog

No	Description	Drawn	Approved	Date
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NOTES:
Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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2. Existing Environment

2.1 Climate and Rainfall

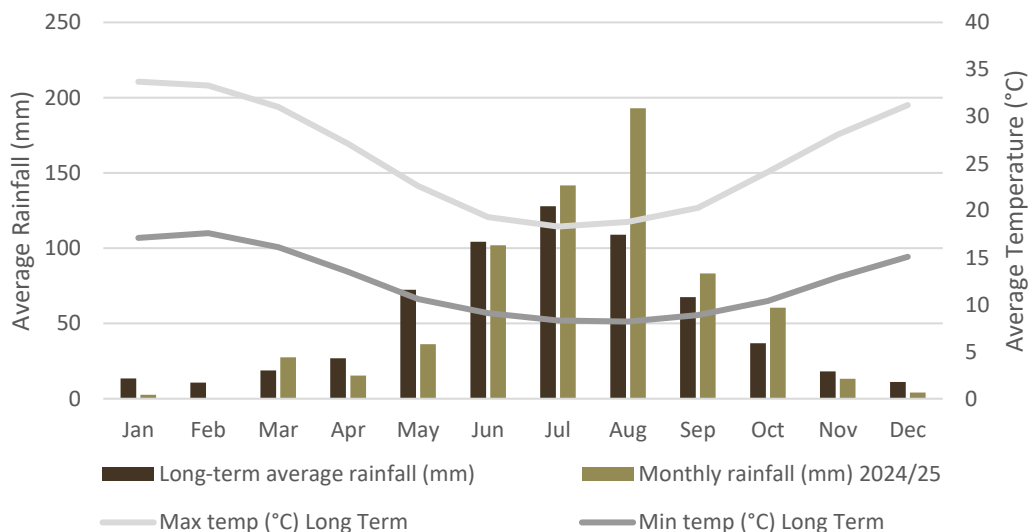
The Survey Area is located within the SCP. Beard (1990) described the climate of the area as warm Mediterranean, with cool wet winters (May to September) and warm dry summers.

Climate results are presented using the closest long-term Bureau of Meteorology (BoM) weather station with a complete dataset. The station utilised for the Survey Area was Pearce RAAF (Station 009053).

Climate statistics is normally calculated utilising data from the most current climate normal, which is defined as a 30-year interval (BoM, 2007), where possible. A climate normal is a period long enough to include year-to-year variations while avoiding the influence of longer-term changes in climate.

The long-term mean minimum temperature for Pearce RAAF ranges from 8.3 C (August) to 17.8 C (February) (1937-2025) and the long-term mean maximum temperature ranges from 18.3 C (July) to 33.8 C (January) (Graph 1) (BoM, 2025).

The Pearce RAAF weather station recorded 601.6 mm of rainfall in the 10 months prior to the flora survey (January 2025 to September 2025), which is 50.9 mm above the long-term average of 550.7 mm for the same period (BoM 2025). In the three months prior to the survey (July to September 2025), 418 mm of rainfall was recorded, which is 113.9 mm above the long-term average of 304.1 mm for the same time period (BoM, 2025).



Graph 1: Long-term and Monthly Total Rainfall, Maximum Temperatures for Pearce RAAF (Station 009053) (BOM, 2025)

2.2 Interim Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical and geological attributes. These bioregions are further subdivided into 419 subregions as part of a refinement of the IBRA framework (Commonwealth of Australia, 2012). The Survey Area occurs within the SCP Biogeographic Region, subregion Perth (SWA02). The subregion supports a rich diversity of flora and fauna, with vegetation dominated by Banksia woodlands, heaths, and seasonal wetlands. It is recognised for its high species richness and endemism but has also experienced extensive clearing and fragmentation due to urban development around Perth. The SWA02 is part of the broader SCP bioregion and is considered a priority for conservation due to ongoing pressures from land use change, weed invasion, and altered fire regimes.

2.3 Geology and Soils

The soil landscape mapping units (DPIRD-027) intersecting the Survey Areas are listed below in Table 2 and shown in Figure 3.

Table 2: Soil Systems Intersecting the Survey Area (DPIRD-027)

Mapping Unit Symbol	Map Unit Name	Description
212Bs__Ja	Bassendean, Jandakot phase	Jandakot low dunes. Slopes <10 % and generally more than 5 m relief. Grey sand over pale yellow sands generally underlain by humic and iron podzols; Banksia spp. low open woodland with a dense shrub layer
212Bs__G	Bassendean, Gavin phase	Flat or gently undulating landscape. Iron-humus podzols and some diatomite deposits. Banksia spp. Low open woodland with scattered emergent Eucalyptus calophylla and <i>Melaleuca preissiana</i> dense shrub layer
212Bs_Ws	Bassendean Seasonal Swamp phase	Depression with free water in winter. Humus podzols and peat. Dense <i>M. preissiana</i> ; <i>M. raphiophylla</i> and <i>E.rudis</i> around the edges with reeds and sedges in the centre.

2.4 Pre-European Vegetation

2.4.1 Vegetation Association Mapping

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia. Beard (1981) mapped the vegetation of the SCP at 1:1,000,00 scale. This mapping described one broad vegetation association for the Survey Area, namely Bassendean (DPIRD-006).

Beard's mapping attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps are maintained in digital form by the Department of Primary Industries and Regional Development (DPIRD; DPIRD, 2019). Extents are updated periodically by Department of Biodiversity, Conservation and Attractions (DBCA; DBCA, 2018). The representative vegetation association within the Survey Area is Bassendean_949 (Table 3) (Figure 4).

Table 3: Pre-European Vegetation Intersecting the Survey Area (DPIRD-006)

Vegetation Type	Description	Original Extent (ha)	Current Extent (ha)	% Remaining	% Managed for Conservation
BASSENDEAN_949	Low woodland or open low woodland - Low woodland or open low woodland - Other acacia, banksia, peppermint, cypress pine, casuarina, York gum.	115,119.15	69,992.31	60.80	20.83

2.4.2 Vegetation Complex Mapping

The vegetation complexes of the SCP were mapped by Heddle et al. (1980) at a scale of 1:250,000. According to this data (DBCA-046), the Survey Area is primarily representative of two vegetation complexes (see Figure 5):

- Pinjar Complex; Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - Banksia species to a fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca preissiana* (Moonah) and sedgelands.
- Bassendean Complex North; Vegetation ranges from a low open forest and low open woodland of Banksia species *Eucalyptus tottiana* (Pricklybark) to low woodland of Melaleuca species and sedgelands which occupy the moister sites.

An extension of the vegetation complex mapping of Heddle et al. (1980) was conducted by Webb et al. (2016), including an update of the vegetation complex extents. The current extents of the Heddle (1980) vegetation complex are presented in Figure 5 (GoWA, 2017, GoWA, 2018).

Table 4: Vegetation Complex Representation (DBCA-046)

Vegetation Complex	Original Extent (ha)	Current Extent (ha)	% Remaining	% Managed for Conservation
Pinjar Complex	4,892.64	1,735.34	35.47	4.57
Bassendean Complex - North	79,057.35	56,659.67	71.67	25.94

2.5 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Department of Water and Environmental Regulation (DWER) to prevent the degradation of important environmental values such as Threatened Flora, Threatened Ecological Communities (TECs), significant wetlands or Bush Forever Sites.

The Survey Area does not intersect any ESAs; the closest ESA is located approximately 500 m north of the Survey Area, associated with Bush Forever Site 389: Chitty Road Bushland (DWER-046; Figure 6).

The Bush Forever policy and program was developed to provide a policy and implementation framework with the aim to ensure bushland protection and management issues in the Perth Metropolitan Region and is managed by the Department of Planning, Land and Heritage (DPLH). The Survey Area does not intersect any Bush Forever Sites (DPLH-019; Figure 6).

In addition, the Survey Area does not intersect any conservation areas managed by the Department of Biodiversity, Conservation and Attractions (DBCA-011), the nearest is Gnangara - Moore River State Forest, located directly north of Neaves Road.

2.6 Wetlands and Hydrology

The Survey Area does not intersect any wetlands listed in the Directory of Important Wetlands in Australia (DBCA-045) and is not located in close proximity to any major river or drainage line (DWER-031). However, the Survey Area intersects one mapped feature within the Geomorphic Wetlands of the SCP dataset (DBCA-019) (Figure 7):

- Resource Enhancement Wetland (REW) - Dampland - (UFID 8094), described as 'Wetland name unknown', intersecting the eastern portion of the Survey Area.

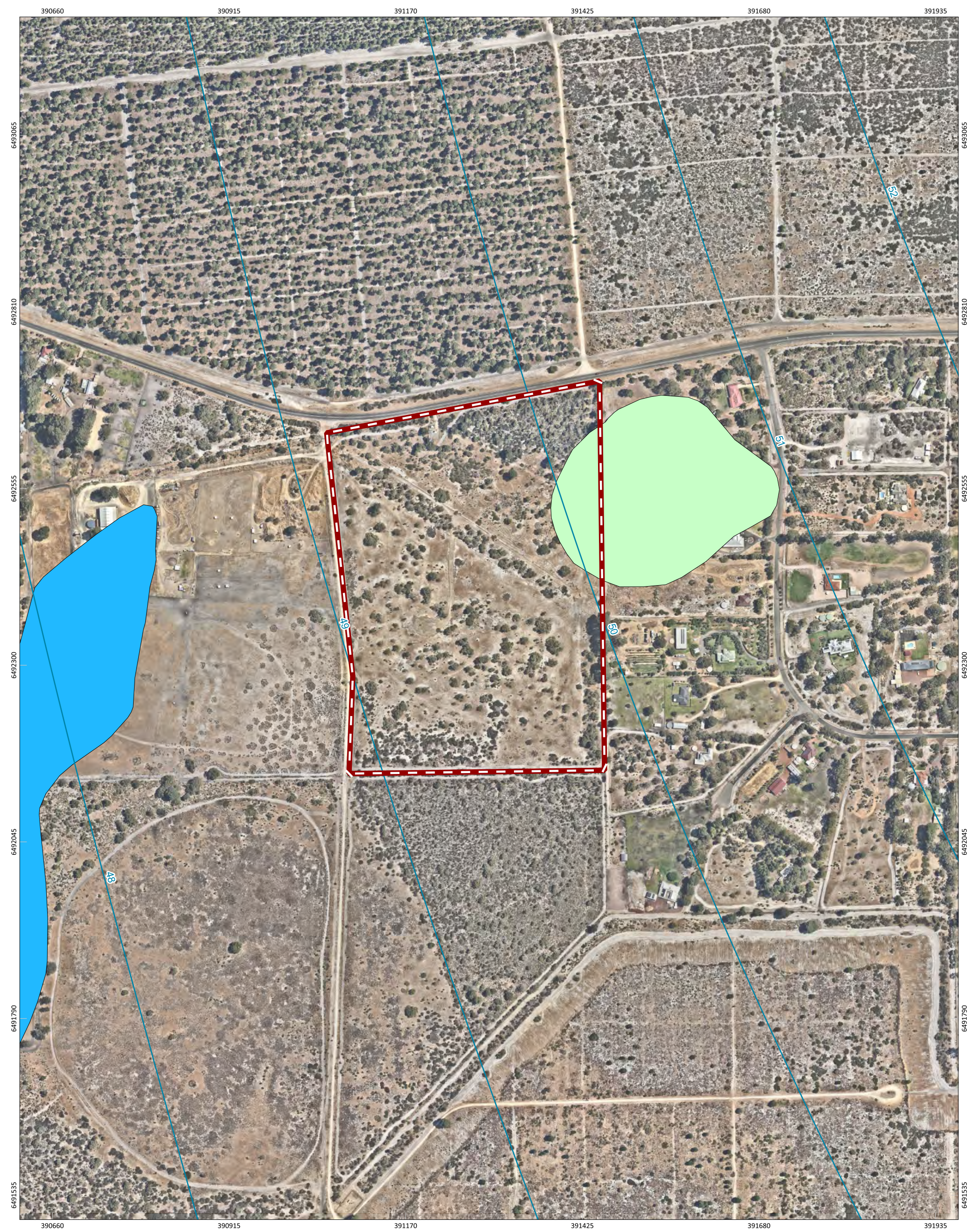


Figure 7: Surface Water Features and Geomorphic Wetlands

0

40

80

120

160 m

↑

N

SCALE

1:5,100

SHEET SIZE

A3 COLOUR

COORDINATE REFERENCE SYSTEM

GDA2020 / MGA zone 50

DATA SOURCE

NEARMAPS

PROJECT/REPORT NAME

Biological Survey Technical Report
350 Neaves Road, Mariginiup

CLIENT

Parcel Property

PROJECT NUMBER

A25.264

VERSION

0

DRAWN BY / REVIEWED BY

SC/ZL

DATE

28/4/2026

Legend

Survey Area

Gnangara Jandakot Water Table Elevation (Contours)
– 2019 Max (DWER-100)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

Multiple Use

Resource Enhancement

No	Description	Drawn	Approved	Date
A	Original issue	SC	ZL	28/4/2026

NOTES:
Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

WESTERN ENVIRONMENTAL

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2.7 Historical Clearing

The Survey Area was historically cleared in the 1960s, presumably for agricultural grazing. The remanent vegetation was likely Banksia woodland. See Table 5 for satellite imagery from Landgate showing historical clearing of the Survey Area to current day.

Table 5: Historical Clearing of the Survey Area.

Capture Dates and Observations	Aerial Imagery (Landgate, 2026)
07-11/03/1965 Earliest satellite imagery of the Survey Area. A northern portion was cleared with access tracks constructed.	
10/07-06/09/1974 The southern and northern portion of the Survey Area was completely cleared and partially cleared, respectively. The strip of native vegetation in the centre remained unaltered.	
07/12/2001-09/02/2002 Natural regrowth of vegetation occurred across the Survey Area. Additional access tracks were made. The strip of native vegetation in the centre remained unaltered.	

Capture Dates and Observations	Aerial Imagery (Landgate, 2026)
18-29/08/2011 A portion of northern vegetation was cleared for installation of a small power station. An access track was built through the centre remanent vegetation stripe.	
07/08-11/09/2025 Present state of the Survey Area with observed species regrowth.	

3. Methodology

3.1 Desktop Assessment

3.1.1 Database Searches

Database searches of DBCA records were requested to compile a list of potential conservation significant flora, fauna and ecological communities previously recorded within or surrounding the Survey Areas (Table 6). In addition, an EPBC Protected Matters Search Tool (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Area (DCCEEW, 2025).

Table 6: Database Searches

Database Name	Date Received and Reference Number	Search Type	Search Area
DBCA Threatened and Priority Fauna database search	13/04/2026 21-0426FA	Threatened and Priority Fauna	10 km buffer around the Survey Areas
DBCA Threatened and Priority Flora database search	13/04/2026 35-0426FL	Threatened and Priority Flora	10 km buffer around the Survey Areas
DBCA Threatened and Priority Ecological Communities database search	13/04/2026 25-0426EC	Threatened and Priority Ecological Communities	10 km buffer around the Survey Areas
Protected Matters Search Tool	14/04/2026	Commonwealth listed Threatened flora, fauna and Threatened Ecological Communities	10 km buffer around the Survey Areas

3.1.2 Likelihood of Occurrence

Conservation listed flora, fauna and ecological communities identified from the desktop assessment were assessed to determine the likelihood of their occurrence within the Survey Area, both prior to and post field survey. The assessment was completed based on the likelihood of occurrence criteria presented in Table 7.

Only species either recorded within the Survey Area or considered as having a high or medium likelihood of occurrence in post field survey assessment will be discussed in detail. Species classified as having a low likelihood of occurrence will not be discussed unless a justification for this classification is required.

The likelihood of occurrence assessment for flora and communities is contained within Appendix C and the likelihood of occurrence assessment for fauna is contained within Appendix G.

Table 7: Likelihood of Occurrence Criteria

Likelihood	Criteria
Recorded	Recorded in the Survey Area from database searches, previous survey by others or by current survey.
High	Flora and Communities Suitable habitat for flora or communities occurs within the Survey Area; and Records of flora or community <2 km from the Survey Area, with record <30 years old. Fauna Records of fauna species <10 km from the Survey Area. With record <20 years old; or For species with well understood and specific habitat preference/ requirements, when specific habitat is present in the Survey Area, and records present <10 km from the Survey Area. Species with general habitat preference, which is present in the Survey Area, and records present <5 km from the Survey Area.
Medium	Flora and Communities Suitable or marginally suitable habitat occurs within the Survey Area; and Records of flora or community <5 km from the Survey Area. Species or community is strongly linked to a specific habitat, which occurs within the Survey Area and records are present <10 km from the Survey Area. Fauna There are records <10 km from the Survey Area, however: The species is strongly linked to a specific habitat, which is marginally suitable or small in extent in the Survey Area; or Species has a general habitat preference, but small extent of suitable habitat is present. There is suitable habitat in the Survey Area, but records are >10 km from Survey Area.
Low	Records are historical only or are pre mapping procedures (e.g. records assigned to towns or place names). The species has a well understood and specific habitat preference/ requirements, which is absent from the Survey Area; or Suitable habitat is present, however there are no existing records of the species from the region despite reasonable previous search effort; or There is some suitable habitat in the Survey Area, however the species is very infrequently recorded in the locality (e.g. migratory bird species).

3.2 Flora and Vegetation Survey

3.2.1 Field Survey and Timing

The field survey was conducted over one two-person day by the survey team listed in Table 8. The survey was conducted during the peak spring flowering period for the region (EPA, 2016).

Table 8: Survey Team and Timing

Name	Position and years of Experience	DBCA Flora Taking Licence No.	Survey Dates
Frank Obbens	Botanist/Taxonomist, >20 years	-	9th of October 2025
Zirui Lin	Junior Botanist, 2 years	FB62000863	

3.2.2 Floristic Sampling

A Detailed survey was undertaken to describe the values within the Survey Area. This included several sampling techniques as described below. All sampling methodologies were undertaken as per the guidance presented in EPA (2016).

Quadrat and Relevé Sampling

A total of six non-permanent flora quadrats and three relevés were established within the Survey Area. Quadrats were only established in vegetation that was spatially large enough and where the vegetation was assessed as being Good condition by the criteria outlined in the EPA (2016) guidance or in best condition areas of the degraded vegetation types. All quadrats measured 10 m x 10 m (covering an area of 100 m²).

The following information was collected from within each quadrat:

- Observer.
- Date.
- Quadrat/site number.
- Global Position System (GPS) location (GDA2020; accuracy +/- 0.5 m) of the north-west corner.
- Digital photograph (spatially referenced with a reference number), taken from the north-west corner, looking diagonally across the quadrat.
- Broad soil type and colour.
- Topography.
- List of flora species recorded with height and total foliar cover within the quadrat for each species.

-
- National Vegetation Information System (NVIS) Vegetation description (NVIS Technical Working Group, 2017).
 - Vegetation condition

The data collected in the quadrats and opportunistic observations are provided in Appendix D. Survey effort, including sampling locations and track logs, is presented in Figure 2.

Opportunistic Sampling

Species not captured in any quadrats or relevés were recorded and collected opportunistically to ensure all species within the Survey Area were captured. The full flora inventory is provided in Appendix E as a Site x Species matrix.

3.2.3 Flora Taxonomy and Lodgement of Specimens

Where field identification of plant taxa was not possible, specimens were collected for identification using resources of the Western Australian Herbarium (WAH). Identification of flora collections, including confirmations of Priority flora, was completed by taxonomist Frank Obbens. Non-typical specimens were submitted to the WAH and confirmed by WAH taxonomist (M. Hislop).

The finalised species list was checked against FloraBase (WAH, 2025) to determine the conservation status and known distribution of each taxon. Introduced species were compared against the current status under the Biosecurity and Agriculture Management Act 2007 (BAM Act) Declared Pest list (DPIRD, 2022) and the list of Weeds of National Significance (WoNS) (CISS, 2025) to determine their control status.

Threatened and Priority Flora Report Forms (TPFRFs) will be submitted to DBCA for new populations of conservation listed flora.

3.2.4 Vegetation Description and Classification

Vegetation was described from the quadrats using the height and estimated cover of dominant and characteristic species of each stratum based on NVIS, recorded at Level V (NVIS Technical Working Group, 2017). Up to three species per stratum (upper, mid and ground) were used to formulate vegetation descriptions for each relevé and each vegetation type. Vegetation types were defined by observation of species dominance and structural composition by the field survey team.

Statistical analysis was undertaken to assist in defining floristic groups and defining associations with Floristic Community Types, as per Gibson *et al.* (1994).

3.2.5 Vegetation Condition Assessment

Vegetation condition mapping was undertaken as per the requirements of EPA (2016). Delineation and mapping of vegetation condition within the Survey Area included critical review of sampling data (quadrats, relevés and mapping notes), vegetation mapping and aerial photography (i.e. delineation of tracks and cleared areas). Polygon boundaries for vegetation condition were digitised using the QGIS package.

3.2.6 Floristic Analysis

FCT Analysis

The methods used are those outlined in *Methods for Survey and Identification of Western Australian Threatened Ecological Communities* (DBCA 2023a) being Floristic Community Type (FCT) assignment using the Gibson et al. (1994) and Keighery et al. (2012) datasets, and assignment by the minimum dissimilarity between the Survey Area plots and plots from the two regional datasets (nearest neighbour). Statistical analysis was undertaken to assist in defining floristic groups and defining associations with FCTs as per Gibson et al. (1994).

See Appendix F for detailed statistical methodology.

Species Accumulation Curve

A species accumulation curve and estimated total number of species was generated using quadrat data utilising the Chao non-parametric estimator in the R suite Vegan package. See Section 4.3.2 for results.

3.3 Identification and Assessment of Significant Vegetation

3.3.1 Identification of Threatened and Priority Ecological Communities

The relationship of the quadrat data to the FCTs (Gibson et al, 1994) was undertaken as described in Section 3.2.6. Inferred FCTs were considered with reference to the Commonwealth and State lists of TECs and Priority Ecological Communities (PECs) to confirm presence of significance ecological communities. TECS and PECs were also assessed as per guidance in:

- Methods for survey and identification of Western Australian threatened ecological communities by DBCA (2023a).
- Listing in the Priority Ecological Communities for Western Australia version 35 by DBCA (2023b).
- Applicable Commonwealth Approved Conservation Advice including Listing Advice (for EPBC Act listed communities).

Threatened and Priority Community Report Forms will be submitted to DBCA for new populations of conservation listed communities.

3.3.2 Banksia Woodland of the Swan Coastal Plain TEC

The presence and distribution of the Banksia Woodlands of the Swan Coastal Plain TEC ('Banksia Woodland TEC') was assessed as per the diagnostics presented in Section 2 of the Department of the Environment and Energy (DotEE; 2016). This process includes:

- Determining if the key diagnostic characteristics are present.
- Determining the condition of the patch/s.
- Determining if the patch/s size meets the minimum size (ha) requirements.
- Review of patch/s in surrounding context to determine if patch meets condition thresholds.

3.4 Basic Fauna Survey

The basic fauna survey incorporated a number of survey techniques as per the Terrestrial Fauna Technical Guidance (EPA, 2020). A basic survey is a low-intensity survey, conducted at the local scale to gather broad fauna and habitat information. The primary objectives are to verify the overall adequacy of the desktop study, and to map and describe habitats, with a focus on habitat for conservation listed fauna.

Fauna species were identified by active searches, secondary evidence such as scats, tracks, calls, remains, diggings and other signs. A fauna inventory was not compiled as part of this survey (not required under basic level survey) however observations are used to inform the fauna habitat type assessment.

The fauna survey was undertaken by one ecologist on the 9th of October 2027, totalling a one-person day effort.

Potential habitats for conservation listed species were identified and evaluated and the likelihood of occurrence assessed, criteria used as per Table 7.

3.4.1 Fauna Habitat Type Assessment

The fauna habitat types present within the Survey Area were defined considering landform, vegetation, structure such as rockpiles, logs and fauna assemblage occupying the area.

The following information was used to define and map all fauna habitat types within the Survey Area at specific fauna habitat assessment points and during traverses of the Survey Area:

- Land systems and landform.
 - Vegetation type and condition mapping.
 - Soil characteristics.
 - Structure such as rockpiles and logs.
-

-
- Fauna assemblage information from desktop assessment and field observations.
 - Aerial imagery and historic imagery.

Each fauna habitat type is described considering suitability for various fauna species groups or conservation listed species. In addition, the fauna habitat type's likelihood to harbour specialised fauna species which are not found in adjacent areas was taken into consideration. Habitat types were delineated in the field and digitised upon return from the field survey.

3.4.2 Fauna Taxonomy

Terrestrial vertebrate fauna taxa were identified in the field by an experienced ecologist.

Taxonomy and nomenclature follow the WA Museum checklist 2025 (WAM, 2025a). Conservation status follows the DBCA Threatened and Priority fauna list (DBCA, 2025b). Where required verification of identification of secondary evidence (tracks, scats, diggings) may be undertaken by a relevant species group expert.

3.5 Targeted Black Cockatoo Survey

3.5.1 Black Cockatoo Habitat Assessment

The Survey Area falls within the SCP which is within the modelled distribution range of Carnaby's black cockatoo (*Zanda latirostris*) and Forest red-tailed (*Calyptorhynchus banksii*) (DAWE, 2022). As the Survey Area falls outside of the modelled breeding and foraging distribution for Baudin's black cockatoo, they have not been considered further within this assessment.

The SCP is used by Carnaby's black cockatoos for foraging, with some patches of breeding habitat. Vegetation used by Carnaby's is dominated by Banksia spp. and Tuart (*Eucalyptus gomphocephala*) woodlands, as well as Marri (*Corymbia calophylla*), with Jarrah (*E. marginata*) in the east. (DAWE, 2022).

Within the SCP, Carnaby's black cockatoo and Red-tailed black cockatoo can be flexibly observed year-round. Most commonly present from January through to July, some individuals remain present all year round. The timing of the survey in October 2025 provided good opportunity to record foraging individuals and nesting for Carnaby's and Red-tail black cockatoos. If no individuals are present, searching for foraging evidence is a reliable alternative as it will generally persist in the landscape (particularly marri nut chews) for up to two years (DAWE, 2022).

The Black cockatoo habitat field survey followed the *Commonwealth referral guidelines for Threatened Black cockatoos* (DAWE, 2022) for identifying breeding, foraging and roosting habitat.

Breeding Habitat Assessment

The Commonwealth defines breeding habitat as that which contains known, suitable or potential nesting trees, and which occurs within the range of the species. Terminology used in this report for breeding habitat trees follows that defined in glossary of DAWE (2022) as shown in Table 9.

Table 9: Breeding Habitat Terminology

Breeding Habitat Term	Definition (DAWE, 2022a)
Known nesting trees	Trees (live or dead but still standing) which contains a hollow where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks or feathers).
Suitable nesting trees	Trees with suitable nesting hollows present, although no evidence of use.
Suitable nesting hollows	Any hollow with dimensions suitable for use for nesting by black cockatoos. See Appendix J for further discussion on nesting hollow characteristics.
Potential nesting trees	Trees that have a suitable Diameter at Breast Height (DBH) to develop a nest hollow, but do not currently have hollows. For most species of trees, suitable nest hollows are only found in live trees with a DBH of at least 500 mm.

In addition to Commonwealth guidelines for assessing breeding habitat trees, a scoring system based on that developed by Dr Mike Bamford (referred to as Bamford Class) was applied to class breeding habitat trees. This system and the Bamford Class alignment with DAWE (2022) breeding habitat terminology are shown in Table 10.

Table 10: Black Cockatoo Potential Breeding Tree Class

Bamford Class	Description of Tree and Hollows/Activity	Alignment with DAWE (2022a) Breeding Habitat Terminology
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow, eggs present.	Known nesting tree
2	Hollow of suitable size and angle visible with chew marks attributed to Black Cockatoo nesting activity around entrance.	Known nesting tree
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present if from ground-based assessment only (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10 m with thin rim).	Suitable nesting tree
4	Tree with hollows or broken branches that might or do contain hollows, but hollows or potential hollows are not of a suitable size, or are aligned or obstructed so as to prevent access	Potential nesting tree
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.	Potential nesting tree

Trees identified as having potentially suitable hollows present were inspected using a pole camera or small drone to inspect hollow internal dimensions. Hollow information that was recorded included:

- Size of entry.
- Estimated depth.
- Hollow type (knot, fissure, spout, vertical/chimney).
- Suitability for use.
- Evidence of use.
- Presence of other birds or bees.

Foraging Habitat Assessment

The Commonwealth defines foraging habitat as areas including plants of species known to support foraging within the range of each black cockatoo species. Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) woodlands are particularly important to Forest Red-tailed Black Cockatoo, while proteaceous heaths (shrublands dominated by *Banksia*, *Hakea* and *Grevillea* species) are also utilised by Carnaby's black cockatoo (DAWE, 2022).

The potential of the habitat within the Survey Area to support foraging was described, and any evidence was recorded, along with opportunistic sightings of any black cockatoo individuals.

Habitat mapping of the Survey Area was used in conjunction with the site assessment to determine the foraging quality using the Foraging Habitat Scoring Tool (DAWE, 2022). The Foraging Habitat Scoring Tool (DAWE, 2022) is applied once only for an entire site. A secondary assessment was undertaken using the 'Habitat Scoring System for WA black cockatoo foraging habitat' (the Habitat Quality Scoring Tool) provided by DCCEEW in 2023 as an unpublished source. The Habitat Quality Scoring Tool produces a score of 0-7 for site condition and may be applied to each identified fauna habitat type. An overall site context score of 0-3 is then added. See Appendix I for detailed scoring tool methodologies.

As per the Habitat Quality Scoring Tool areas with a site condition score of 2 or lower (foraging condition low, negligible or none) are "extremely unlikely to be considered as suitable habitat". These areas are therefore classified as not comprising suitable foraging habitat in this assessment.

Roosting Habitat Assessment

Roosting habitat was assessed based on observation of roosting or roosting evidence recorded during survey and based on habitat suitability (generally tall trees in the landscape in proximity to a water source). During the field survey, searches were conducted for evidence of roosting (e.g. piles of scats, feeding debris or chewed trees).

4. Results

4.1 Desktop Assessment

4.1.1 Flora Desktop Assessment

The DBCA database and Commonwealth Protected Matters Search Tool (PMST) searches identified 49 conservation-listed flora species as occurring within 10 km. These species are either found within 10 km of the Survey Areas or have the potential to occur in the region as identified by PMST searches. See Figure 8 for locations.

No previous records are present within the Survey Areas. See Appendix C for full database search results and likelihood of occurrence assessment. The likelihood of occurrence assessment identified that post survey all species had low likelihood of occurrence.

Likelihood of Occurrence

The pre-survey likelihood of occurrence assessment identified that of the 40 conservation listed flora species:

- One was considered to have a high likelihood of occurrence.
- Three were considered to have a medium likelihood of occurrence.
- Forty-six were considered to have a low likelihood of occurrence.

Post-survey, all of the species with high or medium likelihoods of occurring were reclassified as low.

Species with a pre-survey likelihood of occurrence of high or medium are discussed below in Table 11.

Table 11: Threatened and Priority Flora Species with a Pre Survey High or Medium Likelihood of Occurrence

Species Name	DBCA listed	EPBC Act listed	Preferred Habitat	Flowering period	Pre-survey LOOA	Justification	Post Survey LOOA
<i>Cyathochaeta teretifolia</i>	P3		Grey sand, sandy clay. Swamps, creek edges.	-	High	Closest recorded about 2.5km NW of the Survey Area <30 years ago. Previous record is in remnant bushland of similar vegetation that is present in the Survey Area.	Low. Not observed or recorded within the Survey Area.
<i>Poranthera moorokatta</i>	P2		White-grey sand.	Sep to Nov	Medium	Previously recorded 4.6km W of the Survey Area <30 years ago. Preferred habitat present, species distribution is likely more widespread than currently known.	Low. Not observed or recorded within the Survey Area.
<i>Caladenia huegelii</i>	CR	EN	Grey or brown sand, clay loam.	Sep to Oct	Medium	Nearest record is 2.8km north-east of the Survey Area in Banksia Woodland, some suitable habitat occurs within the Survey Area.	Low. Not observed or recorded within the Survey Area.
<i>Calectasia elegans</i>	CR	EN	White, grey or yellow sand, gravel.	Jun to Oct	Medium	Records 5 km from the Survey Area, are located within remnant bushlands of Banksia woodland. Some suitable habitat to occur within the Survey Area. Florabase point seems to within 2km east to Survey Area near Neaves Road.	Low. Not observed or recorded within the Survey Area.

4.1.2 Threatened and Priority Ecological Communities

The desktop assessment identified that 13 TECs and PECs occur within 10 km of the Survey Area (see Figure 8), two had a high likelihood of occurrence, three had a medium likelihood and seven had a low likelihood of occurrence. The pre-survey assessment identified that of the 13 communities:

- Two TECs/PECs were considered to have a high likelihood of occurrence.
- Three TECs/PECs were considered to have a medium likelihood of occurrence.
- Eight TECs/PECs were considered to have low likelihood of occurrence.

Communities that had a high or medium likelihood of occurrence pre-survey are discussed below in Table 12. See Appendix C for full database search results and likelihood of occurrence assessment.

Table 12: Threatened or Priority Ecological Communities with Pre Survey High or Medium Likelihood of Occurrence

Floristic Community Type/ Comm ID/Community Name	State Listed	EPBC Listed	Justification
Banksia Woodlands of the Swan Coastal Plain ecological community	P3	EN	High – the southern boundary of the Survey Area intersect the buffer of this TEC mapped by DBCA. The exact occurrence is 13 m south of the Survey Area boundary.
SCP20a/<i>Banksia attenuata</i> woodlands over species rich dense shrublands	CR	*EN	High – Edge of mapped occurrence of community buffer is 530 m north of the Survey Area. Suitable soil association and pre-European vegetation associations.
SCP21c/Low lying <i>Banksia attenuata</i> woodlands or shrublands	P3	*EN	Medium - Edge of mapped occurrence of community buffer is 3.3 km east of the Survey Area. Suitable soil association. This TEC tends to occupy wetter areas which are present within the Survey Area.
SCP22/<i>Banksia ilicifolia</i> woodlands	P3	*EN	Medium - Edge of mapped occurrence of community buffer is 3.4 km north from Survey Area. Suitable soil association and pre-European vegetation associations.
SCP23b/Swan Coastal Plain <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	P3	*EN	Medium - Edge of mapped occurrence of community buffer is 4 km north east of the Survey Area. Suitable soil association and pre-European vegetation association.

4.2 Flora Survey

4.2.1 Flora

A total of 78 vascular flora species, including 21 introduced species (26.9 %), were recorded from within the Survey Area from six quadrats, three relevés and opportunistic observations.

The families with the highest number of taxa were Myrtaceae (9 taxa), Poaceae (8 taxa) and Fabaceae (7 taxa). The most recorded genera were *Hibbertia* (3 taxa), *Ehrharta* (3 taxa) and *Banksia* (2 taxa). These families and genera are typical and common for the locality.

A site by species matrix and inventory of flora recorded is provided in Appendix E.

4.2.2 Threatened and Priority Flora

No Threatened or Priority flora species were identified during the survey or have previously been recorded within the Survey Area. The post-survey likelihood of occurrence assessments found that all threatened or priority flora species had low likelihood of occurring.

Majority of the Survey Area was in Completely Degraded condition due to historical clearing and agricultural grazing.

4.2.3 Flora of Other Significance

Flora may be considered of other conservation significance if it is a novel taxon or represents a range extension.

No species were identified as representing range extensions or flora of other significance within the Survey Area.

4.2.4 Introduced Species

A total of 21 introduced taxa were recorded within the Survey Area. These are listed in Table 13 along with their status under the BAM Act or WoNS listing. A comprehensive weed inventory was not collected in cleared and Completely Degraded areas, listed species are common/widespread.

One species recorded, Bridal creeper (**Asparagus asparagoides*), is listed as a Declared Pest listed under the BAM Act and as a WoNS. This species is discussed further below.

Table 13: Introduced Species within the Survey Area

Taxon	Common Name	Status Under BAM Act/WoNS
<i>Aira cupaniana</i>	Silvery Hairgrass	
<i>Asparagus asparagoides</i>	Bridal Creeper	WONS Declared Pest - s22(2)
<i>Avena barbata</i>	Breaded Oats	
<i>Briza maxima</i>	Blowfly Grass	
<i>Bromus diandrus</i>	Great Brome	
<i>Carpobrotus edulis</i>	Hottentot Fig	
<i>Ehrharta brevifolia</i>	Annual Veldt Grass	
<i>Ehrharta calycina</i>	Perennial Veldt	
<i>Ehrharta longiflora</i>	Annual Veldt Grass	
<i>Erodium cicutarium</i>	Common stork's-bill	
<i>Ficinia marginata</i>	Coarse Club Rush	
<i>Freesia alba x leichtlinii</i>	Freesia	
<i>Gladiolus caryophyllaceus</i>	Wild Gladiolus	
<i>Hypochaeris glabra</i>	Smooth Cats-ear	
<i>Leontodon rhagadioloides</i>	Cretan Weed	
<i>Ornithopus compressus</i>	Yellow Serradella	
<i>Pelargonium capitatum</i>	Rose Pelargonium	
<i>Pentaschistis airoides</i>	False Hairgrass	
<i>Pinus radiata</i>	Pine	
<i>Ursinia anthemoides</i>	Ursinia	
<i>Wahlenbergia capensis</i>	Cape Bluebell	

Bridal Creeper (Asparagus asparagoides) - Declared Pest and WoNS

Rhizomatous and tuberous, perennial herb and climber, can grow and climb up to 5 m high. Flowers are white and bloom between August and September. The plants produce fleshy fruit containing the seeds that are foraged and spread by birds. The preferred habitat is sandy, loamy or clayey soils over granite and can be found in a variety of landscapes including roadsides, creek lines and undisturbed bushland (WAH, 1998-; Hussey, et al, 2007). The **Asparagus asparagoides* was recorded opportunistically in three locations with three individuals recorded in total. See Figure 10 and Table 14 for locations.

Table 14: Declared Weed Abundance and Location

Taxon Name	Common Name	Status under the BAM Act/WoNS	Abundance	Easting	Northing
<i>Asparagus Asparagoides</i>	Bridal creeper	Declared Pest, WoNS	1	6492651.170522135	391287.32356676814
<i>Asparagus Asparagoides</i>	Bridal creeper	Declared Pest, WoNS	1	6492181.827701513	391230.6191994503
<i>Asparagus Asparagoides</i>	Bridal creeper	Declared Pest, WoNS	1	6492301.128652112	391207.8445697751

4.3 Vegetation Mapping

4.3.1 Floristic Analysis

All six quadrats established during the survey were subjected to multivariate analysis by Dr Shane Chalwell of Plantecology Consulting. Results of the analysis are discussed below and shown in Table 15.

Multivariate statistical analysis used to assist in defining vegetation types is presented in Appendix F. FCT analysis was undertaken with using presence absence data collected during the current survey.

Initially, species nomenclature was updated to be consistent with current usage. Where original names could not be clearly matched to an updated usage that taxon was removed, as were records that could not be identified to species level in the dataset. Intraspecific ranks were also raised to specific rank if no comparable rank was used in the original dataset.

The data from the current survey was then added to both SCP datasets one site at a time. Each new dataset was then analysed using the Bray-Curtis distance coefficient (a resemblance measure) and the flexible UPMGA linkage method (beta = 0.1), which were used in the PATN package for the original Gibson et. al. (1994) analysis. Assignment of the Keralup quadrats was to the nearest distinct group by inspection of the resulting dendrogram, with reference to the nearest neighbour produced by the Bray-Curtis distance method.

The results assignment of Q01, Q02, Q04 and Q06 quadrats using the Gibson et. al. (1994), Keighery et. al (2012) dataset and nearest neighbour analysis all strongly confirmed FCT 21c is present within representative vegetation of those quadrats within the Survey Area. This result is consistent with the presence of typical species for the type including *Banksia attenuata* and *Lomandra caespitosa*, as well as common species such as *Banksia menziesii*, *Burchardia congesta*, *Dasypogon bromeliifolius*, *Gompholobium tomentosum*, *Kunzea glabrescens*, *Patersonia occidentalis*, *Petrophile linearis*, *Scholtzia involucrata* and *Stylidium repens*.

When using the Gibson et al. (1994) dataset, all plots except Q03 were first assigned to a group comprising plots mostly from FCT 21c with a secondary fusion with a mixed group comprising plots from FCT 22 '*Banksia ilicifolia* woodlands'. The result for plot Q03 shows a fusion with a group mostly comprising FCT 11 'Wet forests and woodlands'. Which is reasonable as Q03 is in close proximity to a Resource Enhancement Wetland that occurs within the Survey Area, however, the Bray Curtis dissimilarities method showed the nearest neighbour is FCT 21c. It's a possibility that Q03 lies within a transitional phase of both, however, the analysis indicates it mostly aligns with FCT 21c.

Plot Q05 was initially assigned FCT 21c using the Gibson et al. (1994) dataset, however, the nearest neighbour analysis indicated Q05 aligned with FCT 4 '*Melaleuca preissiana* damplands'. Considering most weight was given to assignments that were consistent between the Gibson et al. (1994) and Keighery et al. (2012) datasets, Q05 is assigned FCT 21c.

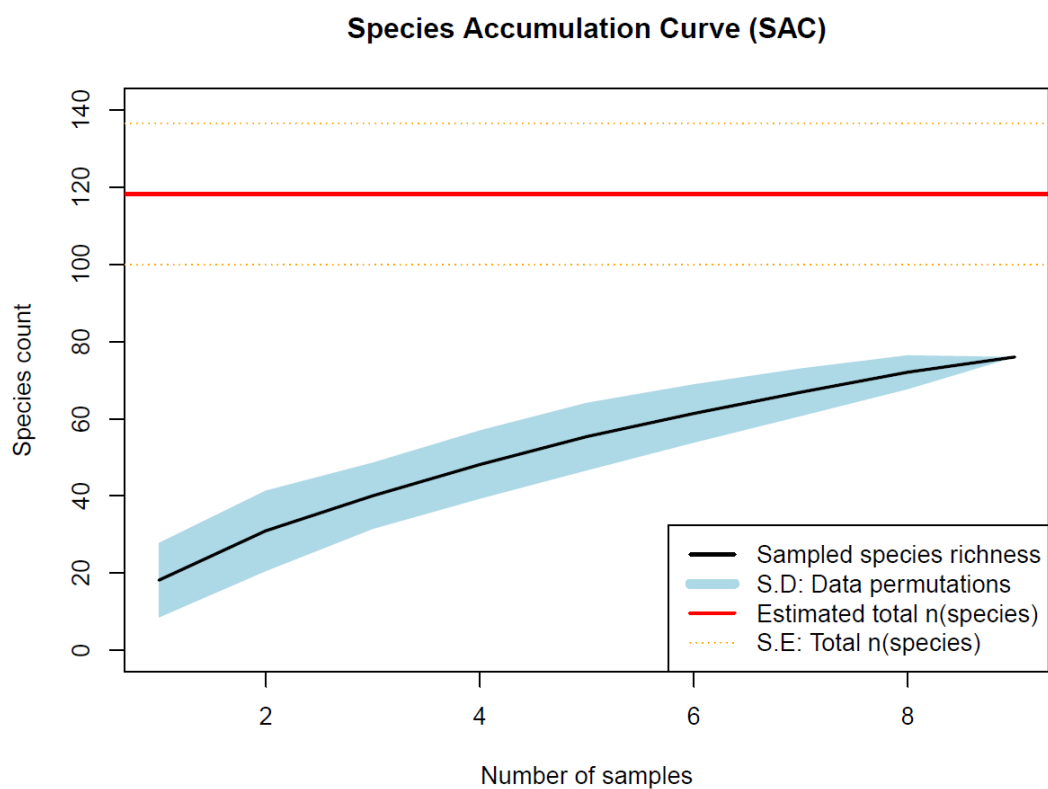
Table 15: Floristic Analysis FCT Assignment

Plots (Quadrats)	Assignment to Gibson et al. (1994)	Assignment to Keighery et al. (2012)	Nearest Neighbour	Probable FCT
Q01	21c	21c	21c	21c
Q02	21c	21c	21a	21c
Q03	11	21c	21c	21c
Q04	21c	21c	21a	21c
Q05	21c	21c	4	21c
Q06	21c	21c	21c	21c

4.3.2 Species Accumulation Curve

A species accumulation curve and estimated total number of species was generated using quadrat data utilising the Chao non-parametric estimator in the R suite Vegan package. The species accumulation curve indicates that the curve is approaching the asymptote but despite the large number of taxa recorded additional survey effort may identify further taxa. With 78 species recorded (including opportunistic observations) it is considered that the survey is adequate to describe the flora of the Survey Area taking account of degrading factors present. The species accumulation curve indicates that the curve is approaching asymptote, which is displayed as the estimated total number of species ($n = 118.25 \pm 18.35$ chao.se).

The estimated total number of species suggests that 65.96 % of flora species were recorded, based on the 78 taxa recorded within the six quadrats and three relevés.



Graph 2: Species Accumulation Curve of the Survey Area

4.3.3 Vegetation Types

A total of six vegetation types were identified within the Survey Area. These are described in Table 14 and illustrated in Figure 9. A small proportion of the Survey Area was cleared for fire breaks, access tracks and potential agricultural grazing; these areas were mapped as *BG01 - Paddock and open sand* and had no vegetation types assigned.

The majority of the vegetation types was fragmented and highly degraded, with patches of intact vegetation in VT01 (Banksia woodland) and VT02 (open Jarrah woodland with scattered Banksias) exhibiting moderate species diversity.

Table 16: Vegetation Types and Descriptions

Vegetation Unit Description	Vegetation Condition	Sampling Sites	Area and Proportion	Representative Photo
Veg Code: VT01 Description: Banksia woodland A tall open forest of <i>Eucalyptus Marginata</i>, <i>Banksia attenuata</i> and <i>Banksia menziesii</i> over a tall shrubland midstory of <i>Adenathos cygnorum</i> and <i>Kunzea glabrescens</i> over a low, open ground cover of <i>Xanthorrhoea preissii</i>, <i>Dasypogon obliquifolius</i> and <i>Hibbertia racemosa</i> over <i>Hypocalymma angustifolium</i>, <i>Gladiolus caryophyllaceous</i> over weedy grasses. White to grey, sandy leached soils. FCT: FCT 21c for Q01, Q02, Q03, Q06.	Good to Degraded	Q01 Q02 Q03 REL01	3.44 ha 17.34%	

Vegetation Unit Description	Vegetation Condition	Sampling Sites	Area and Proportion	Representative Photo
Veg Code: VT02 Open Jarrah Woodland with Scattered Banksia Open mid woodland of <i>Eucalyptus marginata</i>, <i>Eucalyptus patens</i> and <i>Nuytsia florabunda</i> over isolated shrubs of <i>Xanthorrhoea preissii</i> and <i>Jacksonia floribunda</i> over weedy grasses. White to grey, sandy leached soils.	Degraded to Completely Degraded	-	1.03 ha 5.19 %	
Veg Code: VT03 Kunzea Scrubland Tall shrublands of <i>Kunzea glabrescens</i> with isolated clumps of <i>Jacksonia furcellata</i> over weedy grasses. White to grey, sandy leached soils.	Completely Degraded	-	0.60 ha 3.03 %	

Vegetation Unit Description	Vegetation Condition	Sampling Sites	Area and Proportion	Representative Photo
Veg Code: VT04 Adenanthos Shrubland Mid shrubland of <i>Adenanthos cygnorum</i> over isolated clumps of <i>Banksia menziesii</i> over isolated clumps of <i>Gladiolus caryophyllaceus</i> over isolated clumps of grasses of <i>Ehrharta calycina</i> and <i>Avena barbata</i> and weedy grasses. White to grey, sandy leached soils. FCT: FCT 21c for Q04 and Q05	Completely Degraded	Q04 Q05	1.82 ha 9.16 %	
Veg Code: VT05 Scattered Nuytsia and Banksia Mid isolated trees of <i>Nuytsia florabunda</i>, <i>Eucalyptus todiana</i>, <i>Banksia illicifolia</i>, <i>Banksia attenuata</i> and <i>Eucalyptus marginata</i> over isolated clumps of shrubs of <i>Xanthorrhoea preissii</i>, <i>Patersonia occidentalis</i> and <i>Hypocalymma robusta</i> over weedy grasses. White to grey, sandy leached soils	Completely Degraded	REL02 REL03	5.61 ha 28.28 %	

Vegetation Unit Description	Vegetation Condition	Sampling Sites	Area and Proportion	Representative Photo
				
Veg Code: VT06 Ecotone of Melaleuca sumpland and Banksia Woodland <i>Mid isolated trees of Melaleuca preissiana, Eucalyptus marginata and Banksia attenuate over clumps of sedges of Lyginia imberbis over isolated clumps of Petrophile linearis over weedy grasses.</i> Light grey sandy leached soils.	Completely Degraded	-	0.38 ha 1.90 %	

Vegetation Unit Description	Vegetation Condition	Sampling Sites	Area and Proportion	Representative Photo
BG01 Bare sand and paddock Dense ground coverings of <i>*Ehrharta calycina,</i> <i>*Avena barbata</i> and other Poaceae species after historic clearing.	Completely Degraded	-	6.96 ha 35.11 %	
Total	-	-	19.82 ha 100 %	

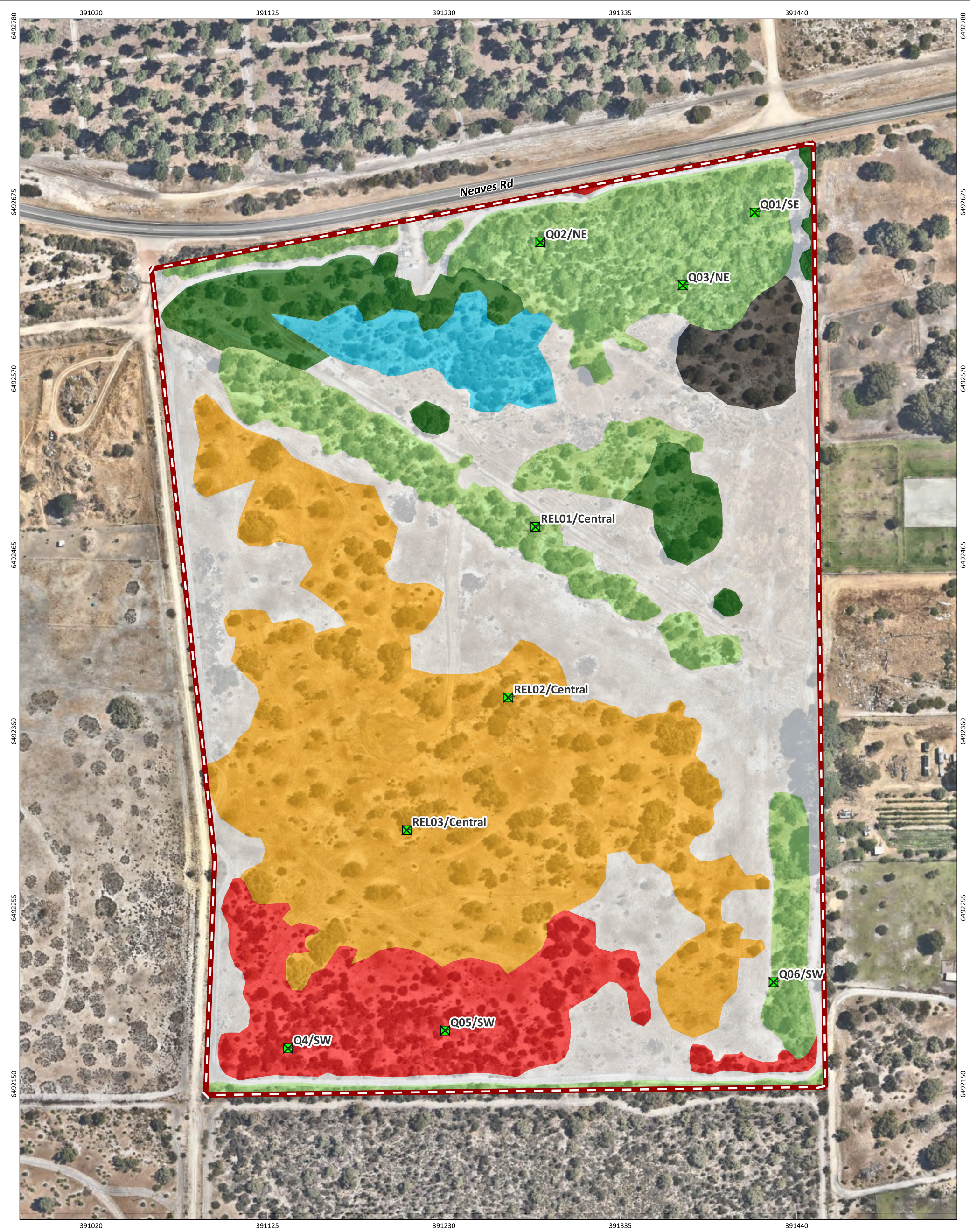


Figure 9: Vegetation Types

0

20

40

60

80 m

↑

N

SCALE

1:2,100

SHEET SIZE

A3 COLOUR

COORDINATE REFERENCE SYSTEM

GDA2020 / MGA zone 50

DATA SOURCE

NEARMAPS

PROJECT/REPORT NAME

Biological Survey Technical Report
350 Neaves Road, Mariginiup

CLIENT

Parcel Property

PROJECT NUMBER

A25.264

VERSION

0

DRAWN BY / REVIEWED BY

SC/ZL

DATE

28/4/2026

Legend

Survey Area

Quadrat / Releve

Vegetation Type

BG-01 - Open/Cleared Paddock

VT01 - Banksia Woodland

VT02 - Jarrah Woodland with
Scattered Banksia

VT03 - Kunzea Scrubland

VT04 - Adenanthos Shrubland

VT05 - Scattered Nuyisia and
Banksia

VT06 - Melaleuca Sumpland

No

Description

Drawn

Approved

Date

A

Original issue

SC

ZL

28/4/2026

NOTES:

Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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4.3.4 Vegetation Condition

The vegetation within the Survey Area ranged from Good to Completely Degraded with the majority of the Survey Area being in Completely Degraded condition. See Table 17 and Figure 10 for details. The Survey Area has been affected by degrading factors including clearing, agricultural grazing and weed invasion.

Table 17: Vegetation Condition of the Survey Area (as per EPA, 2016 condition scale)

Vegetation Condition	Extent (ha)	Extent (%)
Excellent	-	-
Very Good	-	-
Good	2.92	14.74
Degraded	3.25	16.37
Completely Degraded	13.65	68.89
Total	19.82	100



Figure 10: Vegetation Condition and Significant Weeds

0

20

40

60

80 m

↑

N

SCALE

1:2,100

SHEET SIZE

A3 COLOUR

COORDINATE REFERENCE SYSTEM

GDA2020 / MGA zone 50

DATA SOURCE

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CLIENT

Parcel Property

PROJECT NUMBER

A25.264

VERSION

0

DRAWN BY / REVIEWED BY

SC/ZL

DATE

5/6/2026

Legend

Survey Area

Vegetation Condition

Cleared

Completely degraded

Degraded

Good

Weed Observation

WONS & Declared Pest

Aa

Asparagus asparagoides

No	Description	Drawn	Approved	Date
A	Original issue	SC	ZL	5/6/2026

NOTES:
Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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4.3.5 Threatened and Priority Ecological Communities

Of the five TECs and PECs identified by the desktop assessment as having a medium or high likelihood of occurrence, one TEC was identified as present; Banksia Woodlands of the Swan Coastal Plain ecological community, listed as Endangered under the EPBC Act and a Priority 3 PEC in WA. A total of 0.544 ha of banksia woodland aligned with the Banksia woodland TEC of the SCP within the Survey Area. At least 5 ha of the same connective TEC is directly south of the Survey Area.

The PEC "Low-lying *Banksia attenuata* woodland on shrubland" was also present within the Survey Area, listed as Priority 3 PEC in WA. A total of 3.79 ha of vegetation types VT01, VT04 and VT06 contained SCP 21c PEC within the Survey Area.

Results of a presence/absence assessment are provided below in Table 18. Threatened and Priority communities' presence was assessed as per guidance in Methods for survey and identification of Western Australian threatened ecological communities by DBCA (2023) and as per listing in the Priority Ecological Communities for Western Australia version 35 by DBCA (2024a). Where applicable, Commonwealth Approved Conservation Advice including Listing Advice is also applied for EPBC Act listed communities.

Table 18: Threatened and Priority Ecological Communities Presence or Absence within the Survey Area

Floristic Community Type/ID	Community Name	State Listed	EPBC Listed	Presence/Absence	Justification	Total within Survey Area
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	P3	EN	Present	This community has been recorded in the southern lot adjacent of the Survey Area; confirmed in three patches of at least 5 ha of the same community. Criteria defining the presence of the community are complex. See the following section for results of assessment against the Approved Conservation Advice defining criteria.	0.54 ha
SCP 21c	Low-lying <i>Banksia attenuata</i> woodland on shrublands	P3	-	Present	This community has been recorded during field observations and patches were confirmed during the FCT analysis. A portion of this FCT type forms part of the Banksia Woodland of the SCP patch within the Survey Area. Refer to Section 4.3.1 for presence confirmation.	3.79 ha

Banksia Woodland of the Swan Coastal Plain TEC (EN)

The pre survey desktop assessment identified that DBCA database mapping indicates the potential presence of the Banksia Woodlands of the Swan Coastal Plain TEC (Banksia Woodland TEC) in the Survey Area. The field survey found that portions of vegetation type VT01 'Banksia woodland' may align with the vegetation structure and composition of the TEC community.

The Conservation Advice describes a four-step process for identifying presence of the community. The steps are:

- Key diagnostic characteristics (location and physical environment, soils and landform, structure, and composition.
- Vegetation condition thresholds.
- Minimum patch size.
- Further information to assist in determining the presence of the ecological community and significant impacts.

The Conservation Advice defines a patch as "a discrete and mostly continuous area of the ecological community. A patch may include small-scale (<30 m) variations, gaps and disturbances, such as tracks, paths or breaks" (DCCEEW, 2019). Where breaks are present (e.g. cleared gaps of >30m or area of non-Banksia Woodland vegetation types) several patches within a Survey Area may be defined and assessed against the criteria separately. The assessment is also tenure blind and requires consideration of vegetation outside of the Survey Area.

A total of three potential Banksia Woodland TEC patches were identified within the Survey Area (Figure 11) within VT01. The southern lot adjacent to the Survey Area contains three patches of gazetted Banksia Woodland of the SCP TEC (UOC 107485, UOC 107486, UOC 113433), and are comprised of at least 5 ha of Good to Very Good condition banksia woodland.

The assessment of the patch against the criteria is below and presented in Table 19. There was a total of 0.54 ha of Banksia Woodland of the SCP TEC within the Survey Area.

Table 19: Banksia Woodland TEC Patch Assessment

Characteristic	Key Diagnostic Criteria	Patch 1	Patch 2	Patch 3
Step 01				
Location and physical environment	Occurs in the SCP IBRA bioregion. Occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands; occasionally on Quindalup sands or eolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau.	All three patches meet criterion: - Survey Area occurs on the SCP. - Occurs on deep, leached sands of the Bassendean Soil.		
Structure	Low woodland to forest structure Distinctive upper tree layer or tall shrub layer of Banksia species at >2% cover. May have emergent trees of Eucalyptus or Allocasuarina. An often highly species-rich understorey that consists of sclerophyllous shrubs of various heights and a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs.	All three patches meet criterion: All three patches within VT01 are comprised of a woodland structure with a canopy layer dominated by Banksias attenuata, Banksia illicifolia and B. menziesii at >2% cover.		
Species composition	Canopy is most commonly dominated or co-dominated by and must include at least one of the following species: - Banksia attenuata - Banksia menziesii - Banksia prionotes - Banksia ilicifolia	All three patches meet criterion: All three patches within VT01 are dominated or co dominated by Banksia attenuata, Banksia illicifolia and B. menziesii.		
Step 02				

Characteristic	Key Diagnostic Criteria	Patch 1	Patch 2	Patch 3
Condition thresholds	To be considered as a part of the ecological community a patch should meet at least the Good Condition category.	Does not meet criterion: Total patch size: 1.69 ha. • 1.52 ha (89.98 %) is in Good condition. • 0.17 ha (10.02 %) is in Degraded condition. Upon utilisation of the weighted average quality class calculator (WEPL, 2026), the overall average vegetation quality of the patch was 2.89. The score does not meet Good category (3), thus falls within the category of Degraded (2).	Does not meet criterion: Total patch size: 1.10 ha. • 0.82 ha (82.83 %) is in Good condition. • 0.17 ha (34.34 %) is in Degraded condition. Upon utilisation of the weighted average quality class calculator (WEPL, 2026) the overall average vegetation quality of the patch was 2.82. The score does not meet Good category (3), thus falls within the category of Degraded (2).	Meets criterion: Total patch size: 0.54 ha in Good condition. The patch is connective to gazetted Banksia WLD of the SCP polygons south of the Survey Area, which likely contains at least 5 ha of Good to Very Good condition community.
Step 03				
Size and condition thresholds	‘Pristine’ – no minimum patch size applies ‘Excellent’ – 0.5 ha or 5,000 m2 ‘Very Good’ – 1 ha or 10,000 m2 (e.g. 100 m x 100 m) ‘Good’ – 2 ha or 20,000 m2 (e.g. 200 m x 100 m) Degraded- does not meet criteria A patch is a discrete and mostly continuous area of the ecological community. A patch may continue into vegetation outside of the Survey Area so long as the patch meets key diagnostic criteria. A patch may include small scale (<30m) gaps such as tracks, breaks or disturbed vegetation	Does not meet criterion: Total patch size: 1.69 ha. • 1.52 ha (89.98 %) is in Good condition. • 0.17 ha (10.02 %) is in Degraded condition. Upon utilisation of the weighted average quality class calculator (WEPL, 2026), the overall average vegetation quality of the patch was 2.89. The score does not meet Good category (3), thus falls	Does not meet criterion: Total patch size: 1.10 ha. • 0.82 ha (82.83 %) is in Good condition. • 0.17 ha (34.34 %) is in Degraded condition. Upon utilisation of the weighted average quality class calculator (WEPL, 2026) the overall average vegetation quality of the patch was 2.82. The score does not meet Good category (3), thus falls	Meets criterion: Total patch size: 0.54 ha in Good condition. The patch is connective to gazetted Banksia WLD of the SCP polygons south of the Survey Area, which likely contains at least 5 ha of Good to Very Good condition community.

Characteristic	Key Diagnostic Criteria	Patch 1	Patch 2	Patch 3
		within the category of Degraded (2). Patch 1 within VT01 is not connected within 30 m to any gazetted Banksia Woodland TEC patch.	within the category of Degraded (2). Patch 1 within VT01 is not connected within 30 m to any gazetted Banksia Woodland TEC patch.	
Step 04				
Assessing variation in canopy cover, quality or condition.	As per the Conservation advice "Patches can be spatially variable and are often characterised by one or more areas within a patch that meet the key diagnostic characteristics and condition threshold criteria, amongst areas of lower condition. Average canopy cover and quality across the broadest area that meets the general description of the community should be used". Hence for patches with a mixture of vegetation condition present, the patch should be assessed considering the "average" condition of the patch across the broadest area potentially comprising a patch.	Does not meet criterion: Upon utilisation of the weighted average quality class calculator (WEPL, 2026), the overall average vegetation quality of Patch 1 was 2.89. The score does not meet Good category (3), thus falls within the category of Degraded (2).	Does not meet criterion: Upon utilisation of the weighted average quality class calculator (WEPL, 2026), the overall average vegetation quality of the patch was 2.82. The score does not meet Good category (3), thus falls within the category of Degraded (2).	Meet criterion: Total patch size: 0.54 ha in Good condition. The patch is connective to gazetted Banksia WLD of the SCP polygons south of the Survey Area, which likely contains at least 5 ha of Good to Very Good condition community.
Landscape position and influence on broader landscape	The landscape position of the patch, including its position relative to surrounding vegetation influences how important it is in the broader landscape. For example, if it enables movement of native fauna or plant material or supports other ecological processes.	Does not meet criterion: Patch 1 within the Survey Area is isolated to surrounding banksia woodland patches.	Does not meet criterion: Patch 2 within the Survey Area is isolated to surrounding banksia woodland patches.	Meet criterion: Patch 3 is connective to gazetted Banksia WLD of the SCP polygons south of the Survey Area, which likely contains at least 5 ha of Good to Very Good condition community.