Bio Resource Recovery Plant Project Sites

Spring Flora and Fauna Survey

V & V Walsh

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Executive Summary

GHD Pty Ltd (GHD) was engaged by V & V Walsh to undertake a spring flora and fauna survey of two potential site locations for the Bio Resource Recovery Project (BRRP) to support future environmental approvals. The purpose of the survey was to delineate key flora and fauna values and potential sensitivities to two proposed project footprints (Project Areas) and adjacent vegetation (site walkover areas). Most of the proposed Project Area has been cleared of native vegetation and has a long history of grazing. It is assumed that all infrastructure (carparks etc) and laydown associated with the construction and operation of the BRRP will be within the project footprint. No clearing or associated works is proposed within the two site walkover survey areas.

This report includes a habitat significance for the vegetation patches that occur in the survey area.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.6 and the assumptions and qualifications contained throughout the Report.

Key findings

Vegetation and flora

The structure and composition of the remnant vegetation remaining across all the survey areas has been largely altered and is completely or almost completely lacking a native understorey due to a long history of disturbance such as clearing, agricultural land use, vehicle tracks, edge effects, kangaroos and rabbit populations, and weed invasion. Much of the vegetation can be described as parkland cleared with the flora comprising weedy grasses and herbs with isolated native trees and shrubs.

Project Area 1 – West of the processing plant

- Two vegetation types were mapped within Project Area 1 (not including cleared areas) which comprised of Weedy Grassland with Isolated Trees and two small patches of highly degraded *Eucalyptus rudis* (Flooded Gum) / *Agonis flexuosa* (Peppermint) Woodland to Open Forest. The remnant vegetation was all rated as Completely Degraded and lacked any native understorey.
- None of the vegetation types mapped within Project Area 1 are representative of any known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).
- Twenty-seven flora taxa (including subspecies and varieties) representing twelve families were recorded from Project Area 1 during the field survey. This total comprised four native taxa and 23 introduced flora taxa.
- No threatened flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act) or Priority flora listed by the Department of Biodiversity Conservation and Attractions (DBCA) were recorded from Project Area 1 . The likelihood of occurrence assessment concluded one significant flora species may possibly occur based on previous records and suitability of habitat. Due to the degraded nature of the site, no other significant flora are considered likely to occur.
- Of the 23 introduced taxa recorded within Project Area 1 , two species are listed as a Declared Pest under the *Biosecurity and Management Act 2007; *Zantedeschia aethiopica* (Arum lily) and **Asparagus asparagoides* (Bridal creeper). Bridal creeper is also listed as a Weed of National Significance (WoNS).

Project Area 2 – East of the processing plant

- Five vegetation types were mapped within Project Area 2 (not including cleared areas). The most dominant vegetation types consisted of previously cleared Weedy Grassland with Isolated Trees and *Eucalyptus rudis* / *Agonis flexuosa* Woodland to Open Forest as well as three small patches comprising of *Agonis flexuosa* Woodland, Planted Eucalypts and *Corymbia calophylla* Open Forest. The vegetation was largely cleared or

altered and is in Completely Degraded condition, except the small area of *Corymbia calophylla* Open Forest rated as Good to Degraded.

- None of the vegetation types mapped within Project Area 2 are representative of any known TECs or PECs.
- Sixty-two flora taxa (including subspecies and varieties) representing 28 families were recorded from Project Area 2 during the field survey. This total comprised 27 native taxa and 35 introduced taxa.
- No threatened flora listed under the EPBC Act or BC Act or Priority flora listed by the DBCA was recorded from Project Area 2. The likelihood of occurrence assessment concluded one significant flora species may possibly occur based on previous records and suitability of habitat. Due to the degraded nature of the site, no other significant flora are considered likely to occur.
- Of the 35 introduced taxa recorded within Project Area 2, two species are listed as a Declared Pest under the *Biosecurity and Management Act 2007; *Zantedeschia aethiopica* (Arum lily) and **Asparagus asparagoides* (Bridal creeper). Bridal creeper is also listed as a WoNS.

Site walkover area 1

- The remnant vegetation within site walkover area 1 is predominantly *Agonis flexuosa* Woodland with a small patch of *Melaleuca raphiophylla* Woodland along the southern boundary. The vegetation provided good canopy cover but lacked structural diversity with a bare understorey dominated by introduced grasses and herbs. The northern and eastern boundary of the survey area has previously been cleared and/or consists of a grassland of introduced species. The condition of the remnant vegetation was rated as Degraded.

Site walkover area 2

- The remnant vegetation remaining in site walkover area 2 consisted of *Corymbia calophylla* Open Forest near the South Western Highway, *Corymbia calophylla* and *Eucalyptus rudis* Open Forest along Preston River, *Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest and Weedy Grassland with isolated trees associated with the previously cleared paddocks. The remnant vegetation was patchy and in the most part lacked a native understorey, ranging from Good to Completely Degraded condition.

Fauna

Project Area 1

- Project Area 1 is predominantly cleared and dominated by introduced grasses and herbs. There are two small isolated patches of the habitat type Flooded Gum / Peppermint Open Forest. Both patches are parkland cleared and in completely degraded condition.
- Eight fauna species were recorded in Project Area 1 including seven birds and one mammal. Of these, one species is introduced (Rabbit).
- No significant fauna species was recorded in Project Area 1 during the assessment. One Western Ringtail Possum was observed in nearby Peppermint Woodland in site walkover area 1.
- Based on a likelihood of occurrence assessment for significant fauna and the significant fauna recorded during the survey in nearby vegetation, a further five significant species are considered likely to occur in Project Area 1, including: Forest Red-tailed Black Cockatoo, Baudin's Cockatoo, Carnaby's Cockatoo, Peregrine Falcon, and Western Ringtail Possum.
- No evidence of Black Cockatoo foraging, breeding or roosting was recorded.
- The Flooded Gum habitat within Project Area 1 provides limited foraging and potential breeding and roosting habitat for all three species of Black Cockatoo.
- A total of nine potential Black Cockatoo habitat trees (all Flooded Gum species) of suitable DBH (>500 mm) were recorded in Project Area 1. None of the trees recorded contained hollows.

Project Area 2

- Project Area 2 is been predominantly cleared and/or contains a ground cover dominated by introduced grasses and herbs with isolated native trees. Much of the area comprises of existing road, infrastructure and farmland.
- The habitat types remaining in Project Area 2 include Flooded Gum / Peppermint Open Forest, Marri and Flooded Gum Open Forest, Peppermint Woodland, Planted Eucalypts and Marri Open Forest which are all in degraded to completely degraded condition and lack native understorey except a small pocket of Marri Open Forest in good to degraded condition.
- Twenty-seven fauna species were recorded within Project Area 2 including 20 birds, six mammals and one reptile. Of these, four species are introduced (Rabbit, European Fox, Laughing Kookaburra and Sheep).
- Two significant fauna species were recorded in Project Area 2 during the assessment, they include the Forest Red-tailed Black and Western Ringtail Possum. The South-west Brush-tailed Phascogale was observed immediately adjacent to project area 2 within the Marri Open Forest habitat (site walkover area 2).
- Based on a likelihood of occurrence assessment for significant fauna and nearby records, a further six significant species are considered likely to occur in Project Area 2, including: Carnaby's Cockatoo, Baudin's Cockatoo, Peregrine Falcon, Quenda, Western False Pipistrelle and Coastal Plains Skink.
- One Forest Red-tailed Black Cockatoo individual was observed in a Marri tree during the survey and multiple observations of foraging evidence (chewed marri nuts) was recorded. No evidence of breeding or roosting was observed.
- Project Area 2 contains 1.17 ha of suitable foraging habitat (0.87 ha within the project footprint and 0.3 ha in the road infrastructure area) and has a foraging quality score of 6 (moderate value) for Baudin's Cockatoo and Carnaby's Cockatoo and score of 8 (high value) for Forest Red-tailed Black Cockatoo. However suitable foraging habitat for Forest Red-tailed Black Cockatoos is sparse across Project Area 2. There is only one marri tree located within the project footprint and eight trees scattered within the road infrastructure area.
- A total of 22 potential Black Cockatoo habitat trees (13 Flooded Gums and 9 Marri) were recorded in Project Area 2. Of these, two were recorded containing a hollow (one Marri and one Flooded Gum). Neither hollow was considered to be suitable for Black Cockatoo breeding.

Site walkover area 1

- The habitat types mapped within site walkover area 1 comprise of Peppermint Woodland, a small patch of Melaleuca Woodland and Completely Degraded Grassland. The woodland habitat type in the survey area provides good canopy cover but lacks structural diversity, native ground cover and microhabitats.
- One significant fauna species, the Western Ringtail Possum, was recorded in site walkover area 1 during the assessment. The Peppermint Woodland provides core habitat for this species.
- No evidence of Black Cockatoo breeding or roosting was recorded in the survey area. Foraging evidence (chewed marri nuts) from Forest Red-tailed Black Cockatoo was observed.
- The area provides limited foraging, breeding and roosting habitat, with few scattered Marri and Flooded Gums occurring within the Peppermint Woodland habitat.
- A total of seven potential Black Cockatoo habitat trees were recorded, including six Marri and one Flooded Gum. No trees were recorded with hollows.

Site walkover area 2

- The habitat types mapped within site walkover area 2 comprise of Marri Open Forest near the South Western Highway, Marri and Flooded Gum Open Forest along Preston River, Flooded Gum/Peppermint Woodland to Open Forest and Completely Degraded Grassland with isolated trees. The woodland and open forest habitat types in the survey area generally provide good canopy cover but lack structural diversity, native ground cover and microhabitats.

- Four significant fauna species were recorded in site walkover area 2 during the assessment, including the Western Ringtail Possum, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and South-west Brush-tailed Phascogale.
- Both the Forest Red-tailed Black Cockatoo and Baudin's Cockatoo were recorded within site walkover area 2. Extensive evidence of foraging (chewed marri nuts) within the survey area by Forest Red-tailed Black Cockatoo and to a lesser extent the Baudin's Cockatoo was observed during the survey.
- No evidence of roosting or breeding was observed.
- A total of 388 potential Black Cockatoo habitat trees were recorded in site walkover area 2, including 192 Flooded Gum (*Eucalyptus rudis*), 193 Marri (*Corymbia calophylla*) and three stags (dead Eucalypts). Of these, 10 were recorded containing one or more hollows, but only six of these trees were considered to contain suitable hollows and three possibly suitable for use by Black Cockatoos.

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1. Introduction

1.1 Background

V & V Walsh engaged GHD Pty Ltd (GHD) to undertake a spring flora and fauna survey of two potential site locations for the Bio Resource Recovery Project (BRRP) to support future environmental approvals. A Detailed and Targeted spring flora and vegetation survey and Basic and Targeted fauna survey was recommended for the proposed site footprints and road networks, with a 10 metre (m) buffer to allow for potential widening. The majority of Location 1 and Location 2 (Plate 1) is cleared land with a long history of grazing. It is assumed that all infrastructure (carparks etc) and laydown associated with the construction and operation of the BRRP will be within the provided location footprints.

A site walkover of neighbouring vegetation of the two proposed project sites was also required and include a basic and targeted survey for Western Ringtail Possum and Black Cockatoo's as well as delineating the broad vegetation types and condition to provide an assessment of potential impacts of the project on surrounding areas.

This Report also includes descriptions of discrete vegetation patches within the survey footprint. These descriptions include vegetation type, vegetation condition and habitat value.

These areas will not be cleared as part of the proposed project.

1.2 Purpose of this report

The purpose of the survey is to describe the key flora and fauna values across the survey footprint and potential sensitivities to impact areas within the survey area and adjacent vegetation.

The outcome of the survey and information supplied in this biological survey report will assist in the planning process for site selection for the BRRP as well as inform the environmental assessment and approvals process and assist in the preparation of Environmental Impact Assessment documentation. The survey findings may also assist in developing appropriate environmental management strategies to avoid and minimise environmental impacts.

1.3 Location

1.3.1 Survey area

The Project Area is located at V & V Walsh in Davenport, on the eastern side of the South Western Highway, south of Rawling Road. The Detailed and Targeted spring flora and vegetation survey and Basic and Targeted fauna survey was undertaken within the two proposed project footprints and associated road infrastructure (Project Area 1 and Project Area 2) (Plate 1) which comprised a total of 8.57 ha. The site walkover was undertaken in vegetation adjacent to the two proposed Project Area (Plate 2) which comprised a total of 19.54 ha. A breakdown of the different survey areas and level of assessment undertaken is provided in Table 1. The survey areas are shown on Figure 1 (Appendix A).

Table 1 Survey areas

Location	Detailed spring flora survey (Project Area)		Site Walkover	Total area (ha)
	Project footprint	Road infrastructure		
Project Area 1	2.05 ha	0.66 ha	3.58	6.29 ha
Project Area 2	3.46 ha	2.50 ha	15.96 ha	21.92 ha
Total	5.51	3.16	19.54	

1.3.2 Study area

A study area was defined for the desktop-based searches for the assessment and includes a five kilometre (km) buffer of the survey area.

1.4 Scope of works

The scope of work was to undertake two levels of survey to assess the flora, vegetation and fauna values of the survey areas.

A Detailed and Targeted spring flora and vegetation survey and Basic and Targeted fauna survey was undertaken to assess the proposed project locations. The following actions were completed to fulfil the scope:

- A desktop assessment to determine the environmental values and significant flora, fauna, habitat, vegetation and other environmental features (such as riparian areas, wetlands) relating to the survey area.
- A Detailed flora and vegetation and Basic fauna survey to verify/ground truth the desktop results and survey area.
- Targeted flora survey for species identified by the desktop assessment as potentially or likely to occur within the survey areas.
- Targeted fauna survey for Western Ringtail Possum and the three threatened Black Cockatoo species
- Mapping of vegetation, vegetation condition, significant fauna and flora records, and fauna habitat
- Provision of a technical report (this document) outlining the methods and results of the desktop assessment and field survey
- Provision of raw survey data and spatial files in IBSA format.

A site walkover was undertaken to assess the indirect impacts on the flora, vegetation and fauna values of the survey areas adjacent to or surrounding the proposed project locations. The following actions were completed to fulfil the scope:

- Undertake a basic and targeted survey for Western Ringtail Possum and the three threatened Black Cockatoo species
- Delineation of vegetation types and vegetation condition
- Provision of a technical report (this document) and spatial mapping

1.5 Relevant legislation, conservation codes and background information

In Western Australia (WA) some ecological communities and flora are protected under both Federal and State Government legislation. In addition, regulatory authorities also provide a range of guidance and information on expected standards and protocols for environmental surveys. An overview of key legislation and guidelines, conservation codes and background information relevant to this flora and vegetation survey and fauna survey are provided in Appendix B.

1.6 Report limitations and assumptions

This report: has been prepared by GHD for V & V Walsh and may only be used and relied on by V & V Walsh for the purpose agreed between GHD and V & V Walsh as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than V & V Walsh arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Methodology

2.1 Desktop assessment

A desktop assessment of the survey area was completed prior to commencement of the survey with the results used to guide survey effort. The desktop assessment included:

- A review of the Department of the Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) to identify Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within the study area (DAWE 2023) (Appendix C)
- A review of Department of Biodiversity, Conservation and Attractions (DBCA) Threatened and Priority Ecological Communities (TECs and PECs), Flora and Fauna databases. These databases identify conservation significant communities, flora and fauna species present within the survey area and surrounds that are contained in DBCA records (Figure 2c, Appendix A)
- The DBCA *Dandjoo* database for flora and fauna species previously recorded within the study area (DBCA 2023) (Appendix C)
- Black Cockatoo roosting and breeding sites – buffered (Government of WA (GoWA) 2023) (Figure 2c, Appendix A)
- Identification of Environmentally Sensitive Areas (ESAs) and DBCA-managed conservation estates and reserves present within or near the survey area (GoWA 2023) (Figure 2a, Appendix A)
- Identification of wetlands and hydrological features (Figure 2b, Appendix A)
- Previous broad scale vegetation mapping of the survey area and the pre-European extent remaining (GoWA 2019a and b).
- Previous studies undertaken within or in close proximity to the survey area (GHD 2021)

2.2 Field Survey

2.2.1 Flora and vegetation

GHD senior ecologist Erin Lynch (flora licence no. FB62000081-3) and graduate environmental scientist Kiara De Landgrafft completed a single-season detailed flora and vegetation survey on the 20 to 22 November 2023.

The field survey was undertaken to identify and describe the dominant vegetation units, assess vegetation condition, and identify and record vascular flora taxa present at the time of survey. Targeted searches for significant ecological communities and flora taxa were also undertaken during the field survey.

The survey methodology employed by GHD was undertaken with reference to the EPA (2016a) Technical Guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment*.

Data collection

Field survey methods involved walking transects, opportunistic sampling and representative photo points and dominant species lists in identified vegetation types. No quadrats or relevés were undertaken in the survey area due to the lack of understorey and degraded condition of the site within the detailed survey area boundary.

Data collected at each vegetation type was recorded on a pro-forma data sheet and included the parameters detailed in Table 2.

Table 2 Data collected in the field

Aspect	Measurement
Collection attributes	Site code, personnel/recorder; date, photograph
Physical features	Aspect, slope, landform, soil attributes, ground surface cover, leaf and wood litter.
Location	Coordinates recorded in GDA94 datum using a hand-held GPS tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed using the condition rating scale adapted by EPA (2016a) for the South West Botanical Province.
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer. List of all species associated with the representative vegetation type including average height and cover (using NVIS)

A flora inventory was compiled from taxa recorded and opportunistically collected across the survey area.

Vegetation types

Vegetation types were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations. Vegetation types were described based on structure, dominant taxa and cover characteristics as defined by field observations. Vegetation type descriptions follow National Vegetation Information System (NVIS) and are consistent with NVIS Level V (Association) (NVIS Technical Working Group 2017).

Statistical analysis

No statistical analysis was undertaken due to the lack of structure and degraded nature of the vegetation within the survey area. Classification analysis of quadrat floristic data with quadrats from the Swan Coastal Plain (SCP) Floristic Community Types (FCT) dataset requires comparable vegetation (i.e. original remnant vegetation types). The survey area had a high level of disturbance, therefore, the statistical analysis was not conducted, as it was reasonable to assume the outcome of this assessment would result in a low similarity to FCT data and be inconclusive.

Vegetation condition

The vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces of Western Australia (IBRA) (devised by Keighery (1994) and adapted by EPA (2016a)). This scale recognises the intactness of vegetation, which is defined by the following:

– Completeness of structural levels

– Extent of weed invasion

– Historical disturbance from tracks and other clearing or dumping of rubbish

– The potential for natural or assisted regeneration.

The scale consists of six rating levels as outlined in Appendix B.

Targeted flora searches

Prior to the field survey, information obtained from the desktop assessments (e.g. EPBC Act PMST, *NatureMap* and DBCA database search results) was reviewed to determine conservation significant flora taxa potentially present within the survey area. Targeted searches for conservation significant flora based on desktop assessments and habitat availability was undertaken throughout the survey area.

Flora identification and nomenclature

Species well known to the survey botanist were identified in the field. All other species were collected and assigned a unique collection number to facilitate tracking. Specimens collected during the field assessment were dried and processed in accordance with the requirements of the WA Herbarium. Species were identified by the use of taxonomic literature, electronic keys and online electronic databases.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (WA Herbarium 1998–2024) and the EPBC Act Threatened species database provided by DCCEEW (2024). Nomenclature used in this report follows that used by the WA Herbarium as reported on *FloraBase* (WA Herbarium 1998–2024).

2.2.2 Fauna

GHD senior ecologist Erin Lynch and graduate environmental scientist Kiara De Landgrafft undertook the Basic fauna survey and Targeted significant species assessment in conjunction with the flora and vegetation assessment on the 20 to 22 November 2023. The survey area was traversed on foot over the course of the survey to identify, describe and map the dominant fauna habitat types, assess habitat connectivity, and identify habitat for conservation significant species. The habitat assessment had specific consideration for the locally occurring and significant fauna, including Black Cockatoo and Western Ringtail Possum habitat requirements. An assessment of the likelihood of significant fauna and their habitats occurring within the survey area was also undertaken.

The survey methodology was undertaken in accordance with the EPA *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016b) and *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2020).

Opportunistic observations

Whilst conducting activities in the survey area, opportunistic observations were made of any other vertebrates (or signs of their presence). Fauna taxa observed or heard were noted, and indirect evidence (such as scats, tracks, diggings, nests, feathers, bones, pellets) indicating the current or recent presence of a species also noted. Searching was undertaken through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and hollow logs.

Habitat assessment

A fauna habitat assessment was undertaken to document the type, value and extent of habitats within the survey area. Specifically, the assessment included:

- Habitat structure (e.g. vegetation type, presence/absence of structural layers such as ground cover and mid storey)
- Presence/absence of refuge including: density of ground covers, fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
- Presence/absence of waterways
- Location of the habitat within the survey area in comparison to the habitat within the surrounding landscape
- Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey area
- Current land use and disturbance history
- Evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance

– Evaluation of the likelihood of occurrence of significant fauna within the habitat (based on presence of suitable habitat)
– A representative photograph of each habitat type.

Black Cockatoo targeted assessment

This assessment focussed on foraging, breeding and roosting habitat for all three locally occurring Black Cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo. The assessment was undertaken across the survey area to determine presence, quality, and extent of habitat. The assessment involved visual and aural assessment of the survey area, identifying breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, roosting areas, current activity, and any other signs of use by Black Cockatoos. For this assessment, the Black Cockatoo referral guidelines (DAWE 2022) were used to define breeding, foraging and night roosting habitat.

Information collected during the field survey included:

– Foraging habitat - the location and extent of suitable Black Cockatoo species foraging habitat was identified and mapped for the survey area, based on the vegetation associations and presence/absence of known foraging species. During the field surveys any direct or indirect evidence of foraging by Black Cockatoos was recorded via GPS.
– Breeding habitat - suitable breeding habitat for Black Cockatoos is defined by DAWE (2022) as trees of species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable Diameter at Breast Height (DBH) to develop a nest hollow. For most tree species, suitable DBH is 500 mm. For Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*), suitable DBH is 300 mm (DAWE 2022). On average, Carnaby's Black Cockatoos are known to nest in hollows with an entrance diameter greater than 20 to 30 cm (Johnstone & Storr 1998; Groom 2011). While the Forrest Red-tailed Black Cockatoo is known to nest in hollows with an entrance of greater than 12 cm (Johnstone & Storr 1998). Therefore, during the field survey hollows were graded into small (up to 6 cm) Medium (6 to 10 cm) and Large (10+ cm).
– Night roosting habitat - suitable roosting habitat is defined by DAWE (2022). Suitable roosting habitat is identified based on the presence of suitable tall trees, evidence of roosting (feathers, twig clips etc.) and proximity of known roosting sites in the survey area.
– Opportunistic observations - both visual and aural observations of Black Cockatoos within the survey area and surrounding region were noted during the survey. This information was used to calculate the amount of foraging habitat, potential breeding habitat and night roosting habitat within the survey area. Any area containing known foraging species or potential nesting trees was considered as habitat for Black Cockatoos.

This information was used to calculate the amount of foraging habitat, potential breeding habitat and night roosting habitat within the survey area. This information is presented in Figure 6.

Western Ringtail Possum targeted assessment

Searching was carried out for presence or recent signs of occurrence of Western Ringtail Possum and for suitable habitat. This involved searching potentially suitable habitat, specifically *Agonis* (Peppermint tree) woodland for scats and dreys (possum nests). A nocturnal survey of identified habitat was also undertaken through spotlighting traverses. Nightspotting was undertaken over two nights for a total of 3 hours each night (1.5 hr x two people). Results of the survey and suitable habitat are presented in Figure 6, Appendix A.

Fauna species identification and nomenclature

Identification of fauna species was made in the field using available field guides and electronic guides (e.g. Morcombe 2004, Menkhorst and Knight 2010, Neville 2013 and Wilson and Swan 2021). Where identification was not possible, photographs of specimens were collected to be later identified.

Nomenclature used in this report for all faunal groups follows that used by the Western Australian Museum and the DBCA Dandjoo database (DBCA 2023).

2.3 Limitations

2.3.1 Desktop limitations

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the survey area. The records from the DBCA searches of Threatened and Priority flora and fauna provide more accurate information for the general area and local occurrence. However, some collections, sighting or trapping records cannot be dated and often misrepresent the current range of Threatened and Priority species.

2.3.2 Field survey limitations

The EPA (2016a, 2020) Technical Guidance states that flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 3. Based on this assessment, the survey effort has not been subject to any constraints, which affect the thoroughness of the assessment or conclusions formed.

Table 3 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information	Nil	Adequate information is available for the survey area. This information includes: Broad scale (1:250,000) mapping by Beard (1979) and digitised by Shepherd et al. (2002) Vegetation mapping by Heddle et al. 1980 and Webb (DBCA) (2016) Regional biogeography (Mitchell et al. 2002).
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial vertebrate fauna were sampled during the survey. Non-vascular flora, invertebrate and aquatic fauna were not surveyed.
Proportion of flora collected and identified (based on sampling, timing and intensity) Proportion of fauna identified, recorded and/or collected	Minor	The Detailed vegetation and flora survey was undertaken on 20-22 November 2023. The flora recorded from the field survey is provided in Appendix D The portion of flora collected and identified was considered moderate, based on largely degraded survey area, survey effort and timing. The Basic fauna survey aimed to map habitat and identify conservation significant species that may be present. An opportunistic species inventory was recorded however many cryptic species would not have been identified during a basic survey and seasonal variation within species often requires surveys at a particular time of the year. Due to the degraded nature of the survey area this is not considered a significant constraint.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	The survey area was entirely accessible and was accessed by foot.
Mapping reliability	Minor	The vegetation types were mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1979) and field data. Data were recorded in the field using hand-held GPS tools (e.g. Samsung tablet and Garmin GPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers, including tree canopies. The Garmin GPS units used for this survey are accurate to within ±5 metres on average. Therefore, the data

Aspect	Constraint	Comment
		points consisting of coordinates recorded from the GPS may contain minor inaccuracies.
Timing/weather/season/cycle	Nil	The field survey was undertaken in spring 2023. This is within the recommended survey timing for flora and vegetation surveys within the South-West botanical province (EPA, 2016). In the three months prior to the survey (August-October) 211 mm of rainfall was recorded. This total is less than the long-term average for the same period (August - October; 233.5 mm) (BoM 2023), this is not considered to be a limitation. The weather for all fauna surveys was clear and warm.
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	The majority of the survey area has been subject to historical disturbances such as clearing and weeds. These disturbances did not impact the survey.
Resources	Nil	Adequate resources were employed during the field surveys. Six person days were spent undertaking the survey.
Access restrictions	Nil	There were no access restrictions within the survey area.
Experience levels	Nil	The senior ecologist and environmental scientist who executed the survey are practitioners suitably qualified and experienced in the field. Senior ecologist Erin Lynch has more than 15 years experience undertaking flora and fauna surveys in the region. Graduate Environmental scientist Kiara De Langrafft has more than 2 years' experience undertaking flora and fauna surveys in the south-west of WA.

3. Desktop assessment

3.1 Climate

The Bunbury area experiences a Mediterranean climate and is characterised by warm, dry summers and cool, wet winters. Rainfall is largely received during the winter months as a result of cold fronts that regularly cross the South West coast. The closest BoM weather station is Bunbury (site number 009965) (BoM 2023).

Climatic data from this site indicates the mean maximum temperature of the area ranges from 17.3 °C in July to 30 °C in February and the mean minimum temperature ranges from 7.3 °C in July to 15.9 °C in February. The mean annual rainfall is 726.3 mm with an average of 83.6 rain days per year (BoM 2023). In the three months prior to the survey (August-October) 211 mm of rainfall was recorded. This total is is less than the long-term average for the same period (August - October; 233.5 mm) (BoM 2023).

3.2 Landforms and soils

The Swan Coastal Plain is comprised of five major geomorphological units, which lie more or less parallel to the coast, being the Quindalup, Spearwood and Bassendean Dunes, the Pinjarra Plain and the Ridge Hill Shelf (McArthur and Bettenay 1960, Churchwood and McArthur 1980). The survey area lies within the Bassendean Dune and Pinjarra Plain elements, which are broadly described as:

– Bassendean dune and sandplain system: Pleistocene sand dunes with very low relief, leached grey siliceous sand intervening sandy and clayey swamps and gently undulating plains. These occur immediately west of, and partly overlie, the Pinjarra Plain
– Pinjarra Plain: Broad low relief plain west of the foothills, comprising predominantly Pleistocene fluvial sediments and some Holocene alluvium associated with major current drainage systems. Major soils are naturally poorly drained with many swamps.

The DAFWA (2007) soil mapping indicates there are seven different soil types within the survey area which are listed and described in Table 4.

Table 4 Soil units occurring within the survey area (DAFWA 2007)

Unit	Description
213Pj__P1b	Flat to very gently undulating plain with deep acidic mottled yellow duplex (or effective duplex) soils. Moderately deep pale sand to loamy sand over clay: imperfectly drained and moderately susceptible to salinity in limited areas.
213Pj__P3	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 to clay loam surface horizons.
212Bs__B2	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.
212Bs__B3	Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam.
212Bs__B4	Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan.
213PjSWP6c	Very gently undulating alluvial terraces and fans. Moderate to moderately well drained uniform friable brown loams, or well structured gradational brown earths.
213PjSWP10	Gently undulating to flat terraces adjacent to major rivers, but below the general level of the plain, with deep well drained uniform brownish sands or loams subject to periodic flooding.

3.3 Wetlands and watercourses

The Preston River runs along the eastern border of the survey area. The survey area occurs extensively within a low-lying palusplain, which is seasonally inundated or has a high water table during winter. The EPBC Act PMST did not identify any wetlands of international importance (Ramsar wetland) or Nationally Important Wetlands within a 5 km buffer of the survey area.

The Geomorphic Wetlands Swan Coastal Plain dataset (Hill *et al.* 1996) identified the survey area intersects with two multiple use wetlands (ID 14329 and 15450), two conservation class wetlands (ID 14516 and 14501) and two areas not assessed (including a sumpland and artificial lake) (ID 1319 and 1321) (Figure 2b, Appendix A).

3.4 Land use

3.4.1 DBCA managed lands

There are no DBCA managed conservation areas within or in proximity to the survey area.

3.4.2 Environmentally sensitive areas

Two Environmentally Sensitive Areas (ESA's) intersect the survey area. The ESA's are located along the north western boundary and eastern boundary of the survey area. Both ESA's appear to be associated with the two conservation class wetlands that intersect the survey area, which includes the Preston River (ID 14516 and 14501).

3.5 Regional biogeography

The survey area is situated in the Southwest Botanical Province of WA (Beard 1979) within the SCP (SWA) bioregion and the Perth (SWA2) subregion as described by the Interim Biogeographic Regionalisation of Australia (IBRA) (DEE 2016a).

The SCP bioregion is a low lying coastal plain, mainly covered with woodlands. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats and costal limestone. Heath and/or Tuart woodlands occur on limestone, *Banksia* and Jarrah-*Banksia* woodlands on Quaternary marine dunes of various ages and Marri on colluvial and alluvial soils. The subregion also includes a complex series of seasonal wetlands (Mitchell *et al.* 2002).

3.6 Broad vegetation mapping

3.6.1 Vegetation associations

Broad scale (1:250,000) pre-European vegetation mapping of the area has been completed by Beard (1979) at an association level. The survey area intersects two vegetation associations:

– Vegetation association 1000: Mosaic: Medium forest; Jarrah-Marri/Low woodland; Banksia/Low forest; Teatree (*Melaleuca* spp.)
– Vegetation association 1182: Medium woodland; *Eucalyptus rudis* and *Melaleuca rhaphiophylla*

The pre-European mapping has been adapted and digitised by Shepherd *et al*. (2002). The extent of the vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by the DBCA (latest update March 2019 – GoWA 2019b). As shown in Table 5, the current extents of vegetation association 1000 and 1182 are less than 30 % of their pre-European extent at the IBRA Bioregion, IBRA subregion and within the Local Government Authority (LGA) levels.

Table 5 Extents of vegetation associations mapped within the survey area (GoWA 2019b)

Vegetation Association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed land (proportion of Current Extent)
Swan Coastal Plain IBRA Bioregion		1,501,221.93	578,997.37	38.57	38.47
1000	State: WA	99,835.86	27,768.84	27.81	18.64
	IBRA Bioregion: Swan Coastal Plain	94,175.31	24,869.20	26.41	19.18
	Sub-region: Perth	94,175.31	24,869.20	26.41	19.18
	LGA: City of Bunbury	2,171.67	621.00	28.60	2.12
1182	State: WA	23,437.06	6,133.59	27.5	55.33
	IBRA Bioregion: Swan Coastal Plain	12,309.34	1,400.60	11.38	6.10
	Sub-region: Perth	12,309.34	1,400.60	11.38	6.10
	LGA: City of Bunbury	280.10	86.93	31.03	-

Regional vegetation for the Swan Coastal Plain (at vegetation complex level) was mapped by Heddle *et al*. (1980) and updated and extended by Webb *et al*. (2016). The mapping indicates that two vegetation complexes are present within the survey area:

– Southern River Complex – Open woodland of *Corymbia calophylla* (Marri) – *Eucalyptus marginata* (Jarrah) – *Banksia* species on elevated areas and a fringing woodland of *Eucalyptus rudis* (Flooded Gum) – *Melaleuca rhaphiophylla* (Swamp Paperbark) along streams. South of the Murray River *Agonis flexuosa* (Peppermint) occurs in association with the Flooded Gum and Swamp Paperbark.
– Swan Complex – Fringing woodland of *Eucalyptus rudis* (Flooded Gum) – *Melaleuca rhaphiophylla* (Swamp Paperbark) with localised occurrence of low open forest of *Casuarina obesa* (Swamp Sheoak) and *Melaleuca cuticularis* (Saltwater Paperbark).

GoWA (2018c) assessed the vegetation complexes against presumed pre-European extents within the SWA IBRA Bioregion (Table 6) and LGA levels (Table 7). The current extents of the vegetation complexes occurring within the survey area are less than 20 % of the pre-European distribution within the SWA IBRA Bioregion and less than 30% within the LGA.

Table 6 Extent of vegetation complexes on the Swan Coastal Plain mapped within the survey area (GoWA 2019c)

Vegetation Complex	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed lands
Southern River Complex	58,781.48	10,832.18	18.43	1.18
Swan Complex	15,194.13	2,062.03	13.57	0.37

Table 7 Extent of vegetation complexes within the Local Government Areas mapped within the survey area (GoWA 2019c)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	% of pre-European extent	Proportion of the vegetation complex within the LGA %	Vegetation complex
Southern River Complex	City Bunbury	2,205.16	635.67	28.83	3.75
Swan Complex	City of Bunbury	305.61	88.07	28.82	2.01

3.7 Significant ecological communities

A search of the EPBC Act PMST identified five EPBC Act-listed TECs potentially occurring within 5 km of the survey area. Sixteen TECs and PECs were identified in a search of the DBCA TEC/PEC database as shown on Figure 2c, Appendix A. Two TECs/PECs (or their buffers) intersect the survey area: Banksia dominated woodlands of the Swan Coastal Plain and Herb Rich Shrublands in Clay Pans (FCT08).

Table 8 lists the TECs and PECs identified by the desktop searches of the survey area.

Table 8 Threatened and Priority Ecological Communities identified in the desktop searches of the survey area

Community type	EPBC Act	BC Act/ DBCA	Description
Banksia woodlands of the Swan Coastal Plain (TEC) Banksia dominated woodlands of the Swan Coastal Plain IBRA region (PEC)	Endangered	Priority 3	The ecological community is a woodland associated with the Swan Coastal Plain. A key diagnostic feature is a prominent tree layer of Banksia, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range (TSSC 2016).
Coastal shrublands on shallow sands (SCP29a)		Priority 3	Mostly heaths on shallow sands over limestone close to the coast. No single dominant but important species include *Spyridium globulosum, Rhagodia baccata*, and *Olearia axillaris*.
Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. (1994))	Critically Endangered	Endangered	The shrublands or open woodlands of this community are inundated for longer periods and have lower species richness and numbers of weed taxa than the other clay pan types. Sedges including *Chorizandra enodis, Cyathochaeta avenacea, Lepidosperma longitudinale* and *Leptocarpus coangustatus* are more common in this community. Shrubs including *Hakea varia, Melaleuca viminea* and *Eutaxia virgata* are common.
Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Critically Endangered	Endangered	The community can occur under a shrub layer comprising *Melaleuca viminea, M. osullivanii, M. cuticularis* or *Casuarina obesa* or other shrubs but can also occur as woodlands or herblands. Some areas such as where *Melaleuca cuticularis* or *Casuarina obesa* occur as an overstorey may be saline for part of the year due to evaporation resulting in increased salinity. A suite of herbs such as *Philydrella pygmaea, Brachyscome bellidioides, Centrolepis aristata, Centrolepis polygyna, Pogonolepis stricta* and *Cotula coronopifolia*; frequently occur in the community. Species such as *Angianthus drummondii, Eryngium pinnatifidum subsp. palustre* and *Blennospora drummondii* occur in low frequency

Community type	EPBC Act	BC Act/ DBCA	Description
Herb Rich Shrublands in Clay Pans (SCP08)	Critically Endangered	Endangered	This vegetation community type occurs in low lying flats with a clay impeding layer allowing seasonal inundation. While aquatic annuals are common. This vegetation community type is dominated by one or more of the shrubs: *Viminaria juncea, Melaleuca viminea, M. lateritia, broom bush, Kunzea micrantha* or *K. recurva* with occasional emergents of *Eucalyptus wandoo*. Species such as *Hypocalymma angustifolium* (white myrtle), *Acacia lasiocarpa var. bracteolata* long peduncle variant (G. J. Keighery 5026) and *Verticordia huegelii* (variegated featherflower) occur at moderate frequencies. This vegetation community type has a high percentage of weeds and appears to be the clay pan vegetation community type that has the greatest disturbance.
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Priority 3	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).
Tuart (*Eucalyptus gomphocephala*) woodlands and Forests of the Swan Coastal Plain (TEC) Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain (PEC)	Critically Endangered	Priority 3	Mostly confined to Quindalup Dunes and Spearwood Dunes from Jurien Bay to the Sabina River, with outliers along some rivers. Tuart is the key dominant canopy species however Tuart communities comprise a variety of flora and fauna assemblages. Flora commonly occurring with Tuart include *Agonis flexuosa, Banksia attenuata, B. grandis, Allocasuarina fraseriana, Xylomelum occidentale, Macrozamia riedlei, Xanthorrhoea preissii, Spyridium globulosum, Templetonia retusa* and *Diplolaena dampieri*
Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands (SCP25) (Can form a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC or the Tuart Woodlands of the Swan Coastal Plain PEC)	Endangered (Part)	Priority 3	Woodlands of *Eucalyptus gomphocephala - Agonis flexuosa* south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than tuart were occasionally recorded, including *Corymbia calophylla* at Paganoni block and *Eucalyptus decipiens* at Kemerton. Occasionally dominants other than tuarts were recorded (*Corymbia calophylla and Eucalyptus decipiens*) however tuarts are emergent nearby. Banksias found in this community include *Banksia attenuata, B. grandis* and *B. littoralis*. Tuart formed the overstorey nearby however.
Quindalup *Eucalyptus gomphocephala* and / or *Agonis flexuosa* woodlands (SCP30b) (Can form a component of the Tuart Woodlands of the Swan Coastal Plain PEC)		Priority 3	This community is dominated by either Tuart or *Agonis flexuosa*. The presence of *Hibbertia cuneiformis, Geranium retrorsum* and *Dichondra repens* differentiate this group from other Quindalup community types. The type is found from the Leschenault Peninsular south to Busselton

Community type	EPBC Act	BC Act/ DBCA	Description
Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Critically Endangered	Endangered	The community occurs on skeletal soils that have shallow microtopography and the habitat is the most rapidly drying of the four clay pans identified in Gibson et al. (1994). Shrubs in the community include *Hakea sulcata, Hakea varia, Pericalymma ellipticum* and *Verticordia densiflora*. Herbs and sedges that are also common include *Schoenus rigens, Aphelia cyperoides, Centrolepis aristata, Schoenolaena juncea, Drosera gigantea* subsp. *gigantea* and *Drosera menziesii* subsp. *menziesii*
Southern *Banksia attenuata* woodlands	Endangered	Priority 3	Southern *Banksia attenuata* woodlands ('community type 21b') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) This community is restricted to sand sheets at the base of the Whicher Scarp, the sand sheets on elevated ridges or the sand plain south of Bunbury. Structurally, this community type is normally *Banksia attenuata* or *Eucalyptus marginata – B. attenuata* woodlands. Common taxa include *Acacia extensa, Jacksonia* sp. Busselton, *Laxmannia sessiliflora*, *Lysinema ciliatum* and *Johnsonia acaulis*.
Low lying *Banksia attenuata* woodlands or shrublands	Endangered	Priority 3	Low lying *Banksia attenuata* woodlands or shrublands ('floristic community type 21c') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) This type occurs sporadically between Gingin and Bunbury and is largely restricted to the Bassendean system. The type tends to occupy lower lying wetter sites and is variously dominated by *Melaleuca preissiana, Banksia attenuata*, *B. menziesii, Regelia* ciliata*, Eucalyptus marginata* or *Corymbia calophylla*. Structurally, this community type may be either a woodland or occasionally shrubland.
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. (1994))	Endangered	Critically Endangered	The community occurs in linear damplands and occasionally sumplands, between Holocene dunes. Typical and common native species are the shrubs *Acacia rostellifera, Acacia saligna, Xanthorrhoea preissii*, the sedges *Machaerina juncea, Ficinia nodosa, Lepidosperma gladiatum,* and the grass *Poa porphyroclados*. Several exotic weeds are found in this community but generally at low cover values.
Shrublands on calcareous silts of the Swan Coastal Plain (floristic community type 18 as originally described in in Gibson et al. (1994))		Vulnerable	A suckering form of *Acacia saligna* (orange wattle), *Melaleuca viminea* (mohan), *Melaleuca teretifolia* (banbar), *Hakea varia* (variable-leaved hakea), *Xanthorrhoea preissii* (balga) and *Leptomeria ellytes* are common in the shrub layer, with sedges including *Lepidosperma longitudinale* (pithy sword-sedge) and *Gahnia trifida* (coast sawsedge), and a suite of herbs including *Meionectes tenuifolia* a priority 3 flora taxon also common.
Corymbia calophylla woodlands on heavy soils of the southern Swan Coastal Plain (FCT1b)		Vulnerable	The community has been recorded from heavy fertile soils of the southern Swan Coastal Plain south of Dardanup. It consists largely of *Corymbia calophylla* (marri) forests and woodlands. *Eucalyptus marginata* (jarrah) is also common in the tree layer. Common understorey species include *Acacia extensa* (wiry wattle), *Gompholobium polymorphum, Billardiera variifolia, Hibbertia hypericoides* (yellow buttercups), *Hypocalymma angustifolium* (white myrtle) and *Xanthorrhoea preissii* (balga) over a rich herb layer including *Scaevola calliptera, Agrostocrinum scabrum* (blue grass lily), *Austrostipa semibarbata, Dampiera linearis* (common dampiera), *Mesomelaena tetragona* (semaphore sedge), *Morelotia octandra* and *Lomandra purpurea* (purple mat rush).

Community type	EPBC Act	BC Act/ DBCA	Description
Corymbia calophylla – *Xanthorrhoea preissii* woodlands and shrublands, SCP (FCT3c)	Endangered	Critically Endangered	The community occurs on heavy soils of the eastern side of the southern Swan Coastal Plain, generally between Bullsbrook and Stratham. The community is usually dominated by *Corymbia calophylla* (marri) and *Xanthorrhoea preiss*sii (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.
Empodisma peatlands of southwestern Australia.	Endangered		The ecological community described in the Conservation Advice is the assemblage of plants, animals and other organisms associated with a type of freshwater, peat-based wetland (including within damplands, troughs, paluslopes, palusplains and palusmonts floodplains as per Semeniuk 1987) that is found in the high rainfall Province of the south-west of Western Australia (Hopper & Gioia 2004; BOM 2022). It is typically a sedgeland to shrubland vegetation complex on peaty substrates that almost always includes the perennial grass-like twig rush *Empodisma gracillimum* (tanglefoot). Empodisma peatlands provide habitat for a diverse range of hydrophilic species, including threatened, regionally endemic, and relictual flora and fauna species (Horwitz 1997; Lyons et al. 2000; Tauss 2000; Semeniuk et al. 2011).
Honeymyrtle shrubland on limestone ridges of the SCP Bioregion	Critically Endangered	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.

3.8 Flora

3.8.1 Flora diversity

The DBCA Dandjoo database search identified 362 flora taxa representing 64 families previously recorded within 5 km of the survey area (DBCA 2023). This total comprised 314 native taxa and 48 naturalised (introduced) taxa. Dominant families recorded included Fabaceae (45 taxa), Myrtaceae (32 taxa), Orchidaceae (32 taxa) and Cyperaceae (29 taxa). The Dandjoo database search is provided in Appendix C.

3.8.2 Significant flora

Desktop searches of the EPBC Act PMST (DCCEEW 2024), Dandjoo (DBCA 2023), DBCA TPFL and WAHERB databases identified the presence/potential presence of 59 significant flora species occurring within 5 km of the survey area. The desktop searches recorded:

– 21 Threatened taxa listed under the EPBC Act and/or BC Act
– Four Priority 1

– Six Priority 2
– 15 Priority 3
– 13 Priority 4

The locations of conservation significant flora registered on the DBCA databases are mapped on Figure 2c (Appendix A). A list of the significant species and an assessment of the likelihood of the species occurring within the survey area is provided in Appendix D.

3.9 Fauna

3.9.1 Fauna diversity

The DBCA Dandjoo database (DBCA 2023) identified 77 terrestrial vertebrate fauna species previously recorded within 5 km of the survey area. Of the 77 fauna species previously recorded, 71 are native species and 6 are naturalised (introduced) species. The Dandjoo database search is provided in Appendix D.

3.9.2 Significant fauna

Searches of the EPBC Act PMST (DCCEEW 2024), Dandjoo database (DBCA 2023) and DBCA database search identified the presence/potential presence of 28 conservation significance fauna within the survey area. This total does not include those species that are exclusively marine as no marine habitat is present within the survey area. A likelihood of occurrence assessment for conservation significant fauna identified by the desktop is provided in Appendix C.

3.9.3 Black Cockatoo records

Available Black Cockatoo mapping of confirmed roosting and breeding areas (GoWA 2020) identified six confirmed Carnaby's Cockatoo roosting areas within 5 km of the survey area. There are no confirmed Black Cockatoo breeding areas within 20 km of the survey area.

4. Field survey results

4.1 Vegetation and flora

4.1.1 Vegetation types

Seven broad vegetation types not including cleared areas were identified across the entire survey areas (both project footprints and site walkover areas). A large proportion of the areas surveyed lacked native vegetation and comprised of cleared areas (17%) or weedy grasslands with isolated trees (28.5%). Where remnant vegetation remains, the understorey is largely altered and is completely or almost completely lacking native species and dominated by introduced grasses and herbs.

Within the Project Area (project footprint and road infrastructure areas), the vegetation was largely cleared or altered. Both Project Areas 1 and 2 comprise predominantly of previously cleared weedy grassland with isolated trees and small patches of highly degraded *Eucalyptus rudis* (Flooded Gum) / *Agonis flexuosa* (Peppermint) Woodland to Open Forest which lacks native understorey. A very small patch of *Agonis flexuosa* Woodland and Planted *Eucalyptus* sp. was present in Project Area 2. A small area of *Corymbia calophylla* Open Forest overlapped the western end of the road infrastructure area of Project Area 2.

The remnant vegetation within site walkover area 1 comprises *Agonis flexuosa* Woodland with a small patch of *Melaleuca rhaphiophylla* Woodland along the southern boundary. The vegetation provides good canopy cover but lacked structural diversity with a bare understorey dominated by introduced grasses and herbs. The remnant vegetation remaining in site walkover area 2 consisted of *Corymbia calophylla* Open Forest near the South Western Highway, *Corymbia calophylla* and *Eucalyptus rudis* Open Forest along Preston River, *Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest and Weedy Grassland with isolated trees associated with the previously cleared paddocks. The remnant vegetation was patchy, ranging from Good to Completely Degraded condition.

The vegetation types identified in the Project Areas and site walkover areas are summarised in Table 9 and mapped in Figure 4, Appendix A.

Table 9 Description of the vegetation types identified within the survey areas

Vegetation Description	Project Area location and extent (ha)	Photograph
VT1: *Eucalyptus rudis subsp. rudis / Agonis flexuosa* Woodland to Open Forest *Eucalyptus rudis* subsp. *rudis* and *Agonis flexuosa* woodland to open forest with occasional *Corymbia calophylla* and *Melaleuca rhaphiophylla* over a predominantly cleared understorey dominated by introduced grasses and herbs including **Zantedeschia aethiopica, *Asparagus asparagoides, *Avena barbata*, **Cenchrus clandestinus, *Ehrharta calycina, *E. longifolia, *Rumex crispus* and **Arctotheca calendula.*	Project Area 1: – 0.13 ha project footprint – 0.11 ha road infrastructure area Project Area 2 – 0.74 ha project footprint – 0.15 ha road infrastructure area – 4.26 ha site walkover area	
VT2: *Corymbia calophylla* and *Eucalyptus rudis* subsp. *rudis* Open Forest *Corymbia calophylla and Eucalyptus rudis subsp. rudis open forest with occasional Agonis flexuosa over Pteridium esculentum* and **Watsonia meriana* low open shrubland over a grassland and open herbland dominated by introduced species. This vegetation type grows in association of the Preston River which is also mapped as a Conservation Category Wetland (14501).	Project Area 2: – 0.01 ha road infrastructure area – 5.41 ha site walkover area	

Vegetation Description	Project Area location and extent (ha)	Photograph
VT3: *Corymbia calophylla* Open Forest *Corymbia calophylla* open forest over *Agonis flexuosa*, *Banksia attenuata* and *Nuytsia floribunda* woodland over *Kunzea glabrescens* and *Xanthorrhoea brunonis* scattered shrubs over *Dasypogon bromeliifolius*, *Lepidosperma* sp. and **Sonchus asper* herbland and grassland of introduced species (**Ehrharta calycina, *Briza maxima, *Bromus diandrus*).	<u>Project Area 2:</u> – 0.14 ha road infrastructure area – 1.94 ha site walkover area	
VT4: *Melaleuca rhaphiophylla* Woodland *Melaleuca rhaphiophylla* woodland with occasional *Agonis flexuosa* over *Lepidosperma longitudinale* scattered sedges over a groundcover dominated by introduced grasses and herbs. This vegetation type grows in association with a mapped Conservation Category Wetland (14516).	<u>Project Area 1:</u> – 0.16 ha site walkover area	

Vegetation Description	Project Area location and extent (ha)	Photograph
VT5: *Agonis flexuosa* Woodland *Agonis flexuosa* woodland with occasional *Corymbia calophylla* over *Banksia attenuata, Kunzea glabrescens* and *Melaleuca preissiana scattered trees/shrubs* over *scattered Macrozamia riedlei* over a groundcover dominated by introduced grasses and herbs. This vegetation type grows in association with a mapped Conservation Category Wetland (14516).	Project Area 1: – 2.03 ha site walkover area Project Area 2: – 0.10 ha project footprint	
VT6: *Weedy grassland with isolated trees* Open paddocks and previous cleared areas dominated by introduced grasses and herbs with scattered clumps or isolated trees of *Eucalyptus rudis subsp. rudis, Corymbia calophylla* and/or *Agonis flexuosa.*	Project Area 1: – 0.33 ha project footprint – 0.39 ha road infrastructure area – 0.51 ha site walkover area Project Area 2 – 0.26 ha project footprint – 0.88 ha road infrastructure area – 4.18 ha site walkover area	

Vegetation Description	Project Area location and extent (ha)	Photograph
VT7: *Planted Eucalyptus sp.* Planted *Eucalyptus* sp. with occasional *Agonis flexuosa* over weedy grasses and herbs.	<u>Project Area 2:</u> – 0.12 ha project footprint	
Cleared Previously cleared areas, including roads, tracks and other infrastructure.	<u>Project Area 1:</u> – 1.59 ha project footprint – 0.15 ha road infrastructure area – 0.88 ha site walkover area <u>Project Area 2</u> – 2.24 ha project footprint – 1.60 ha road infrastructure area – 0.16 ha site walkover area	

4.1.2 Vegetation condition

The entire footprint of Project Area 1 has been cleared or contains some remnant vegetation in Completely Degraded condition. Approximately 98% of Project Area 2 has either been cleared or comprises remnant vegetation in Completely Degraded condition. A small area of vegetation rated as Good to Degraded condition is present within the road infrastructure area of Project Area 2. The structure and composition of the remaining vegetation is largely altered and completely or almost completely lacks native understorey species due to historic clearing and current land use including grazing, tracks, edge effects, kangaroo and rabbit populations and weed invasion.

The remnant vegetation within site walkover area 1 is in Degraded condition. The tree canopy is dense however the understorey is sparse and is dominated by a groundcover of introduced grasses and herbs.

The vegetation present within site walkover area 2 ranges from Good to Completely Degraded condition. The majority of the area (87%) is rated as Degraded to Completely Degraded condition and can be described as parkland cleared The flora is dominated by introduced grasses and herbs with isolated or small patches of native trees and shrubs. The canopy cover of vegetation along the Preston River is dense however the understorey is sparse and also dominated by weeds. The vegetation adjacent to the South Western Highway is in Good to Degraded condition and somewhat retains basic vegetation structure.

A summary of the vegetation condition for the surveyed Project Areas and site walkover footprints is provided in Table 10 and vegetation condition mapping in Figure 5, Appendix A.

Table 10 Extent (in hectares (ha)) and percentage cover (%) of vegetation condition mapped within each survey area

Vegetation condition	Location 1			Location 2		
	Project footprint	Road infrastructure	Site walkover	Project footprint	Road infrastructure	Site walkover
Good-Degraded	-	-	-	-	0.14 (6%)	1.94 (12%)
Degraded	-	-	2.20 (61%)	-	-	-
Degraded-Completely Degraded	-	-	-	-	-	5.22 (33%)
Completely Degraded	0.46 (22%)	0.50 (77%)	0.51 (14%)	1.22 (35%)	1.03 (41%)	8.64 (54%)
Cleared	1.59 (78%)	0.15 (23%)	0.88 (25%)	2.24 (65%)	1.33 (53%)	0.16 (1%)
Total	**2.05**	**0.65**	**3.59**	**3.46**	**2.50**	**15.96**

4.1.3 Significant ecological communities

Based on the results of the desktop searches, dominant species, landform features and field observations no EPBC or state listed TECs, or DBCA listed PECs were identified within the proposed Project Areas or adjacent site walkover areas. Vegetation recorded within the Project Areas does not meet the structural or compositional criteria to represent any of the TEC or PECs which have been identified within the study area, specifically: Banksia dominated woodlands of the Swan Coastal Plain and Herb Rich Shrublands in Clay Pans (FCT08).

4.1.4 Flora diversity

Project area 1

Twenty-seven flora taxa (including subspecies and varieties) representing twelve families were recorded from Project Area 1 (not including the site walkover area) during the field survey. This total comprised four native taxa and 23 introduced flora taxa.

Dominant families recorded from the Project Area included Poaceae (10 taxa), Asteraceae (3 taxa), Fabaceae (3 taxa) and Myrtaceae (3 taxa).

Project area 2

Sixty-two flora taxa (including subspecies and varieties) representing 28 families were recorded from Project Area 2 (not including the site walkover area) during the field survey. This total comprised 27 native taxa and 35 introduced taxa.

Dominant families recorded from the Project Area included Poaceae (10 taxa), Fabaceae (8 taxa), Myrtaceae (8 taxa) and Asteraceae (6 taxa).

The flora species list recorded during the survey is provided in Appendix D.

4.1.5 Significant flora

No threatened flora listed under the EPBC Act or BC Act or Priority flora listed by the DBCA was recorded from the Project Areas.

Likelihood of occurrence assessment

Based on previous records, habitat requirements, efficacy of the survey, intensity of the survey, flowering times and significantly altered / degraded condition of the site, only one of the significant flora identified within the desktop searches is considered as possible to occur within either Project Area . The species *Eucalyptus rudis* subsp. *cratyantha* (Priority 4) is known to occur in the Bunbury region and has been recorded in a previous survey adjacent to the Project Area (GHD 2021). Recent taxonomic re assessment of the species, indicates that plants in the Bunbury region are an intergrade between *Eucalyptus rudis* subsp*. cratyantha* and the common species *Eucalyptus rudis* subsp*. rudis*, with subsp*. cratyantha* confined to a near-coastal distribution in the Cape Naturaliste area (Mike Hislop, WA Herbarium, pers comm. 2020)*.* The specimens in the Project Areas were consistent with the description for *Eucalyptus rudis* subsp. *rudis*. and were not considered representative of the priority 4 listed flora species *Eucalyptus rudis* subsp. *cratyantha.*

The likelihood of occurrence assessment for significant flora occurring within the Project Areas is provided in Appendix D.

4.1.6 Introduced flora

Of the 23 introduced taxa recorded within Project Area 1 and 35 within Project Area 2, two species are listed as a Declared Pest under the *Biosecurity and Management Act 2007; *Zantedeschia aethiopica* (Arum lily) and **Asparagus asparagoides* (Bridal creeper). Bridal creeper is also listed as a Weed of National Significance (WoNS). Arum lily was a commonly occurring weed which dominated the understorey of parts of the Project Areas and site walkover areas.

Also noted during the survey was the presence of the introduced species *Rubus* sp. (Blackberry) within site walkover area 2. Blackberry is also listed as a Declared Pest under the *Biosecurity and Management Act 2007* and a WoNS.

The remaining introduced taxa are considered environmental weeds and all have been previously recorded on the Swan Coastal Plain. The locations of the Declared Pests/WoNS recorded within the Project Areas is shown on Figure 5, Appendix A.

4.2 Fauna

4.2.1 Broad fauna habitat types

Seven broad habitat types were identified across the entire survey area (both Project Areas and site walkover areas) based on the predominant landforms, soil and vegetation structure in the area (not including cleared areas). These habitat types generally correspond to the vegetation types outlined in Section 4.1.1 and are listed as follows:

– Flooded Gum / Peppermint Open Forest
– Marri and Flooded Gum Open Forest

– Marri Open Forest
– Melaleuca Woodland
– Peppermint Woodland
– Completely Degraded Grassland
– Planted Eucalypts.

Project Area 1 is predominantly cleared and dominated by introduced grasses and herbs. There are two small isolated patches of the habitat type Flooded Gum / Peppermint Open Forest. Both patches are parkland cleared and in completely degraded condition.

Project Area 2 has also been predominantly cleared and/or contains a ground cover dominated by introduced grasses and herbs with isolated native trees. Much of the area comprises established roads/tracks, infrastructure and farmland. The habitat types remaining in Project Area 2 include Flooded Gum / Peppermint Open Forest, Peppermint Woodland, Planted Eucalypts and Marri Open Forest all of which are in Degraded to Completely Degraded condition and lack native understorey except a small pocket of Marri Open Forest in Good to Degraded condition.

The habitat types mapped within site walkover area 1 comprise Peppermint Woodland, a small patch of Melaleuca Woodland and Completely Degraded Grassland. The habitat types mapped within site walkover area 2 comprise Marri Open Forest near the South Western Highway, Marri and Flooded Gum Open Forest along Preston River, Flooded Gum/Peppermint Woodland to Open Forest and Completely Degraded Grassland with isolated trees.

A description of the fauna habitat types is provided in Table 11. Mapping of the fauna habitat types within the survey areas is shown on Figure 6, Appendix A. An assessment of the habitat significance for each discrete vegetation patches in Figure 4 is provided in

Table 12.

Table 11 Fauna habitat types mapped within the survey areas

Broad fauna habitat types	Photograph	Project Area location and extent (ha)
Flooded Gum / Peppermint Open Forest Woodland to open forest of Flooded gum (*Eucalyptus rudis subsp. rudis)* and Peppermint *(Agonis flexuosa)* with *occasional* Marri *(Corymbia calophylla)* and *Melaleuca rhaphiophylla* over a predominantly cleared understorey dominated by introduced grasses and herbs. This habitat type contains low structural diversity and reduced micro-habitat types including tree hollows, fallen logs and branches, and sandy soil. Lack of understorey provides limited habitat for ground-dwelling species. Disturbances included previous clearing of undergrowth, grazing, weeds and tracks. Corresponds with vegetation type: VT1 Habitat provides scattered foraging species (marri) and potential roosting and breeding habitat for Black Cockatoos. May provide suitable habitat for Western ringtail possum and South-western Brush-tailed Phascogale. The Peregrine Falcon may opportunistically utilise this habitat for foraging.		Project Area 1: – 0.13 ha project footprint – 0.11 ha road infrastructure area Project Area 2 – 0.74 ha project footprint – 0.15 ha road infrastructure area – 4.26 ha site walkover area
Marri and Flooded Gum Open Forest Open forest dominated by Marri and Flooded gum with occasional Peppermint over an understorey dominated by *Pteridium esculentum* and **Watsonia meriana* over introduced grasses and herbs occurring along the banks of Preston River. This habitat type contains limited structural diversity and reduced micro-habitat types due to previous clearing, grazing and weed invasion. Habitat provides tree hollows, fallen logs and branches, leaf litter, sandy soil and fresh water. Corresponds with vegetation type: VT2 This habitat provides suitable foraging, breeding and roosting habitat for Black Cockatoos. This habitat is also suitable for South-western Brush-tailed Phascogale, Quenda and Western False Pipistrelle. The Western Ringtail Possum may potentially utilise this habitat. The Peregrine Falcon would opportunistically utilise this habitat for foraging.		Project Area 2: – 0.01 ha road infrastructure area – 5.41 ha site walkover area

Broad fauna habitat types	Photograph	Project Area location and extent (ha)
Marri Open Forest Open forest of *Corymbia calophylla* over a woodland dominated by Peppermint, *Banksia attenuata* and *Nuytsia floribunda* over scattered shrubs of *Kunzea glabrescens* and *Xanthorrhoea brunonis* scattered shrubs over a herbland and grassland dominated by weeds. This habitat type contains low structural diversity and reduced micro-habitat types due to previous clearing, weed invasion and grazing. Microhabitats include tree hollows, fallen logs and branches, dense canopy, leaf litter and sandy soil. Lack of understorey provides limited habitat for ground-dwelling species. Corresponds with vegetation type: VT3 This habitat provides suitable foraging, breeding and roosting habitat for Black Cockatoos. This habitat is also suitable for South-western Brush-tailed Phascogale, Western ringtail possum, Quenda and Western False Pipistrelle. The Peregrine Falcon may opportunistically utilise this habitat for foraging.		Project Area 2: – 0.14 ha road infrastructure area – 1.94 ha site walkover area
Melaleuca Woodland Woodland of *Melaleuca rhaphiophylla* over a cleared understorey entirely dominated by introduced grasses and herbs. Suitable habitat for a range of terrestrial vertebrates associated with seasonal dampland areas, including amphibians. Corresponds with vegetation type: VT4 Limited habitat for ground dwelling species due to the lack of native understorey. The Peregrine Falcon may opportunistically utilise this habitat for foraging only.		Project Area 1: – 0.16 ha site walkover area

Broad fauna habitat types	Photograph	Project Area location and extent (ha)
Peppermint Woodland Woodland of Peppermint and occasional Marri over scattered trees/shrubs of *Banksia attenuata*, *Kunzea glabrescens*, *Melaleuca preissiana* and *Macrozamia riedlei* over a cleared understorey/groundcover dominated by introduced grasses and herbs. This habitat type contains low structural diversity and reduced micro-habitat types including low patches of thick leaf litter, some fallen logs and branches, occasional hollows, and dense upper canopy. Disturbances included previous clearing, grazing, and weeds. Corresponds with vegetation types: VT5 This habitat is suitable for Western Ringtail Possum, South-western Brush-tailed Phascogale, Western False Pipistrelle. The Western Brush Wallaby may potentially utilise this habitat occasionally. Contains scattered foraging species for Black Cockatoos.		Project Area 1: – 2.03 ha site walkover area Project Area 2: – 0.10 ha project footprint
Completely Degraded Grassland Previously cleared areas and open paddocks dominated by a grassland and herbland of introduced species with scattered clumps of *Juncus pallidus* sedges and scattered trees (Flooded gum / *Melaleuca rhaphiophylla)*. Corresponds with vegetation type: VT6 The Peregrine Falcon may opportunistically utilise this habitat for foraging only.		Project Area 1: – 0.33 ha project footprint – 0.39 ha road infrastructure area – 0.51 ha site walkover area Project Area 2 – 0.26 ha project footprint – 0.88 ha road infrastructure area – 4.18 ha site walkover area

Broad fauna habitat types	Photograph	Project Area location and extent (ha)
Planted Eucalypts Planted *Eucalyptus* sp. with occasional Peppermint over a cleared understorey dominated by introduced grasses and herbs. This habitat type lacks structural diversity and provides limited micro-habitat types due to previous clearing, weed invasion and grazing. Lack of understorey provides limited habitat for ground-dwelling species. Correspond vegetation type: VT7 The Peregrine Falcon may opportunistically utilise this habitat for foraging only. Contains low foraging value for Black Cockatoos.		<u>Project Area 2:</u> – 0.12 ha project footprint
Cleared Areas devoid of native vegetation. These areas primarily consisted of roads and dirt tracks.		<u>Project Area 1:</u> – 1.59 ha project footprint – 0.15 ha road infrastructure area – 0.88 ha site walkover area <u>Project Area 2</u> – 2.24 ha project footprint – 1.60 ha road infrastructure area – 0.16 ha site walkover area

Table 12 Habitat Significance of Vegetation Patches

Vegetation Patch Number (Figure 4)	Vegetation Type	Patch area (ha)	Native Vegetation area (ha)	Patch Quality	Habitat Significance
Project Area 1					
P1-1	Cleared	1.59	0.00	Cleared	Low habitat value – completely or almost completely devoid of native vegetation.
P1-2	*Eucalyptus rudis*/*Agonis flexuosa* Woodland to Open Forest	0.13	0.11	Completely degraded	Low habitat value – Small isolated pocket of *Eucalyptus rudis* and occasional *Agonis flexuosa* trees over weeds. No hollows present. Low value foraging habitat for Black Cockatoos.
P1-3	Weedy Grassland with Isolated Trees	0.33	0.03	Completely degraded	Low habitat value - completely or almost completely devoid of native vegetation. Occasional scattered shrub/trees (no hollows).
Project Area 1 – Road Infrastructure					
PR-1-1	Cleared	0.15	0.00	Cleared	Low habitat value – completely or almost completely devoid of native vegetation.
PR-1-2	*Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest	0.11	0.10	Completely Degraded	Moderate habitat value – Small patch of *Eucalyptus rudis* and *Agonis flexuosa*. Parkland cleared however is linked to similar vegetation along the South-western Hwy and provides suitable habitat for Western Ringtail Possum. Low value foraging habitat for Black Cockatoos.
PR-1-3	Weedy Grassland with Isolated Trees	0.39	0.00	Completely Degraded	Low habitat value – Completely cleared and dominated by grassy weeds.

Vegetation Patch Number (Figure 4)	Vegetation Type	Patch area (ha)	Native Vegetation area (ha)	Patch Quality	Habitat Significance
Project Area 2					
P2-1	Cleared	2.24	0.00	Cleared	Low habitat value – completely or almost completely devoid of native vegetation. Occasional isolated shrub/trees (three scattered potential breeding trees - two *Eucalyptus rudis* and one *Corymbia calophylla*. Two contain hollows but unsuitable for Black Cockatoo breeding.
P2-2	*Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest	0.74	0.44	Completely Degraded	Low to moderate habitat value – Small patch of *Eucalyptus rudis* and *Agonis flexuosa* trees that is parkland cleared. Five potential breeding trees present (*E. rudis*), none contain hollows. Not considered core foraging habitat for Black Cockatoos (*E. rudis* and Peppermints are considered low value). Lacks structural diversity. WRP may utilise this habitat as a linkage to surrounding patches of vegetation.
P2-3	Weedy Grassland with Isolated Trees	0.26	0.06	Completely Degraded	Low habitat value – Completely cleared and dominated by grassy weeds. No Black Cockatoo foraging or breeding habitat is present.
P2-4	*Agonis flexuosa* Woodland	0.10	0.08	Completely Degraded	Low habitat value – narrow section along a track that is predominantly cleared with scattered *Agonis flexuosa*. Western Ringtail Possum may utilise this habitat as a linkage to surrounding patches of vegetation. Considered low value foraging habitat for Black Cockatoos. No Black Cockatoo breeding habitat present.
P2-5	Planted *Eucalyptus* sp.	0.13	0.08	Completely Degraded	Low habitat value – Parkland cleared with planted *Eucalyptus* species. Considered low value

Vegetation Patch Number (Figure 4)	Vegetation Type	Patch area (ha)	Native Vegetation area (ha)	Patch Quality	Habitat Significance
					foraging habitat for Black Cockatoos. No Black Cockatoo breeding habitat present.
Project Area 2 – Road Infrastructure					
PR2-1	Cleared	1.06	0.00	Cleared	Low habitat value – completely or almost completely devoid of native vegetation (predominantly road/tracks).
PR2-2	Cleared	0.27	0.00	Cleared	Low habitat value – completely or almost completely devoid of native vegetation (predominantly road/tracks).
PR2-3	*Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest	0.15	0.10	Completely Degraded	Low to moderate habitat value – parkland cleared with mixed *Eucalyptus rudis* and *Agonis flexuosa* trees. Lacks structural diversity. Four potential Black Cockatoo breeding trees present (*E. rudis*) however none contain hollows. Low value foraging habitat for Black Cockatoos. Western Ringtail Possum may utilise this habitat as a linkage to surrounding patches of vegetation.
PR2-4	Weedy Grassland with Isolated Trees	0.42	0.05	Completely Degraded	Low habitat value – completely or almost completely devoid of native vegetation. Occasional isolated shrub/trees. No Black Cockatoo breeding habitat present.
PR2-5	Weedy Grassland with Isolated Trees	0.26	0.06	Completely Degraded	Low to moderate habitat value – completely or almost completely devoid of native vegetation. Occasional isolated trees. Four potential Black Cockatoo breeding trees present (all *Corymbia calophylla*), however none contain hollows. Marri trees provide good quality foraging habitat for Black Cockatoos.

Vegetation Patch Number (Figure 4)	Vegetation Type	Patch area (ha)	Native Vegetation area (ha)	Patch Quality	Habitat Significance
PR2-6	Weedy Grassland with Isolated Trees	0.19	0.03	Completely Degraded	Low habitat value – completely or almost completely devoid of native vegetation. Occasional isolated shrub/trees. No suitable foraging or breeding habitat for Black Cockatoo's.
PR2-7	*Corymbia calophylla* and *Eucalyptus rudis* Open Forest	0.01	0.01	Completely Degraded	Moderate habitat value – small patch of *Corymbia calophylla / Eucalyptus rudis* / *Agonis flexuosa.* One potential breeding tree (*Corymbia calophylla*) with no hollows. Individual Marri also provides suitable foraging habitat. Suitable habitat for Western Ringtail Possum which was recorded in the area. Links to larger adjacent areas of similar vegetation along Preston River.
PR2-8	*Corymbia calophylla* Open Forest	0.14	0.11	Good to Degraded	Moderate to high habitat value – Open forest of *Corymbia calophylla*. Weedy understorey with scattered natives. Provides suitable foraging habitat and potential breeding habitat for Black Cockatoos. Four potential breeding trees (all *Corymbia calophylla*) present, no hollows. Also suitable for the South-Western Brush-tailed Phascogale and Western Ringtail Possum which were both recorded in the area. Quenda and Western False Pipistrelle may also utilise this vegetation. Linkages to adjacent areas of continuous vegetation along the South-western Hwy.

4.2.2 Fauna diversity

Forty-two fauna species were recorded during the survey including 26 birds, nine mammals, six reptiles and one amphibian. Of the total records, eight species (seven birds and one mammal) were recorded from Project Area and 27 species (20 birds, six mammals and one reptile) were recorded from Project Area 2. The remaining species were recorded opportunistically in the site walkover areas. Five of the 42 species recorded during the survey are introduced species, including sheep, cat, European fox, laughing kookaburra and rabbit.

A full list of the fauna recorded during the survey is provided in Appendix E.

4.2.3 Significant fauna

During the survey, four significant fauna species were recorded. These are:

– Forest red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – listed Vulnerable under the EPBC Act/BC Act
– Baudin's cockatoo (*Zanda baudinii*) – listed Endangered under the EPBC Act/BC Act
– Western ringtail possum (*Pseudocheirus occidentalis*) – listed as Critically Endangered under the EPBC Act/BC Act
– South-west Brush-tailed phascogale (*Phascogale tapoatafa wambenger*) listed as a Conservation Dependent species under the BC Act.

Forest Red-tailed Black Cockatoo

The Forest Red-tailed Black Cockatoo is listed as Vulnerable under the EPBC Act and BC Act. This species is endemic to the south-west humid and sub-humid zones of WA (Mawson and Johnstone 1997). It inhabits dense Jarrah (*Eucalyptus marginata*), Karri (*E. diversicolor*) and Marri forests receiving more than 600 mm of average annual rainfall. They primarily feed on seeds of Jarrah and Marri in woodlands and forest, and edges of Karri forests, including Wandoo and Blackbutt. Also forages on *Allocasuarina* cones, Snottygobble (*Persoonia longiflora*) and Mountain Marri (*C. haematoxylon*). The Forest Red-tailed Black Cockatoo generally breed in woodland or forest but may also been in partially cleared woodland or forest, including isolated trees. They nest in hollows in live or dead trees of many eucalypt species such as Marri, Karri, Wandoo, Bullich, Blackbutt, Tuart and Jarrah (DAWE 2022).

Three individuals were observed during the survey. A pair were observed foraging in a Marri tree near the Preston River in site walkover area 2 and another heard calling from a Marri tree within the road infrastructure area of Project Area 1. The Forest Red-tailed Black Cockatoo observations are presented in Figure 6 (Appendix A). Foraging evidence (chewed marri nuts) (Plate 1) was observed throughout the survey areas except within Project Area 1.

Plate 1 Foraging attributed to the Forest Red-tailed Black Cockatoo

Baudin's Black Cockatoo

The Baudin's Cockatoo is listed Endangered under the EPBC Act and BC Act. They are endemic to the south-west of WA. During the breeding season (from October to January) the species nests in isolated pockets of the far south-west of WA within Jarrah, Marri and Karri forests which receive an average of 750 mm of rainfall annually. Breeding generally occurs in woodland or forest but may also occur in former woodland or forest now present as isolated trees within partially cleared parkland or farmland. Nesting occurs in hollows of live or dead Karri, Marri, Wandoo and Tuart trees. During the breeding season feeding primarily occurs in native vegetation, particularly Marri (DAWE 2022). The range then expands during the non-breeding season (from February) as flocks disperse to forage more widely, congregating on the central and northern parts of the Darling plateau, as far as Mundaring and Gidgegannup (DAWE 2022; Saunders 1974 and 1979).

Baudin's Cockatoo was heard calling during the survey and foraging evidence (chewed marri nuts) attributed to Baudin's Cockatoo was observed within site walkover area 2.

Western Ringtail Possum

The Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*) is listed as Critically Endangered under the EPBC Act and BC Act. Three WRP individuals (Plate 1), three dreys (Plate 2) and scats were recorded during the survey. During the nocturnal searches, one WRP was recorded in the Peppermint Woodland in site walkover area 1, another further south in the Marri Open Forest of site walkover area 2 and a third to the east in the Marri and Flooded Gum Open Forest near the Preston River in site walkover area 2. One drey was observed in the Peppermint Woodland in site walkover area 1 whilst the other two were recorded in a Peppermint tree in the Marri-Flooded Gum Open Forest in site walkover area 2. No individual WRP or dreys were recorded within the Project Areas 1 or 2.

The WRP observation locations are presented in Figure 6 (Appendix A). The fauna habitat Peppermint woodland is considered to be the core habitat for the Western Ringtail Possum however the Marri Open Forest, Marri and Flooded Gum Open Forest and Flooded Gum/Peppermint Open Forest also provide suitable habitat for this species.

Plate 2 Western Ringtail Possum individual

Plate 3 Western Ringtail Possum drey in Peppermint tree

South-west Brush-tailed Phascogale

The South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) is listed as a species of special conservation interest (Conservation Dependent) under the BC Act. This species occurs in the south west between Perth and Albany. The South-western Brush-tailed Phascogale have been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees.

One individual was recorded in the Marri Open Forest of site walkover area 2 during the nocturnal searches. The woodlands and open forest habitats provide suitable habitat for this species.

Significant fauna likelihood of occurrence assessment

A likelihood of occurrence assessment was conducted for all conservation significant fauna species identified in the desktop assessment. This assessment was based on species biology, habitat requirements, the likely quality and availability of suitable habitat (based on vegetation associations present within the survey area) and records of the species in the vicinity of the survey area. No assumptions were made on the transient potential of these species. The likelihood assessment is provided in Appendix E.

Of the 28 significant fauna (threatened and priority listed species) identified in the desktop searches an additional five species are considered likely to occur in either one or both Project Areas, including:

– Carnaby's Cockatoo (*Zanda latirostris*)
– Peregrine Falcon (*Falco peregrinus*)
– Quenda (*Isoodon fusciventer*)
– Western False Pipistrelle (*Falsistrellus mackenziei*)
– Coastal Plains Skink (*Ctenotus ora*).

Table 13 provides the conservation listed species present and considered likely for each of the fauna habitats within the survey area.

Table 13 Additional significant fauna considered likely to occur within Project Areas 1 and 2

Common Name	Status		Likelihood of occurrence within Project Area 1	Likelihood of occurrence within Project Area 2
	EPBC Act	BC Act/ DBCA		
Carnaby's Cockatoo (*Zanda latirostris*)	EN	EN	Likely This species is known to occur in the local region. Suitable foraging, breeding and roosting habitat is very limited within the proposed footprint (Flooded Gum trees).	Likely This species is known to occur in the local region. Suitable foraging, breeding and roosting habitat is present within the survey area, however trees are generally patchy and isolated (scattered Marri and Flooded Gums).
Peregrine Falcon (*Falco peregrinus*)		OS	Likely Species is known to occur locally and there is suitable habitat in the survey area. This species may use the survey area for opportunistic foraging but is likely to occur as a flyover.	Likely Species is known to occur locally and there is suitable habitat in the survey area. This species may use the survey area for opportunistic foraging and is known to breed in tall eucalyptus trees.
Quenda (*Isoodon fusciventer*)		P4	Unlikely No suitable habitat is present within Project Area 1.	Likely Suitable habitat may be available within the survey area for foraging however there is limited dense understorey within Project Area 2.
Western False Pipistrelle (*Falsistrellus mackenziei*)		P4	Unlikely No suitable habitat is present within Project Area 1.	Likely Limited suitable habitat is present within Project Area 12
Coastal Plains Skink (*Ctenotus ora*)		P3	Unlikely No suitable habitat is present within p Project Area 1to support this species.	Likely This species has previously been recorded in the local area. Project Area 2 contains very limited suitable habitat (Marri Open Forest).

4.2.4 Black Cockatoo habitat assessment

The habitats in the Project Areas and site walkover areas contain a combination of Marri and Flooded gum woodlands/forest which provides key foraging and breeding habitat for all three species of Black Cockatoo known to occur in the region. Table 13 presents a summary of Black Cockatoo habitat values and definitions as defined within the referral guidelines (DAWE, 2022).

Foraging habitat

Foraging habitat for all three Black Cockatoo species is available across the majority of the surveyed areas, however the presence of foraging species within the two project footprints is limited to scattered or isolated Eucalypt trees. Foraging evidence (chewed Marri nuts) attributed to Forest Red-tailed Black Cockatoo was recorded in Project Area 2 and site walkover areas 1 and 2. Some foraging evidence (chewed Marri nuts) attributed to the Baudin's Cockatoo, was observed in site walkover area 2.

Foraging habitat for Baudin's Cockatoo exists within the surveyed area in the form of key feeding species such as Marri, occasional Jarrah, as well as *Banksia* and *Hakea* species. Foraging habitat for Carnaby's Cockatoo exists within the survey area in the form of key *Banksia* feeding species (*Banksia attenuata, B. ilicifolia, B. littoralis* and *B. grandis*) and Marri. However, no foraging evidence by Carnaby's Cockatoo was observed during the survey. Forest Red-tailed Black Cockatoo feeds primarily on the seeds of Marri and Jarrah as well as *Persoonia longiflora* (Snottygobble) (DAWE, 2022). Black Cockatoo species may utilise Flooded Gum (flowers) as a foraging resource, however preference is likely to be given to more suitable species such as Marri. Additionally, Carnaby's Cockatoo have been observed stripping the bark from *Acacia saligna* and *Agonis flexuosa* searching for grubs and/or invertebrates (Valentine and Stock 2008)

Table 14 provides a summary of the foraging quality score for Project Area 2 for each Black Cockatoo species based on the DAWE (2022) foraging score guidelines. Project Area 1 has less than 1 ha (0.22 ha) of potential foraging habitat (Flooded Gums) and therefore a foraging quality score has not been applied based on the DAWE (2022) guidelines.

Project Area 2 contains 1.17 ha of suitable foraging habitat (0.87 ha within the project footprint and 0.3 ha in the road infrastructure area) and has a foraging quality score of 6 (moderate value) for Baudin's Cockatoo and Carnaby's Cockatoo and score of 8 (high value) for Forest Red-tailed Black Cockatoo. However suitable foraging habitat for Forest Red-tailed Black Cockatoos is sparse across Project Area 2. There is only one marri tree located within the project footprint and eight trees scattered within the road infrastructure area.

No foraging quality score has been applied to the site walkover areas as these areas will not be impacted by the proposed project.

Within the surveyed areas, the Marri Open Forest habitat type contains good quality foraging habitat for all three species of Black Cockatoo. Scattered foraging species are present within the Peppermint Woodland, Marri and Flooded Gum Open Forest and Flooded Gum / Peppermint Open Forest.

Breeding habitat

The Project Areas are located within the modelled predicted breeding range for Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. No actual breeding events were recorded in the area during the survey. All three species are known to utilise Marri trees for breeding, and to a lesser extent Flooded Gum. The survey was undertaken in late November which is during the breeding season for Baudin's Cockatoo (August to December), Carnaby's Cockatoo (July to December) and Forest Red-tailed Black Cockatoo (which have been known to breed throughout the year, peaking in autumn – winter (April to June) and spring (August to October)) (DAWE, 2022).

A total of nine potential Black Cockatoo habitat trees (all Flooded Gum species) of suitable DBH (>500 mm) were recorded in Project Area 1. None of the trees recorded contained hollows.

A total of 22 potential Black Cockatoo habitat trees (13 Flooded Gums and 9 Marri) were recorded in Project Area 2. Of these, only two were recorded containing a hollow (one Marri and one Flooded Gum). Neither hollow was

considered to be suitable for Black Cockatoo breeding. Factors recorded impacting suitability included hollow entrance size, structure and depth. Project Area 2 provides potential breeding habitat but no currently suitable breeding trees.

Within site walkover area 1, a total of seven potential Black Cockatoo habitat trees were recorded, including six Marri and one Flooded Gum. No trees were recorded with hollows. A total of 388 potential Black Cockatoo habitat trees were recorded in site walkover area 2, including 192 Flooded Gum (*Eucalyptus rudis*), 193 Marri (*Corymbia calophylla*) and three stags (dead Eucalypts). Of these, 10 were recorded containing one or more hollows, but only six of these trees were considered to contain suitable hollows and three possibly suitable for use by Black Cockatoos. Factors recorded impacting suitability included hollow entrance size and structure, and bees occupying hollows.

The location of the potential habitat trees has been mapped on Figure 6 (Appendix A) and tree data is available in Appendix E.

Roosting habitat

At the time of the field assessment no evidence of roosting activity, such as branch clippings, droppings and moulted feathers was recorded within the Project Areas or site walkover areas. Both Project Areas contain tall Eucalypt trees (Flooded Gum and Marri) that have the potential to be used as roosting habitat.

Table 14 Black Cockatoo habitat presence and usage within the Project Areas

Habitat usage	Project Area 1	Project Area 2	Site walkover area 1	Site walkover area 2
Foraging habitat	Limited – Flooded Gum which is not considered a core foraging species. No foraging evidence recorded.	Yes - Scattered/ isolated Marri, Flooded Gum and scattered *Banksia* species. Foraging evidence present (chewed Marri nuts) from Forest Red-tailed Black Cockatoo.	Limited - Scattered Marri and Flooded Gum. Foraging evidence present (chewed Marri nuts) from Forest Red-tailed Black Cockatoo.	Yes – Marri, Flooded Gum, occasional Jarrah and scattered *Banksia* species. Extensive foraging evidence throughout the survey area from Forest Red-tailed Black Cockatoo and to a lesser extent Baudin's Cockatoo.
Known nesting tree	None previously recorded or observed during the survey	None previously recorded or observed during the survey	None previously recorded or observed during the survey	None previously recorded or observed during the survey
Potential nesting tree (trees with DBH >500mm)	Yes - 9 potential nesting trees recorded (all Flooded Gum)	Yes – 22 potential nesting trees recorded, comprising of 13 Flooded Gum and 9 Marri.	Yes – 7 potential nesting trees recorded, comprising of 1 Flooded Gum and 6 Marri.	Yes - 388 potential nesting trees recorded, comprising 192 Flooded Gum, 193 Marri and three stags.
Suitable nesting tree and potential nesting hollow	None	Yes – two trees contain hollows (1 Marri and 1 Flooded Gum) however both are not considered suitable for Black Cockatoo's.	None	Yes - 10 trees contain hollows, however only six are considered suitable and three possibly suitable for Black Cockatoo's. No Potential nesting hollows identified.
Breeding habitat	Yes –small patch of Flooded Gums.	Yes – Scattered Flooded Gum and Marri trees.	Yes – Scattered Marri and Flooded Gum present within the Peppermint Woodland habitat.	Yes – All habitat types present contain potential nesting trees (Flooded Gum and Marri)
Roosting habitat	Limited – small patch of Flooded Gum present.	Yes – some tall Flooded Gum and Marri trees present (however scattered).	Limited – occasional scattered Marri and Flooded Gum in the Peppermint Woodland.	Yes – suitable roosting habitat available, particularly along Preston River.

Habitat usage	Project Area 1	Project Area 2	Site walkover area 1	Site walkover area 2
	No evidence of roosting recorded.	No evidence of roosting recorded.	No evidence of roosting recorded.	No evidence of roosting was recorded.

Legend:

Foraging habitat: plant species known to support foraging within the species' range.

Known nesting tree: a tree that has a hollow in which Black Cockatoo breeding has been recorded.

Suitable nesting hollow: any hollow with dimensions suitable for nesting by Black Cockatoo.

Suitable nesting tree: tree with suitable DBH range and with suitable nest hollow present but no evidence of nesting.

Potential nesting tree: Trees with suitable DBH to develop a nest hollow, but currently lack hollows.

Breeding habitat: habitat that contains known, suitable or potential nest trees.

Potential nesting hollows: suitable nest hollows that have clear or possible signs of nesting activity such as chew marks at hollow entrance. Or cockatoo presence indication possible breeding activity

Potential roost tree: Tall tree of any species, usually in close proximity to a freshwater water source.

Known roosting tree: a tree (usually tallest) or any species, usually in close proximity to freshwater, which is confirmed to be used for night roosting either via cockatoos' presence or strong evidence of roosting.

Table 15 Foraging habitat scoring tool for three species of Black Cockatoo within Project Area 2

Black Cockatoo Species	Starting score	Notes and modifications	Final Score
Baudin's Cockatoo	Start at a score of 10 if your site is native Eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadside and parkland cleared areas. Can include planted vegetation. **10**	No evidence of feeding debris **(subtract 2)** Suitable foraging habitat mapped within 12 km Confirmed breeding habitat greater than 12 km away **(subtract 2)** Known night roosting habitat within 20 km Dieback assessment has not been undertaken.	**6**
Carnaby's Cockatoo	Start at a score of 10 if your site is native shrubland, Kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native Eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **10**	No evidence of feeding debris **(subtract 2)** Suitable foraging habitat mapped within 12 km Confirmed breeding habitat greater than 12 km away **(subtract 2)** Known night roosting habitat within 20 km Dieback assessment has not been undertaken.	**6**

Black Cockatoo Species	Starting score	Notes and modifications	Final Score
Forest Red-tailed Black Cockatoo	Start at a score of 10 if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies including along roadsides and parkland cleared areas. **10**	Evidence of feeding debris Suitable foraging habitat mapped within 12 km Confirmed breeding habitat greater than 12 km away **(subtract 2)** Known night roosting habitat within 20 km Dieback assessment has not been undertaken.	**8**

5. Discussion and Conclusions

Project Areas

The two Project Areas (including associated road networks) identified for the proposed project have a long history of clearing and/or disturbances such as grazing, weed invasion, pressure from kangaroo and rabbit populations and existing roads and infrastructure. The remaining remnant vegetation is largely parkland cleared and contains an understorey completely dominated by introduced grasses and herbs.

Two vegetation types were mapped within Project Area 1 which comprised mostly of Weedy Grasslands with Isolated Trees (26%) and two small patches of highly degraded *Eucalyptus rudis* (Flooded Gum) / *Agonis flexuosa* (Peppermint) Woodland to Open Forest (9%). The remaining area (65%) is cleared. The remnant vegetation was all rated as Completely Degraded and lacked any native understorey.

Five vegetation types were mapped within Project Area 2. The most dominant vegetation types consisted of previously cleared Weedy Grassland with Isolated Trees (60%) and *Eucalyptus rudis* / *Agonis flexuosa* Woodland to Open Forest (15%) as well as three small patches consisting of *Agonis flexuosa* Woodland (2%), Planted Eucalypts (2%) and *Corymbia calophylla* Open Forest (2%). The remaining area (60%) is cleared. The remnant vegetation was rated as Completely Degraded except the patch of *Corymbia calophylla* Open Forest which was rated as Good to Degraded.

None of the vegetation types mapped within the Project Areas are representative of any known EPBC or state listed TECs or DBCA listed PECs.

No significant flora species were recorded in either Project Area. The likelihood of occurrence assessment concluded one significant flora species. *Eucalyptus rudis* subsp. *cratyantha* (Priority 4). may possibly occur based on their known range, habitat requirements and previous records adjacent to the Project Areas (GHD 2021). Based on recent taxonomic re assessment of the species, and the specimens within the Project Areas being more consistent with the description for *Eucalyptus rudis* subsp. *rudis*, the individuals recorded in the Project Areas were not considered representative of the Priority 4 listed flora species *Eucalyptus rudis* subsp. *cratyantha.*

Two habitat types, aligning with the described vegetation types, were mapped within Project Area 1, comprising of two small isolated patches of Flooded Gum / Peppermint Open Forest and Completely Degraded Grassland. No significant fauna was recorded in Project Area 1 during the assessment however one WRP was observed in nearby Peppermint Woodland in site walkover area 1. Based on a likelihood of occurrence assessment for significant fauna and the significant fauna recorded during the survey in nearby vegetation, a further five species are considered likely to occur in Project Area 1, including: Forest Red-tailed Black Cockatoo, Baudin's Cockatoo, Carnaby's Cockatoo, Peregrine Falcon, and Western Ringtail Possum. However, given the small size, fragmented and degraded nature of the vegetation remaining, these habitat types are not considered to have high value.

Six habitat types, aligning with the described vegetation types, were mapped within Project Area 2. They comprised Flooded Gum / Peppermint Open Forest, Marri and Flooded Gum Open Forest, Peppermint Woodland, Planted Eucalypts, Marri Open Forest and Completely Degraded Grassland. Two significant fauna species were recorded in Project Area 2, they were the Forest Red-tailed Black Cockatoo and WRP. A South-west Brush-tailed Phascogale was also observed immediately adjacent to Project Area 2 within the Marri Open Forest habitat (site walkover area 2). Based on a likelihood of occurrence assessment for significant fauna and nearby records, a further six significant species are considered likely to occur in Project Area 2, including: Carnaby's Cockatoo, Baudin's Cockatoo, Peregrine Falcon, Quenda, Western False Pipistrelle and Coastal Plains Skink. Suitable habitat for the Quenda, Western False Pipistrelle and Coastal Plains Skink is limited. The majority (79%) of the Project Area has previously been cleared or consists of completely degraded grassland. The vegetation remaining is highly fragmented and degraded and lacks structural diversity and microhabitats.

The Flooded Gum habitat within Project Area 1 provides limited foraging and potential breeding and roosting habitat for all three species of Black Cockatoo. However. no evidence of Black Cockatoo foraging, breeding or roosting was recorded in Project Area 1 during the survey. A total of nine potential Black Cockatoo habitat trees (all Flooded Gum

species) was recorded. None of the trees recorded contained hollows. There is less than 1 ha of suitable foraging, breeding and roosting habitat present in Project Area 1.

In Project Area 2, one Forest Red-tailed Black Cockatoo individual was observed in a Marri tree during the survey and multiple observations of foraging evidence (chewed marri nuts) was recorded. No evidence of breeding or roosting was observed. Project Area 2 contains 1.17 ha of suitable foraging habitat and has a foraging quality score of 6 for Baudin's Cockatoo and Carnaby's Cockatoo and score of 8 for Forest Red-tailed Black Cockatoo. However suitable foraging habitat for Forest Red-tailed Black Cockatoos is sparse across Project Area 2. There is only one marri tree located within the project footprint and eight trees scattered within the road infrastructure area. A total of 22 potential Black Cockatoo habitat trees (13 Flooded Gums and 9 Marri) was recorded. Of these, two were recorded containing a hollow (one Marri and one Flooded Gum). Neither hollow was considered to be suitable for Black Cockatoo breeding.

Assessments of the potential habitat value of patches within the Project Areas confirmed that P1-1, P1-2, P2-1 and P2-2 are primarily cleared and the remaining native vegetation is in Completely Degraded Condition. The survey confirmed there are no TECs or PECs in these patches.

Site Walkover Areas

The remnant vegetation within site walkover area 1 comprised predominantly of *Agonis flexuosa* Woodland with a small patch of *Melaleuca raphiophylla* Woodland along the southern boundary. The vegetation provided good canopy cover but lacked structural diversity with a bare understorey dominated by introduced grasses and herbs. The northern and eastern boundary of the survey area has previously been cleared and/or consists of a grassland of introduced species. The condition of the remnant vegetation was rated as Degraded as it lacked structural diversity and had a groundcover dominated by weeds.

The remnant vegetation remaining in site walkover area 2 consisted of *Corymbia calophylla* Open Forest near the South Western Highway, *Corymbia calophylla* and *Eucalyptus rudis* Open Forest along Preston River, *Eucalyptus rudis/Agonis flexuosa* Woodland to Open Forest and Weedy Grassland with isolated trees associated with the previously cleared paddocks. The remnant vegetation was patchy and in the most part lacked a native understorey, with condition ranging from Good to Completely Degraded.

The habitat types mapped within site walkover area 1 comprise of Peppermint Woodland, a small patch of Melaleuca Woodland and Completely Degraded Grassland. The woodland habitat type in the survey area provides good canopy cover but lacks structural diversity, native ground cover and microhabitats. One significant fauna species, the Western Ringtail Possum, was recorded in site walkover area 1. The Peppermint Woodland provides core habitat for this species. No evidence of Black Cockatoo breeding or roosting was recorded in the survey area. Foraging evidence (chewed marri nuts) from Forest Red-tailed Black Cockatoo was observed. The area provides limited foraging, breeding and roosting habitat, with few scattered Marri and Flooded Gums occurring within the Peppermint dominated woodland. A total of seven potential Black Cockatoo habitat trees were recorded, including six Marri and one Flooded Gum. No trees were recorded with hollows.

The habitat types mapped within site walkover area 2 comprise of Marri Open Forest near the South Western Highway, Marri and Flooded Gum Open Forest along Preston River, Flooded Gum/Peppermint Woodland to Open Forest and Completely Degraded Grassland with isolated trees. The woodland and open forest habitat types in the survey area generally provide good canopy cover but lack structural diversity, native ground cover and microhabitats. Four significant fauna species were recorded in site walkover area 2, including the Western Ringtail Possum, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and South-west Brush-tailed Phascogale. Both the Forest Red-tailed Black Cockatoo and Baudin's Cockatoo were recorded within site walkover area 2. Extensive evidence of foraging (chewed marri nuts) within the survey area by Forest Red-tailed Black Cockatoo and to a lesser extent the Baudin's Cockatoo was also observed. No evidence of roosting or breeding was observed during the survey. A total of 388 potential Black Cockatoo habitat trees were recorded in site walkover area 2, including 192 Flooded Gum (*Eucalyptus rudis*), 193 Marri (*Corymbia calophylla*) and three stags (dead Eucalypts). Of these, 10 were recorded containing one or more hollows, but only six of these trees were considered to contain suitable hollows and three possibly suitable for use by Black Cockatoos.

Although the structure of the vegetation has been altered significantly, the conservation value of the habitat types present in both site walkover areas is considered to be moderate to high as they provide suitable habitat for a number of locally occurring significant fauna species (such as the Western ringtail possum and South-western brush-tailed phascogale) as well as high quality foraging habitat and potential roosting and breeding habitat for three locally occurring Black Cockatoo species.

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Appendix A

Figures

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Project Location

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 1

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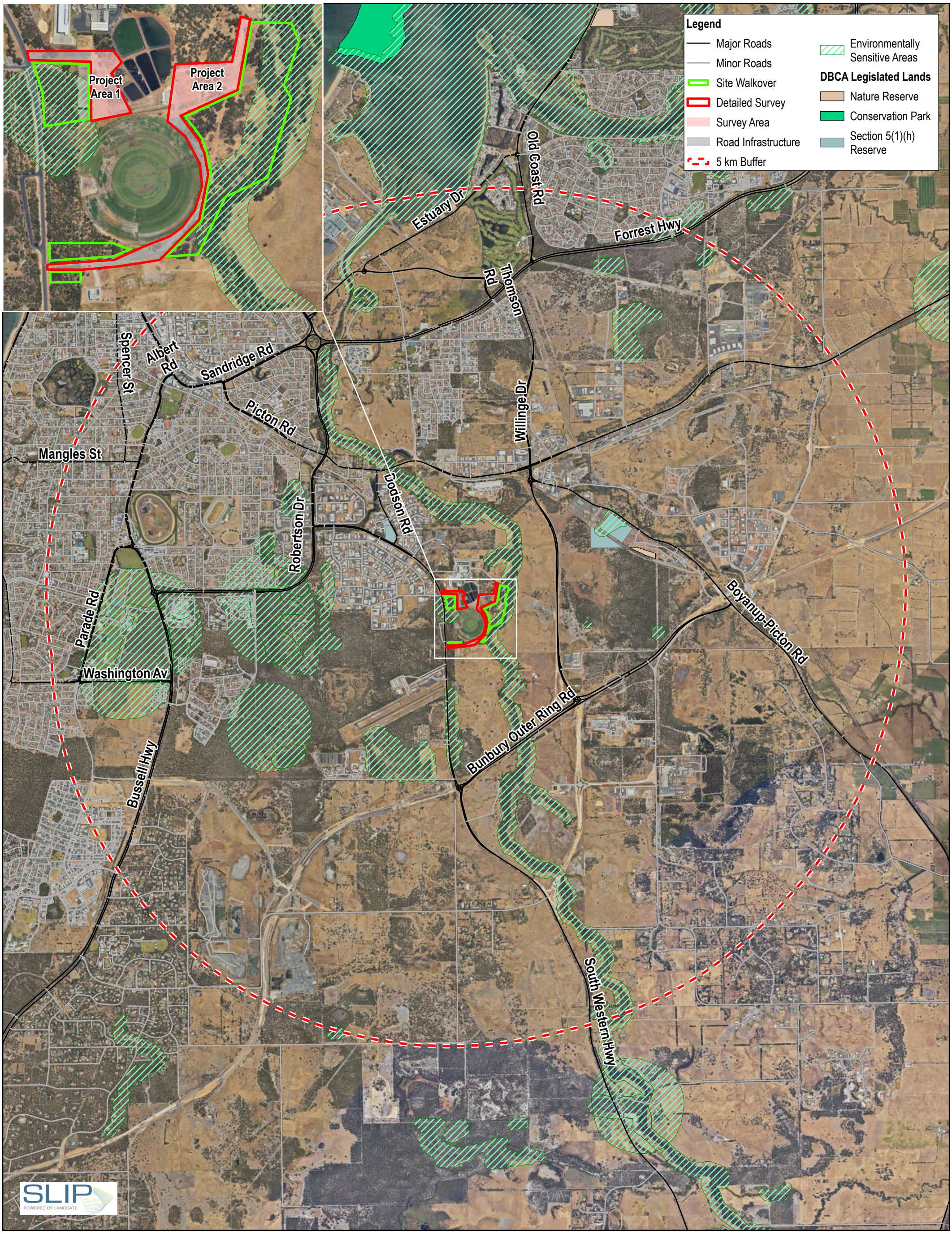

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Meters

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Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Land Use Constraints

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 2a

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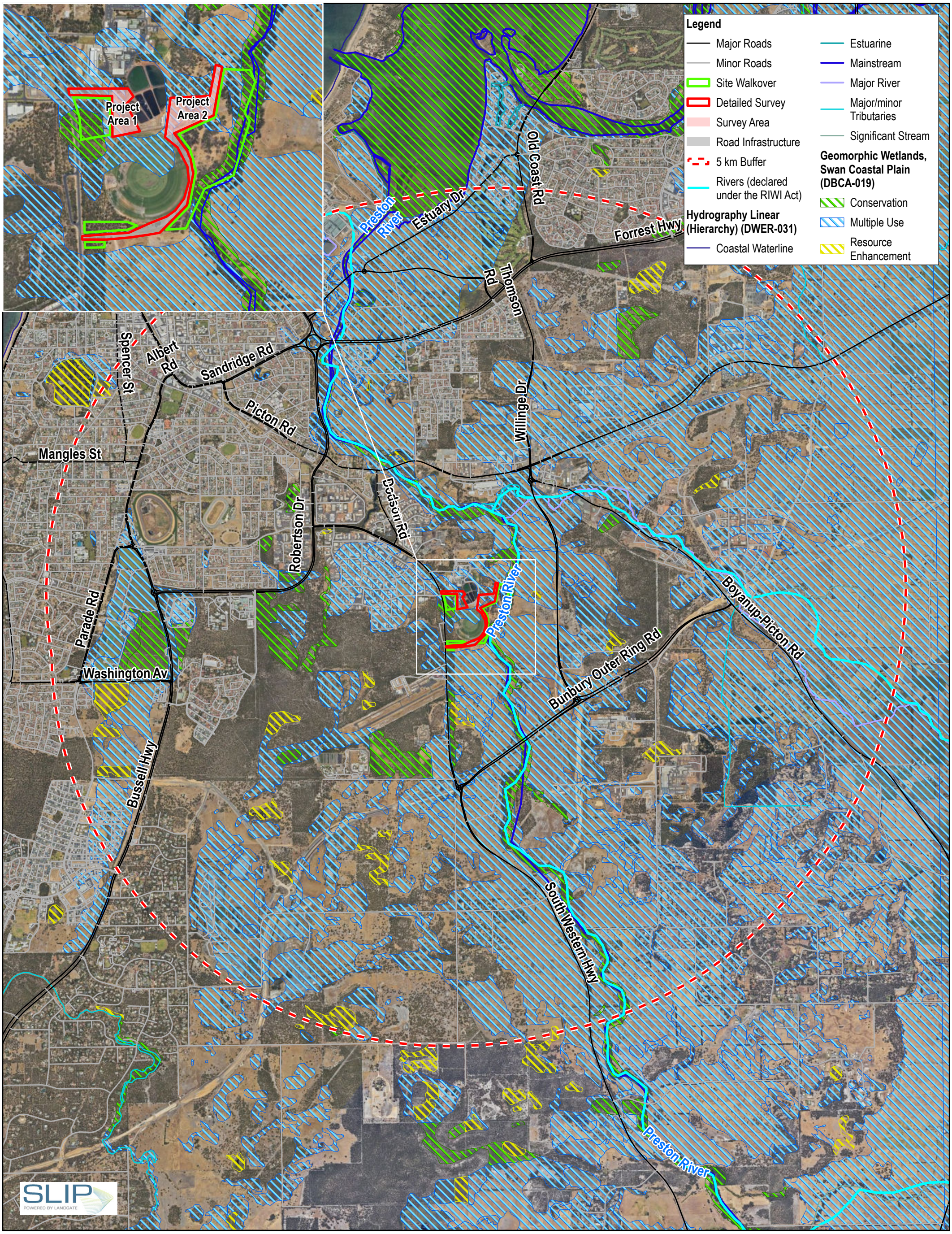

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GHD

V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Hydrological Constraints

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 2b

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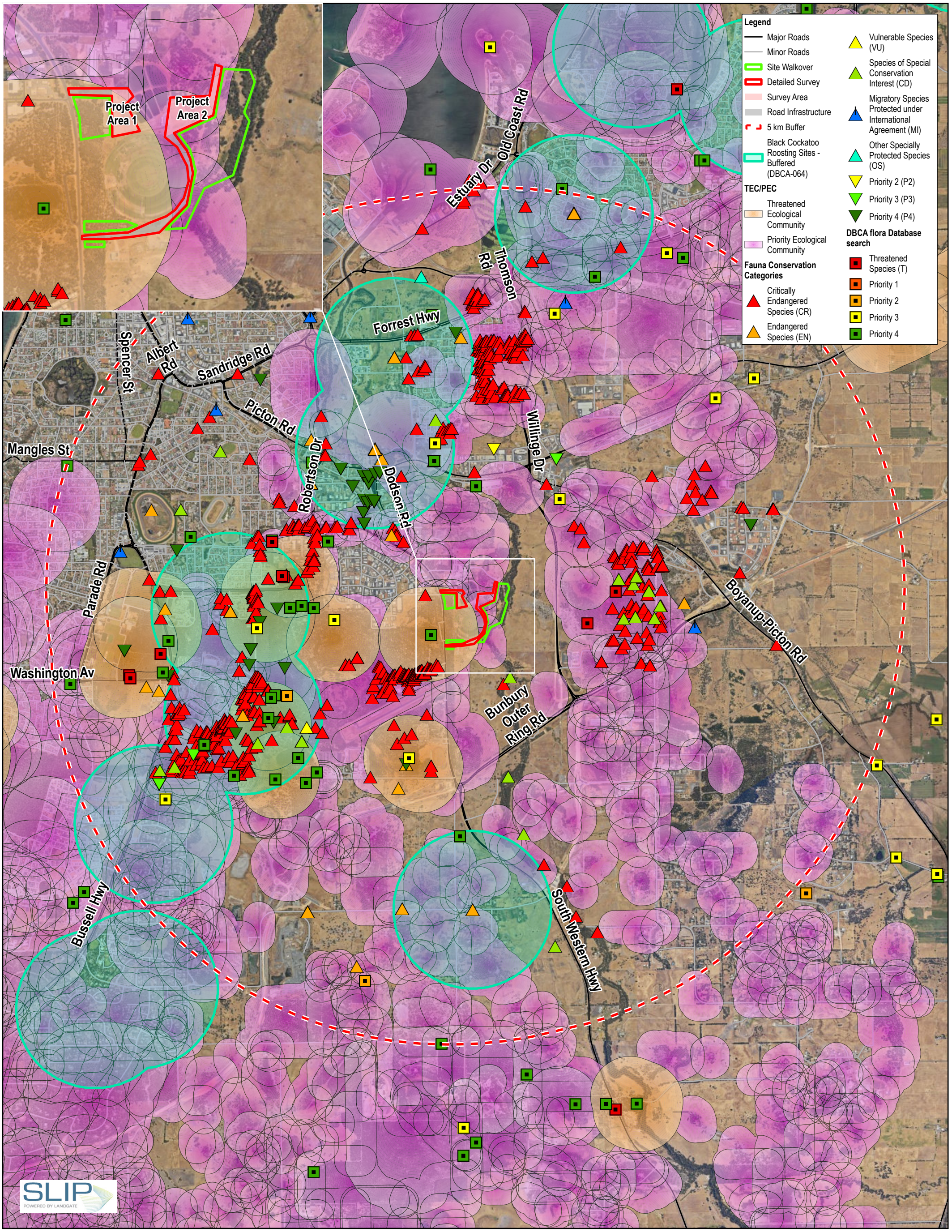

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Meters

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GHD

V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Biological Constraints

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 2c

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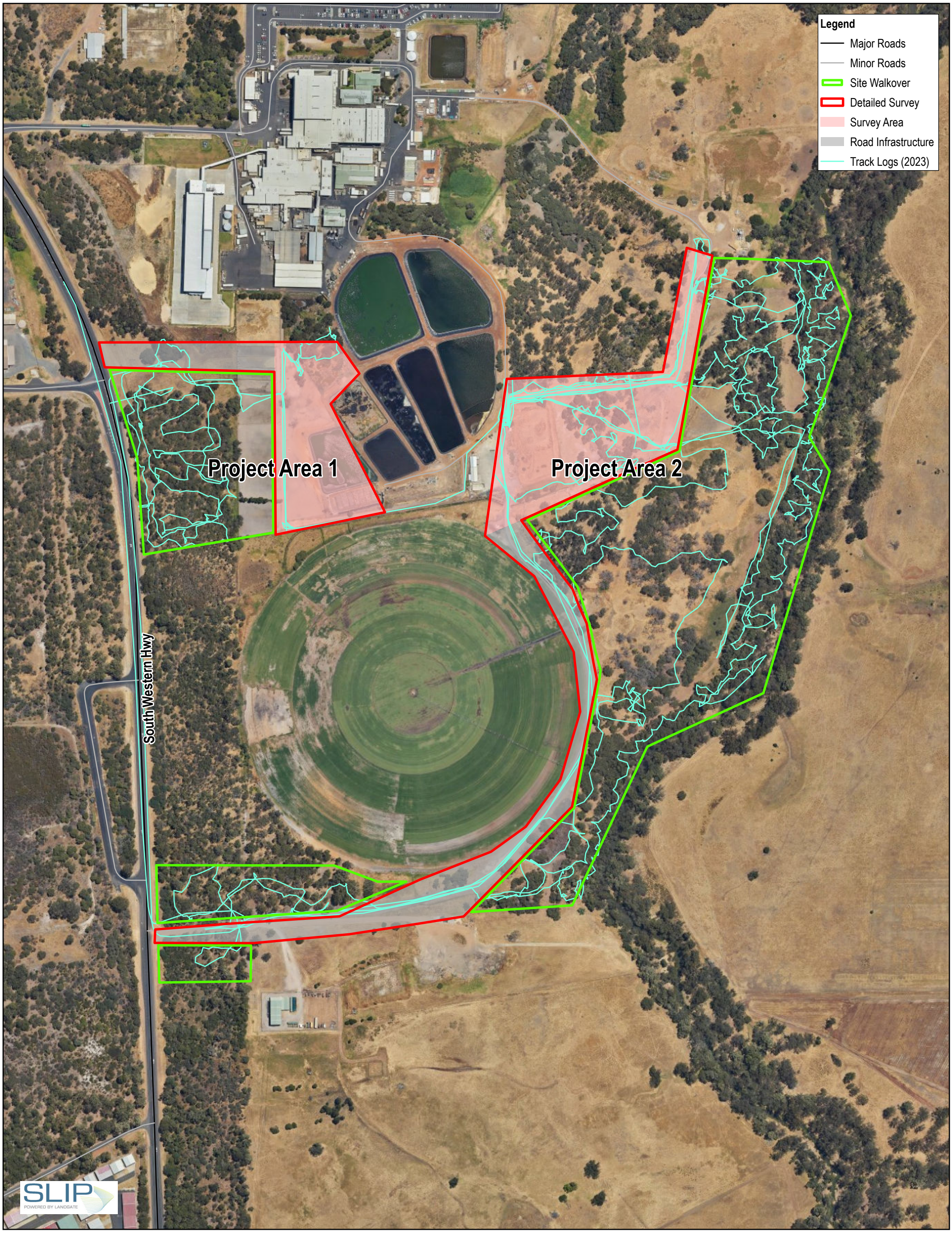

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 50

N

GHD

V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Survey Effort

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 3

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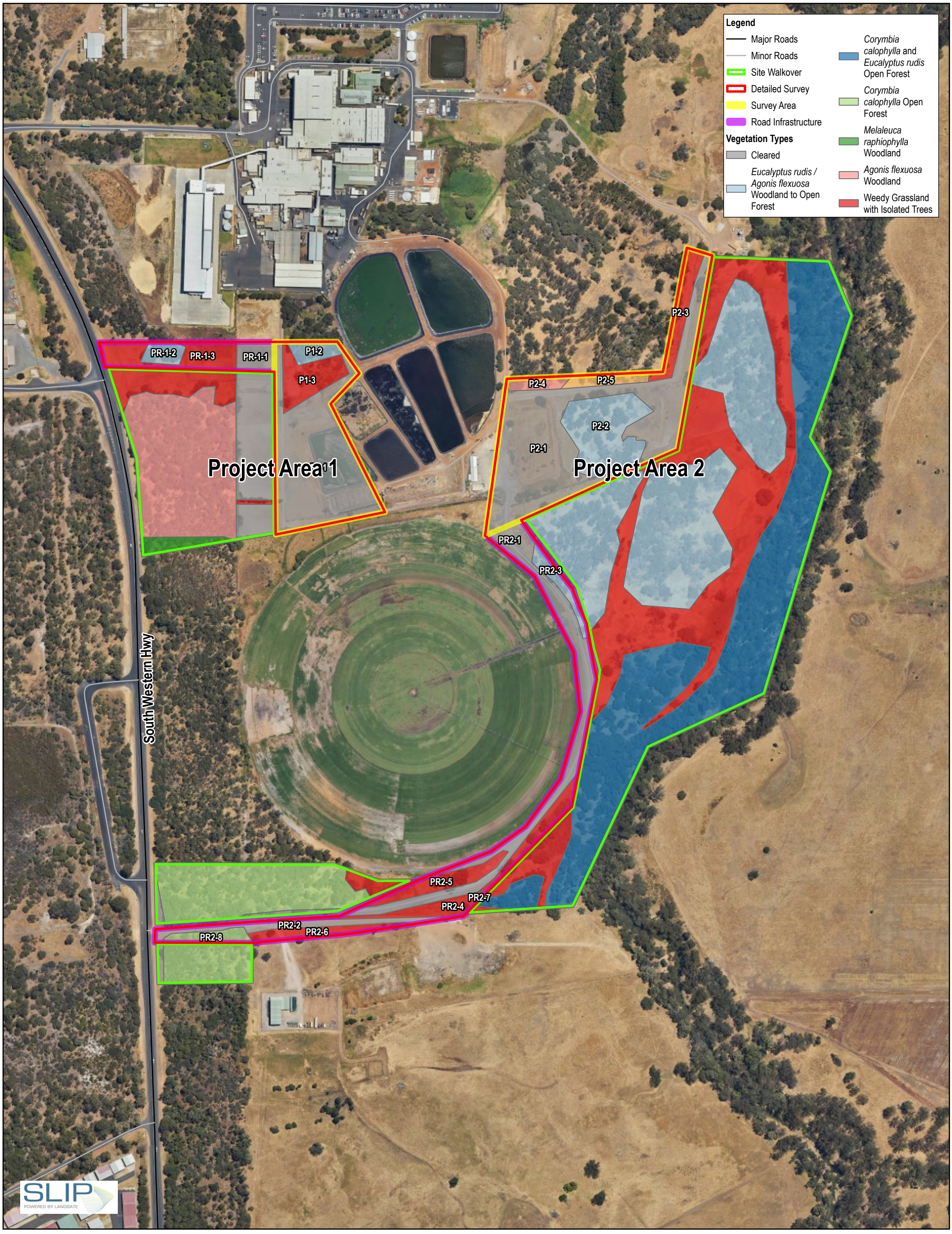
World Hillshade: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland,



Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Vegetation Types

Project No. **12619510**
Revision No. **0**
Date **26/07/2024**

FIGURE 4

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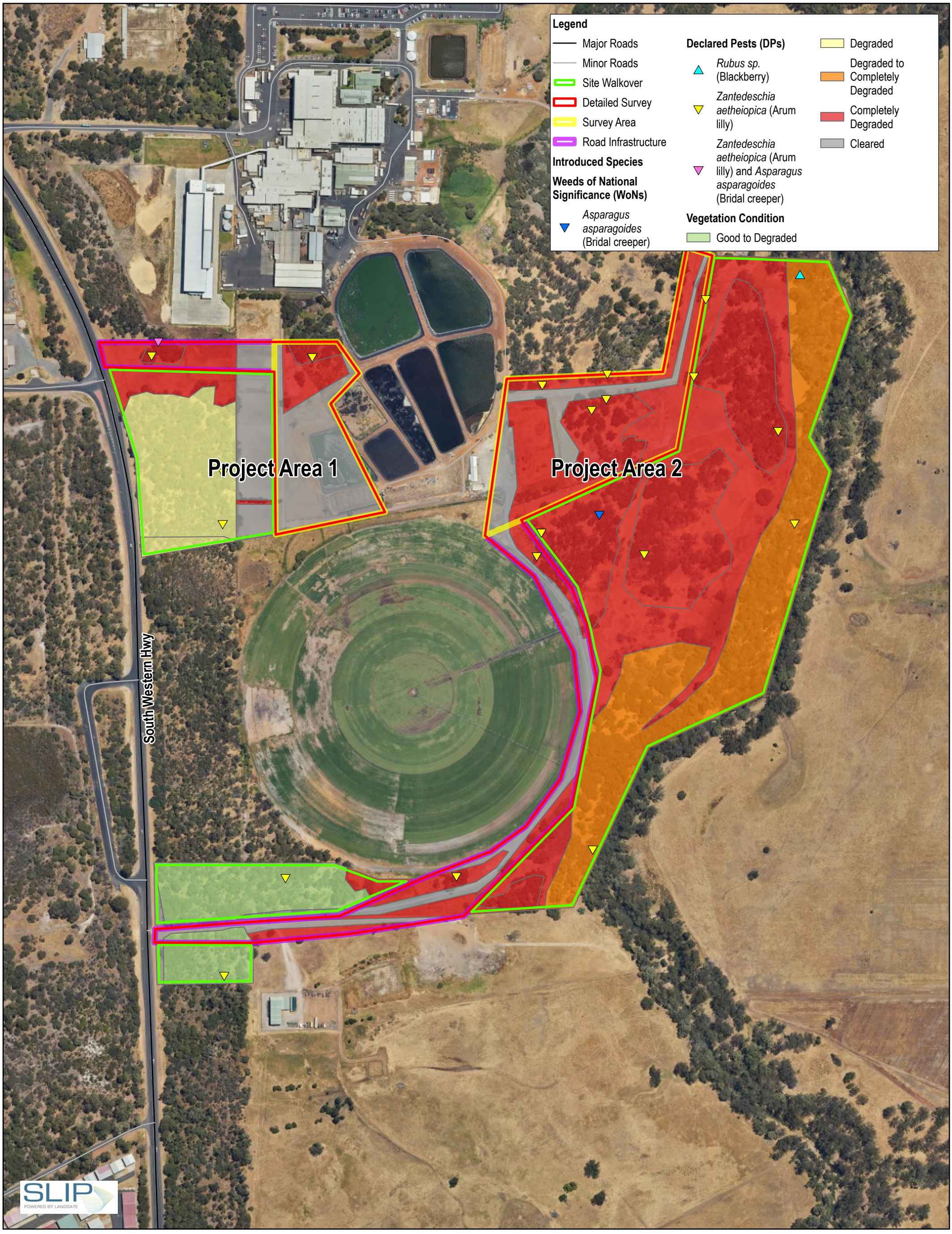

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Map Projection: Transverse Mercator
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V&V Walsh Resource Recovery
Project Sites Spring Survey

Vegetation Condition and Significant Weeds

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 5

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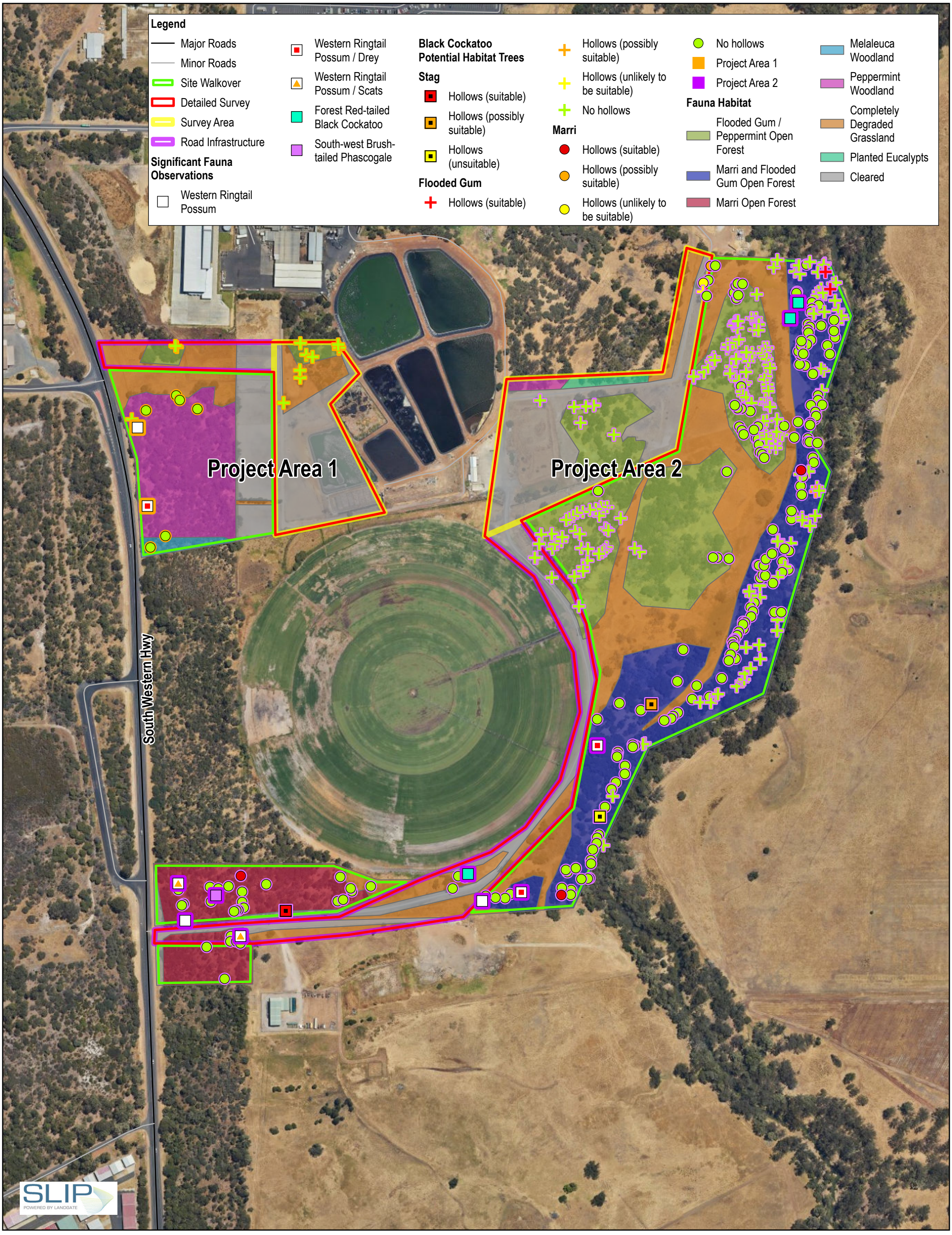

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Map Projection: Transverse Mercator
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V&V Walsh
V&V Walsh Resource Recovery
Project Sites Spring Survey

Fauna Habitat Types and Significant Fauna Records

Project No. **12619510**
Revision No. **0**
Date **22/04/2024**

FIGURE 6

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Data source: WANow:
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Appendix B

Relevant legislation, conservation codes and background information

Relevant legislation

Federal *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

Nationally threatened flora and fauna species and ecological communities

Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

State *Environmental Protection Act 1986*

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

1. Native vegetation should not be cleared if it comprises a high level of biodiversity.
2. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
3. Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
4. Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
5. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
6. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
7. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
8. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

9. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
10. Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State *Biodiversity and Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

– Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
– If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
– The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
– The conservation of biodiversity and ecological integrity should be a fundamental consideration indecision-making
– Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976.* The main purposes of the BAM Act and its regulations are to:

– Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
– Manage the impact and spread of those pests already present in the state
– Safely manage the use of agricultural and veterinary chemicals
– Increased control over the sale of agricultural products that contain violative chemical residues.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the *Australian Heritage Commission Act 1975* of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in "Bush Forever" Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002.*
The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) applies.
Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

Reserves and conservation areas

Bush Forever

Bush Forever, which was released in December 2000 and proclaimed in 2010, is a Government initiate aimed to retain and protect regionally significant bushland on the Swan Coastal Plain within the Perth Metropolitan Region. Bush Forever aims to protect more than 51,000 hectares of regionally significant bushland within 287 sites across the metropolitan portion of the Swan Coastal Plain (Government of Western Australia (GoWA) 2000). Bush Forever sites constitute ESAs as declared by a notice under Section 51B of the EP Act.

Department of Biodiversity, Conservation and Attractions managed land and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional parks, nature reserves, State forest and timber reserves. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed land use changes and development proposals that abut DBCA managed lands will generally be referred to DBCA throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil.

Ramsar Wetlands (Wetlands of International Importance)

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity … because of their ecological, botanical, zoological, limnological or hydrological importance” (DAWE 2020b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DAWE 2020b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DAWE 2020a):

– It is a good example of a wetland type occurring within a biogeographic region in Australia
– It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
– It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
– The wetland supports one percent or more of the national populations of any native plant or animal taxa
– The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
– The wetland is of outstanding historical or cultural significance.

Geomorphic wetlands

Categorisation of wetlands has been conducted by Hill et al. (1996), delineating Swan Coastal Plain wetlands into levels of protection and management categories. Conservation Category Wetlands are wetlands that support high levels of attributes and functions. Resource Enhancement Wetlands are those that have been partly modified but still support substantial functions and attributes. Multiple Use Wetlands are classified as those wetlands with few attributes that still provide important wetland functions. Multiple Use wetlands have few important ecological attributes and functions remaining.

The Geomorphic Wetlands Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia’s Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2019), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated every 2-3 years.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (EPA 2016a). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Vegetation condition rating scale for the South West and Interzone Botanical Provinces

Condition	South West and Interzone Botanical Provinces description
Pristine	Pristine or nearly so, no obvious signs of 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 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 or shrubs.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State BC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The BC Act provides for the Minister to list an ecological community as a TEC (section 27), or as a collapsed ecological community (section 31) statutory listing of State TECs by the Minister. The legislation also describes statutory processes for preparing recovery plans for TECs, the registration of their critical habitat, and penalties for unauthorised modification of TECs.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Codes and definitions for TECs listed under the EPBC Act and/or BC Act

Categories	Definitions
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Endangered *(EN)	An ecological community if, at that time: – is not critically endangered; and – is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Vulnerable (VU)	An ecological community if, at that time: – is not critically endangered or endangered; and – is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Western Australia Conservation Categories (BC Act)	
Threatened Ecological Communities	
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Categories	Definitions
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.
Collapsed ecological communities	
An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time – – there is no reasonable doubt that the last occurrence of the ecological community has collapsed); or – the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover – • its species composition or structure; or • its species composition and structure. Section 33 of the BC Act provides for a collapsed ecological community to be regarded as a threatened ecological community if it is discovered in a state that no longer makes it eligible for listing as a collapsed ecological community.	

Categories and definitions for PECs as listed by the DBCA

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2	Poorly known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority 3	Poorly known ecological communities. – Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: – communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; – communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Priority 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. – Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. – Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

Category	Description
	– Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016a, b) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- A role as a refuge
- Providing an important function required to maintain ecological integrity of a significant ecosystem
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in 'pristine' condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range.

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the BC Act can warrant referral to DAWE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for flora and fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of flora and fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act flora and fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national

extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened or Extinct species under the BC Act cannot also be listed as Specially Protected species.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

For the purposes of this assessment, all species listed under the EPBC Act, BC Act and DBCA Priority species are considered significant.

Categories and definitions for EPBC Act and BC Act listed flora and fauna species

Conservation category	Definition
Threatened species	
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.
Extinct species	
Extinct (EX)	Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).
Extinct in the Wild (EW)	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).
Specially protected species	
Migratory (MI)	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
Species of Special conservation interest (conservation dependent fauna) (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Codes for DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	Poorly-known taxa Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

Priority category	Definition
Priority 2	Poorly-known taxa Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	Poorly-known taxa Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	Rare, Near Threatened and other taxa in need of monitoring – Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. – Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. – Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016a, b) states that significant flora may include taxa that have/are:

– A keystone role in a particular habitat for Threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
– Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
– New species or anomalous features that indicate a potential new species
– Being 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
– Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems).

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007.*

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

– Invasiveness
– Impacts
– Potential for spread
– Socio-economic and environmental values.

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

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Appendix C

Desktop search results

Appendix D

Flora survey results

Flora species recorded in each detailed survey area

Family	Species	Status	Detailed survey area 1	Detailed survey area 2
Araceae	*Zantedeschia aethiopica*	* DP	x	x
Asparagaceae	*Asparagus asparagoides*	* DP, WONS	x	x
Asparagaceae	*Lomandra micrantha*			x
Asteraceae	*Arctotheca calendula*	*	x	x
Asteraceae	*Conyza bonariensis*	*	x	x
Asteraceae	*Hypochaeris glabra*	*		x
Asteraceae	*Sonchus asper*	*	x	x
Asteraceae	*Sonchus oleraceus*	*		x
Asteraceae	*Ursinia anthemoides*	*		x
Brassicaceae	*Brassica tournefortii*	*		x
Caryophyllaceae	*Silene gallica*	*		x
Colchicaceae	*Burchardia congesta*			x
Cyperaceae	*Lepidosperma longitudinale*			x
Cyperaceae	*Lepidosperma squamatum*			x
Cyperaceae	*Mesomelaena tetragona*			x
Dasypogonaceae	*Dasypogon bromeliifolius*			x
Dilleniaceae	*Hibbertia cunninghamii*			x
Fabaceae	*Acacia alata*			x
Fabaceae	*Acacia pulchella*			x
Fabaceae	*Acacia saligna*			x
Fabaceae	*Hardenbergia comptoniana*			x
Fabaceae	*Lotus subbiflorus*	*	x	x
Fabaceae	*Lupinus angustifolius*	*		x
Fabaceae	*Trifolium arvense*	*	x	x
Fabaceae	*Trifolium repens*	*	x	x
Geraniaceae	*Erodium cicutarium*	*		x
Haemodoraceae	*Conostylis* sp.			x
Iridaceae	*Gladiolus undulatus*	*		x
Iridaceae	*Romulea rosea*	*		x
Iridaceae	*Sparaxis bulbifera*	*		x
Iridaceae	*Watsonia meriana*	*		x
Juncaceae	*Juncus pallidus*			x
Loranthaceae	*Nuytsia floribunda*			x
Moraceae	*Ficus carica*	*		x
Myrtaceae	*Agonis flexuosa*		x	x

Family	Species	Status	Detailed survey area 1	Detailed survey area 2
Myrtaceae	*Corymbia calophylla*			x
Myrtaceae	*Eucalyptus marginata*			x
Myrtaceae	*Eucalyptus rudis* subsp. *rudis*		x	x
Myrtaceae	*Eucalyptus* sp.	* (Planted)		x
Myrtaceae	*Kunzea glabrescens*			x
Myrtaceae	*Melaleuca preissiana*			x
Myrtaceae	*Melaleuca rhaphiophylla*		x	x
Oleaceae	*Olea europaea*	*	x	
Oxalidaceae	*Oxalis pes-caprae*	*	x	x
Papaveraceae	*Fumaria capreolata*	*	x	x
Poaceae	*Avena barbata*	*	x	x
Poaceae	*Briza maxima*	*	x	x
Poaceae	*Bromus diandrus*	*	x	x
Poaceae	*Cenchrus clandestinus*	*	x	x
Poaceae	*Cynodon dactylon*	*	x	x
Poaceae	*Ehrharta calycina*	*	x	x
Poaceae	*Ehrharta longiflora*	*	x	x
Poaceae	*Eragrostis curvula*	*	x	x
Poaceae	*Lolium perenne*	*	x	x
Poaceae	*Poa annua*	*	x	x
Polygonaceae	*Rumex crispus*	*	x	x
Proteaceae	*Banksia attenuate*			*x*
Proteaceae	*Banksia grandis*			*x*
Restionaceae	*Desmocladus flexuosus*			*x*
Rubiaceae	*Opercularia hispidula*			*x*
Solanaceae	*Solanum nigrum*	*	x	x
Typhaceae	*Typha* sp.		*x*	
Xanthorrhoeaceae	*Xanthorrhoea brunonis*			*x*
Zamiaceae	*Macrozamia riedlei*			*x*

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within study area from field survey results.
Likely	Species previously recorded within 2 km and large areas of suitable habitat occur in the study area.
Possible	Species previously recorded within 2 km and areas of suitable habitat occur/may occur in the study area.
Unlikely	Species previously recorded within 2 km, but suitable habitat does not occur in the study area.
Highly unlikely	Species not previously recorded within 2 km, suitable habitat does not occur in the study area and/or the study area is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches

PMST – DAWE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within the study area

DBCA – DBCA (2021) Threatened and Priority flora database search within the study area.

NM – DBCA *NatureMap*

Likelihood of occurrence assessment of significant flora identified in the desktop assessment

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Acacia flagelliformis	P4		May-Sep	Rush-like, erect or sprawling shrub, 0.3-0.75(-1.6) m high. Fl. yellow. Sandy soils. Winter-wet areas.	Unlikely	Unlikely
Acacia semitrullata	P4		May-Oct	Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Fl. cream, white. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.	Unlikely	Unlikely
Adelphacme minima	P3		Nov	Sandy soils. Annual 10-20 cm tall. Fl. white.	Unlikely	Unlikely
Andersonia gracilis	EN	EN	Sep-Nov	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely	Unlikely
Angianthus drummondii	P3		Oct-Dec	Erect annual, herb, to 0.1 m high. Fl. yellow. Grey or brown clay soils, ironstone. Seasonally wet flats.	Unlikely	Unlikely

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Aponogeton hexatepalus	P4		Jul-Oct	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green, white. Mud. Freshwater: ponds, rivers, claypans.	Unlikely	Unlikely
Austrostipa bronwenae	EN	EN	Sep-Oct	Perennial grass, 0.6 m high x 0.3 m wide. Flowers green. Calcareous, winter-wet grey-brown sandy-loam or dark brown loam over clay.	Unlikely	Unlikely
Austrostipa jacobsiana	CR	CR	Aug-Sep	Tufted rhizomatous herb, to 1.2 m, leaf sheaths hairy. Marri woodland, Melaleuca tall shrubland.	Unlikely	Unlikely
Banksia mimica	VU	EN	Dec or Jan to Feb	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Flowers yellow-brown. White or grey sand over laterite, sandy loam.	Unlikely	Unlikely
Banksia squarrosa subsp. *argillacea*	VU	VU	Jun-Nov	Erect, open, non-lignotuberous shrub, 1.2–4 m high. Fl. yellow, Jun–Nov. White/grey sand, gravelly clay or loam. Winter-wet flats, clay flats.	Unlikely	Unlikely
Boronia tetragona	P3		Oct-Dec	Perennial, herb, 0.3–0.7 m high, leaves sessile, entire, with papillate margins, branches quadrangular, sepals ciliate. Fl. pink, red. Black/white sand, laterite, brown sandy loam. Winter-wet flats, swamps, open woodland.	Unlikely	Unlikely
Brachyscias verecundus	CR	CR	Nov	Annual (or ephemeral), herb, 0.012-0.022 m high, entirely glabrous. Fl. white/cream. In a moss sward. On a granite outcrop.	Unlikely	Unlikely
Caladenia huegelii	EN	EN	Sep-Oct	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green, cream, red. Grey or brown sand, clay loam.	Unlikely	Unlikely
Caladenia speciosa	P4		Sep-Oct	Tuberous, perennial, herb, 0.35-0.6 m high. Fl. white, pink. White, grey or black sand.	Unlikely	Unlikely
Carex tereticaulis	P3		Sep-Oct	Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. brown. Black peaty sand.	Unlikely	Unlikely
Caustis sp. Boyanup (G.S. McCutcheon 1706)	P3		Dec-Jan	Rhizomatous, clumped perennial, grass-like or herb (sedge), 0.7–1 m high. White or grey sand.	Unlikely	Unlikely
Chamaescilla gibsonii	P3		Sep	Clumped tuberous, herb. Fl. blue. Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Unlikely	Unlikely

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Chamelaucium erythrochlorum	P4		Jul-Oct	Non-lignotuberous shrub, to 2.5 m high. Fl. cream, yellow. Jarrah-marri forest. Loams, sandy clays. Riverbanks, lower slopes, below laterite breakaways.	Unlikely	Unlikely
C*hamelaucium roycei*	VU	VU	Oct-Dec	Winter-wet areas, loams and ironstone.	Unlikely	Unlikely
Craspedia sp. Waterloo (G.J. Keighery 13724)	P2		Aug-Sep or Oct	Completely glabrous. Fl. Bright yellow. Growing in water on seasonally inundated heavy soils of the Pinjarra plain near Waterloo.	Unlikely	Unlikely
Darwinia whicherensis	CR	EN	Oct-Nov	Erect low shrub to 30 cm, flowers green, outer red. Winter-wet area of shrubland over shallow red clay over ironstone	Unlikely	Unlikely
Diuris drummondii	VU	VU	Nov-Jan	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow. Low-lying depressions, swamps.	Unlikely	Unlikely
Diuris micrantha	VU	VU	Sep-Oct	Tuberous perennial, herb, 0.3-0.6 m high. Flowers yellow and brown. Brown loamy clay, winter-wet swamps, in shallow water.	Unlikely	Unlikely
Diuris purdiei	EN	EN	Sep-Oct	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow. Grey-black sand, moist. Winter-wet swamps. Found between Perth and Yarloop.	Unlikely	Unlikely
Drakaea elastica	CR	EN	Oct-Nov	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red, green, yellow. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Unlikely	Unlikely
Drakaea micrantha	EN	VU	Sep-Oct	Tuberous, perennial, herb, 0.15–0.3 m high. Fl. red, yellow. White-grey sand.	Unlikely	Unlikely
Eleocharis keigheryi	VU	VU	Aug-Nov	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green. Clay, sandy loam. Emergent in freshwater: creeks, claypans	Unlikely	Unlikely
Eucalyptus rudis subsp. cratyantha	P4		Jul-Sep	Tree, 5-20 m high, bark rough, box-type. Fl. white. Loam. Flats, hillsides.	Possible	Possible
Franklandia triaristata	P4		Aug-Oct	Erect, lignotuberous shrub, 0.2-1 m high. Fl. white, cream, yellow , brown, purple. White or grey sand.	Unlikely	Unlikely
Gastrolobium sp. Yoongarillup	P1			Description unknown	Unlikely	Unlikely

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Gastrolobium whicherense	P2		Oct	Slender, open shrub, to 1.6 m high. Fl. orange/yellow/red. Red-grey sandy clay over quartzite. Steep westerly slopes.	Unlikely	Unlikely
Grevillea rosieri	P2		Jul-Sep	Shrubs, 0.5 m high. Flowers red or brown. Gravelly soil, or sand; sandplains; gravel pits.	Unlikely	Unlikely
Lambertia echinata subsp. occidentalis	EN	EN	Feb/May-Jun/Oct	Prickly, much-branched, non-lignotuberous shrub, to 3 m high. Fl. yellow. White sandy soils over laterite, orange/brown-red clay over ironstone.	Unlikely	Unlikely
Lasiopetalum membranaceum	P3		Sep-Dec	Multi-stemmed shrub, 0.2-1 m high. Fl. pink, blue, purple. Sand over limestone.	Unlikely	Unlikely
Leptomeria furtiva	P2		Jan, Aug-Oct	Lax, sprawling shrub, 0.2–0.45 m high. Fl. orange, brown. Grey or black peaty sand. Winter-wet flats.	Unlikely	Unlikely
Leucopogon sp. Busselton (D. Cooper 243)	P2		Aug-Sep	Slender, erect shrub to 70 cm; flowers white. Pericalymma ellipticum wet shrubland, Marri-Jarrah woodland.	Unlikely	Unlikely
Lomandra whicherensis	P3			Rhizomatous herb 30x30 cm. Steep quartzite slope, sandy clay over quartzite	Unlikely	Unlikely
Microtis quadrata	P4		Dec-Jan	Slender erect annual herb, 0.3 - 0.8 m high, up to 100 yellowish-green flowers 2.5 - 3mm across. Clay based coastal flats.	Unlikely	Unlikely
Ornduffia submersa	P4		Sep-Oct	Tuberous emergent aquatic perennial dwarf shrub, height to 35 cm; flowers white; leaves floating on surface of water. Clay-based ponds and swamps (semi-aquatic)	Unlikely	Unlikely
Platysace ramosissima	P3		Oct-Nov	Perennial, herb, to 0.3 m high. Fl. white, cream. Sandy soils.	Unlikely	Unlikely
Puccinellia vassica	P1		Sep-Nov	Caespitose annual or perennial, grass-like or herb, 0.41–0.55 m high. Saline soils. On the outer margins of coastal saltmarshes	Unlikely	Unlikely
Pultenaea skinneri	P4		Jul-Sep	Slender shrub, 1-2 m high. Fl. yellow, orange, red. Sandy or clayey soils. Winter-wet depressions.	Unlikely	Unlikely
Rumex drummondii	P4			Erect perennial, herb, 0.6-0.9 m high. Winter-wet disturbed areas.	Unlikely	Unlikely

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Schoenus benthamii	P3		Oct-Nov	Tufted perennial, grass-like or herb (sedge), 0.15-0.45 m high. Fl. brown. White, grey sand, sandy clay. Winter-wet flats, swamps.	Unlikely	Unlikely
Schoenus capillifolius	P3		Oct-Nov	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green. Brown mud. Claypans.	Unlikely	Unlikely
Schoenus loliaceus	P2		Aug-Nov	Annual, grass-like or herb (sedge), 0.03–0.06 m high. Sandy soils. Winter-wet depressions.	Unlikely	Unlikely
Stylidium longitubum	P4		Oct-Dec	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. Pink. Sandy clay, clay. Seasonal wetlands.	Unlikely	Unlikely
Stylidium paludicola	P3		Oct-Dec	Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink. Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Unlikely	Unlikely
Stylidium perplexum	P1		Dec	Cushion like plant to 20 cm tall with scapes extending higher, flowers white. Whicher Scarp in Lateritic soils, upper ridge slope.	Unlikely	Unlikely
Synaphea hians	P3		Jul-Nov	Prostrate or decumbent shrub, 0.15-0.6 m high, to 1 m wide. Fl. Yellow. Sandy soils. Rises.	Unlikely	Unlikely
Synaphea odocoileops	P1		Aug-Oct	Tufted, compact shrub, 0.2–0.5 m high. Fl. yellow. Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas.	Unlikely	Unlikely
Synaphea polypodioides	P3		Sep-Oct	Clumped shrub (sunshrub), 0.35-0.4 m high. Light brown loam, red-brown sandy loam, gravelly, brown sandy clay over laterite. In undulating areas.	Unlikely	Unlikely
*Synaphe*a sp. Fairbridge Farm (D. Papenfus 696)	CR	CR	Oct	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. Yellow. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely	Unlikely
Synaphea sp. Pinjarra Plain (A.S. George 17182)	EN	EN	Sep to Nov	Erect, clumped shrub (sub-shrub), to 0.8 m high. Fl. yellow. Grey sandy loam or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains.	Unlikely	Unlikely

Taxon	Conservation Status		Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence (post survey) in Project Area 1	Likelihood of occurrence (post survey) in Project Area 2
	BC Act/ DBCA listing	EPBC Act				
Synaphea sp. Serpentine (G.R. Brand 103)	CR	CR	Sep-Oct	Shrublands and woodlands on loamy soils	Unlikely	Unlikely
Synaphea stenoloba	EN	EN	Aug-Oct	Caespitose shrub, 0.3–0.45 m high. Fl. Yellow. Sandy or sandy clay soils. Winter-wet flats, granite. Shrublands and woodlands on loamy soils.	Unlikely	Unlikely
Thelymitra variegata	CR		Jun-Sep	Tuberous, perennial, herb, 0.1–0.35 m high. Fl. orange, red, purple, pink. Sandy clay, sand, laterite.	Unlikely	Unlikely
Trithuria australis	P4			Small aquatic herb. Ponds, pools	Unlikely	Unlikely
Verticordia attenuata	P3		Dec-May	Shrub, 0.4–1 m high. Fl. pink. White or grey sand. Winter-wet depressions	Unlikely	Unlikely

Appendix E

Fauna survey results

Fauna species recorded during the field survey

Family	Taxon	Common name	Status	Project Area 1	Site walkover location 1	Project Area 2	Site walkover location 2
BIRDS							
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill			x	x	x
Acanthizidae	*Smicrornis brevirostris*	Weebill			x		x
Accipitridae	*Aquila audax*	Wedgetail Eagle				x	x
Accipitridae	*Haliastur sphenurus*	Whistling Kite				x	x
Alcedinidae	*Dacelo novaeguineae*	Laughing kookaburra	Introduced			x	x
Anatidae	*Anas superciliosa*	Pacific black duck				x	
Anatidae	*Biziura lobata*	Musk Duck				x	
Artamidae	*Cracticus nigrogularis*	Pied butcherbird				x	x
Artamidae	*Gymnorhina tibicen*	Australian magpie		x		x	x
Cacatuidae	*Calyptorhynchus banksii naso*	Red-tailed Black Cockatoo	Vulnerable			x	x
Cacatuidae	*Eolophus roseicapilla*	Galah				x	x
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	Endangered		x	x	x
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			x	x	x
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		x		x	x
Columbidae	*Phaps chalcoptera*	Common Bronzewing					x
Corvidae	*Corvus coronoides*	Australian raven		x	x	x	x
Hirundinidae	*Hirundo neoxena*	Welcome swallow		x			
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		x	x	x	x
Maluridae	*Malurus lamberti*	Variegated Fairy-wren				x	x
Meliphagidae	*Anthochaera carunculata*	Red wattlebird			x		x
Monoarchidae	*Grallina cyanoleuca*	Magpie-lark				x	x
Psittaculidae	*Barnardius zonarius*	Australian ringneck		x	x	x	x
Psittaculidae	*Purpureicephalus spurius*	Red-capped parrot			x		x
Rhipiduridae	*Rhipidura leucophrys*	Willie wagtail		x	x	x	x
Threskiornithidae	*Threskiornis moluccus*	Australian white ibis				x	x

Family	Taxon	Common name	Status	Project Area 1	Site walkover location 1	Project Area 2	Site walkover location 2
Zosteropidae	*Zosterops lateralis*	Silvereye					x
MAMMALS							
Bovidae	*Ovis aries*	Sheep	Introduced			x	x
Canidae	*Vulpes vulpes*	Fox	Introduced		x	x	x
Dasyuridae	*Phascogale tapoatafa wambenger*	South-west Brushtailed Phascogale	Conservation Dependent (CD)				x
Felidae	*Felis catus*	House cat	Introduced		x		x
Leporidae	*Oryctolagus cuniculus*	Rabbit	Introduced	x	x	x	x
Macropodidae	*Macropus fuliginosus*	Western grey kangaroo				x	x
Muridae	*Rattus fuscipes*	Bush Rat			x		
Phalangeridae	*Trichosurus vulpecula*	Common brushtail possum			x	x	x
Pseudocheiridae	*Pseudocheirus occidentalis*	Western ringtail possum	Critically Endangered		x	x	x
REPTILES							
Elapidae	*Pseudonaja affinis*	Dugite				x	
Scincidae	*Egernia napoleonis*	South-western Crevice-skink					x
Scincidae	*Hemiergis quadrilineata*	Two-toed earless skink					x
Scincidae	*Menetia greyii*	Common dwarf skink					x
Scincidae	Morethia obscura	Shrubland Pale-flecked Morethia			x		
Scincidae	*Tiliqua rugosa rugosa*	Bobtail					x
AMPHIBIANS							
Pelodryadidae	*Ranoidea moorei*	Motorbike frog					x

Fauna likelihood of occurrence assessment guidelines

Assessment outcome	Description
Known	Species recorded during the field survey or from recent, reliable records from within or close proximity to the Survey Area.
Likely	Species are likely to occur in the Survey Area where there is suitable habitat within the Survey Area and there are recent records of occurrence of the species in close proximity to the Survey Area. OR Species known distribution overlaps with the Survey Area and there is suitable habitat within the Survey Area.
Unlikely	Species assessed as unlikely include those species previously recorded within 40 km of the Survey Area however: There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the Survey Area. The suitable habitat within the Survey Area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the Survey Area. OR Those species that have a known distribution overlapping with the Survey Area however: There is limited habitat in the Survey Area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). The suitable habitat within the Survey Area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the Survey Area.
Highly unlikely	Species that are considered highly unlikely to occur in the Survey Area include: Those species that have no suitable habitat within the Survey Area. Those species that have become locally extinct, or are not known to have ever been present in the region of the Survey Area.

Source information - desktop searches

NM – *DBCA NatureMap*

PMST – DCCEEW Protected Matters Search Tool (PMST) to identify fauna listed under the EPBC Act potentially occurring within the survey area

Likelihood of occurrence assessment of significant fauna identified in the desktop searches as potentially occurring within the survey area

Taxon	Common Name	Status		Description and habitat requirements	Likelihood of occurrence within the Project Area 1	Likelihood of occurrence within the Project Area 2	Source
		BC Act	EPBC Act				
Birds							
Anous tenuirostris melanops	Australian Lesser Noddy	EN	VU	The Australian Lesser Noddy is usually found only around its breeding islands in the Houtman Abrolhos Islands. It usually occupies coral-limestone islands that are densely fringed with White Mangrove *Avicennia marina*. It occasionally occurs on shingle or sandy beaches. The bird roosts mainly in mangroves, especially at night, but may sometimes rest on a beach. They can commonly be found dead after winter storms along the southwest coast between Yanchep and Dunsborough (DCCEEW 2024).	Highly unlikely The survey area does not contain suitable habitat to support this species.	Highly unlikely The survey area does not contain suitable habitat to support this species.	TPFL
Botaurus poiciloptilus	Australasian Bittern	EN	EN	The Australasian Bittern's preferred habitat is wetlands with tall dense vegetation. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus*) or cutting grass (*Gahnia*) growing over a muddy or peaty substrate. In the south west, the Bittern is largely confined to coastal areas, especially along the south coast. It also occurs around swamps, lakes, pools, rivers and channels fringed with lignum Muehlenbeckia, canegrass Eragrostis or other dense vegetation (Marchant 1990). They can be found in reed beds near Two Peoples Bay, in lakes near Mt Manypeaks, and the Lake Muir area (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST TPFL
Calidris canutus	Red Knot			In Australasia the Red Knot mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (DCCEEW 2024). They are found near mudflats and estuaries from Murchison to Bunbury but are then uncommon from Wilson Inlet to Esperance. In the Perth region they are mainly found in Alfred Cove and Peel Inlet (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap PMST TPFL
Calidris ferruginea	Curlew Sandpiper	CR, IA	CR,MI	Curlew Sandpipers mainly occur in areas with soft mud conditions, including intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are found inland less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. In WA, they are widespread around coastal and subcoastal plains from Cape Arid to south-west Kimberley Division, but are more sparsely distributed between Carnarvon and Dampier Archipelago (DCCEEW 2024). They are common on the Swan Coastal Plain, particularly near large drying lakes like Thompson and Forrestdale, and Peel Inlet. They are less common along the southern coast to Esperance (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap TPFL
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	VU	VU	The Forest Red-tailed Black Cockatoo inhabits the dense jarrah, karri, and marri forests receiving more than 600 mm annual average rainfall but also occurs in a range of other forest and woodland types, including Blackbutt (*E. patens*), Wandoo (*E. wandoo*), Tuart (*E. gomphocephala)*, Albany Blackbutt (*E. staeri*), Yate (*E. cornuta*), and Flooded Gum (*E. rudis*) (DotE 2017). Habitats tend to have an understorey of balga (*Xanthorrhoea* spp.), kingia (*Kingia australis*), snottygobble (*Persoonia* spp.), parrot bush (*Banksia sessillis*), holly-leaved Mirbelia (*Mirbelia dilatata*), bull banksia (*B. grandis*), bullich (*Taxandria* spp.) and sheoak (*Allocasuarina fraseriana*). They are most common in the jarrah forest region of the northern Darling Range from Collie north to Mundaring and are very local throughout the lower south-west. They can be found on the Swan Coastal Plain, mainly in search of food the exotic white cedar (*Melia azedarach*). There are also several small isolated populations in the eastern parts of its range (DCCEEW 2024).	Likely No evidence of foraging was recorded in the survey area. Suitable foraging and potential roosting and breeding habitat is available (although limited) within the survey area.	Present This species was recorded in the survey area (road infrastructure area) during the survey. Evidence of recent and old foraging chews was also observed. Suitable foraging and potential roosting and breeding habitat is available within the area.	NatureMap PMST TPFL

Taxon	Common Name	Status		Description and habitat requirements	Likelihood of occurrence within the Project Area 1	Likelihood of occurrence within the Project Area 2	Source
		BC Act	EPBC Act				
Calyptorhynchus baudinii	Baudin's Cockatoo,	EN	EN	Baudin's Black Cockatoo mainly occurs in eucalypt forests, especially jarrah, marri and karri forest that receives 750 mm of annual rainfall. The species is less frequently in woodlands of wandoo (*E. wandoo*), blackbutt (*E. patens*), flooded gum (*E. rudis*), yate (*E. cornuta*), partly cleared farmlands and urban areas. The range of the species extends from Albany northward to Gidgegannup and Mundaring (east of Perth), and inland to the Stirling Ranges and near Kojonup. Preferred roosts are in areas with a dense canopy close to permanent sources of water (DAWE 2022).	Likely No evidence of Baudin's Cockatoo was recorded in Project Area 1 however evidence of their presence was recorded nearby. Suitable foraging and potential roosting and breeding habitat is available (although limited) within the area.	Present Evidence of Baudin's Cockatoo was recorded in the survey area during the survey. Suitable foraging and potential roosting and breeding habitat is available within the survey area.	Naturemap PMST TPFL
Calyptorhynchus latirostris	Carnaby's Cockatoo,	EN	EN	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum, wandoo, marri, jarrah and karri, and in shrubland or kwongan heathland dominated by Hakea, Dryandra, Banksia and Grevillea species. Breeding activity is restricted to eucalypt woodlands mainly in the semiarid and subhumid interior, from Kalbarri in the north, Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning. The species has expanded its breeding range westward and south into the jarrah-marri forests of the Darling Scarp and into the tuart forests of the Swan Coastal Plain, including the Yanchep area, Lake Clifton and near Bunbury. It nests in trees older than 120-150 years (DAWE 2022).	Likely No evidence of Carnaby's Cockatoo was recorded. Suitable foraging and potential roosting and breeding habitat (although limited) is present.	Likely No evidence of Carnaby's Cockatoo was recorded. Suitable foraging and potential roosting and breeding habitat (although limited) is present.	Naturemap PMST TPFL
Falco peregrinus	Peregrine Falcon	OS		The Peregrine Falcon is found on and near cliffs, gorges, timbered watercourses, riverine environments, wetlands, plains, open woodlands, and pylons and spires of buildings, though less frequently in desert regions (Morcombe 2004; Pizzey and Knight 2012). They are not common but can be found almost anywhere throughout WA and in the southwest, including particularly at Fitzgerald River, Stirling Range, Porongurup National Parks, Kondinin, and Peak Charles, with many more locations north of Perth (Nevill 2013).	Likely This species may use the survey area for opportunistic foraging. It is also known to breed in tall eucalyptus trees.	Likely This species may use the survey area for opportunistic foraging. It is also known to breed in tall eucalyptus trees.	Naturemap
Falco hypoleucos	Grey Falcon	VU	VU	Found on and near cliffs, gorges, plains, open woodlands, and pylons and spires of buildings. They are not common but can be found almost anywhere throughout WA and in the southwest.	Unlikely The survey area is outside the current known distribution for this species.	Unlikely The survey area is outside the current known distribution for this species.	PMST
Ixobrychus falvicollis	Black bittern	P2		The Black Bittern tends to be found on smaller bodies of water, particularly along creek lines with shadowy, leafy waterside trees (callistemons, casuarinas, paperbarks, eucalypts, mangroves, and willows), in sheltered mudflats, and oyster-slats. In the south west they are found on the quieter river systems, often where there are large paperbarks. They can be found in the coastal south west from Perth, through Margaret River, to Northcliffe (Nevill 2013; Pizzey and Knight 2012).	Unlikely The survey area does not contain suitable habitat to support this species	Unlikely The survey area does not contain suitable habitat to support this species	TPFL
Limosa lapponica baueri	Bar-tailed Godwit	MI (& VU or CR at subsp. level)	MI (& VU or CR at subsp. level)	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats (DCCEEW 2024). They are uncommon in the south west, but can be sighted from Geraldton to Bunbury, at Alfred Cove, and then at a few estuaries on the south coast including Kalgan River Mouth and Oyster Harbour (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST TPFL
Limosa lapponica menzbieri	Black-tailed Godwit	MI	MI	In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks. In the south-west, there is some evidence that small flocks move along the coast during April (DCCEEW 2024).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap TPFL

Taxon	Common Name	Status		Description and habitat requirements	Likelihood of occurrence within the Project Area 1	Likelihood of occurrence within the Project Area 2	Source
		BC Act	EPBC Act				
Numenius madagascariensis	Eastern Curlew	CR	CR & MI	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, sometimes within the mangroves, and in coastal saltworks and sewage farms. In the south west, Eastern Curlews are recorded from Eyre, and there are scattered records from Stokes Inlet to Peel Inlet (Marchant & Higgins 1993). They are uncommon further south of Geraldton, but can be spotted in Alfred Cove, Peel Inlet and the Albany region (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap PMST TPFL
Numenius phaeopus	Whimbrel	MI	MI	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields. There are a small number of inland records from saline lakes and canegrass swamps. The Whimbrel is common and widespread from Carnarvon to the north-east Kimberley Division. It is occasionally seen on the south coast of WA and has occasionally been recorded in the south-west and further north to Shark Bay (DCCEEW 2024).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap TPFL
Oxyura australis	Blue-billed Duck	P4		The blue-billed duck is a small Australian almost entirely aquatic duck (Morcombe 2004). The blue-billed duck is endemic to Australia's temperate regions, ranging from the south west of WA, extending to southern Queensland, through New South Wales and Victoria, to Tasmania. The species is readily seen on freshwater lakes and billabongs where deep fresh water is present (Morcombe 2004).	Unlikely No deep fresh water habitat is present.	Unlikely No deep fresh water habitat is present.	NatureMap TPFL
Pluvialis squatarola	Grey Plover	MI	MI	Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (DCCEEW 2024).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	NatureMap TPFL
Rostratula australis	Australian Painted Snipe	EN	EN	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia, canegrass, or sometimes tea-tree (Melaleuca). It sometimes uses areas that are lined with trees, or that have some scattered fallen or washed-up timber (DCCEEW 2024). In the south west it can be found around Carnarvon and wetlands north of Perth, particularly those west of Moora and Gin Gin (Nevill 2013).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST
Sternula nereis nereis	Australian Fairy Tern	VU	VU	The Fairy Tern occurs along the coast of WA as far north as the Dampier Archipelago near Karratha, but mostly in the southern part of Australia including most of the coastline in the south west. It nests on sheltered sandy beaches, coastal inlets, spits and banks above the high tide line and below vegetation. It has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands, and mainland coastline (DCCEEW 2024; Nevill 2013). They can also be seen in saltfields, saline or brackish lakes, and sewage ponds near the coast (Pizzey & Knight 2012).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST
Thalasseus bergii	Crested Tern	MI	MI	The crested tern inhabit coastal offshore waters, beaches, bays, inlets, tidal rivers, salt swamps, lakes and large rivers. The Australian range is primarily coastal on the mainland and around Tasmania. This is a sedentary, dispersive species (Prizzey & Knight 2012).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	Naturemap

Taxon	Common Name	Status		Description and habitat requirements	Likelihood of occurrence within the Project Area 1	Likelihood of occurrence within the Project Area 2	Source
		BC Act	EPBC Act				
Tringa nebularia	Common Greenshank	MI	MI	The Common Greenshank is found in a wide variety of inland wetlands and coastal habitats of varying salinity. It occurs in sheltered coastal areas typically with large mudflats and saltmarsh, mangroves or seagrass, including embayments, harbours, river estuaries, deltas and lagoons, but less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats, and artificial wetlands. They occur around most of the coast from Cape Arid in the south to Carnarvon in the north-west (DCCEEW 2024), and are moderately common here given suitable habitat. They can be found in areas including Wannamal Lake, many Perth lakes, Alfred Cove, Peel Inlet, Vasse and Harvey Estuaries, and the Albany and Esperance regions (Nevill 2013).	Unlikely There is no suitable habitat within the survey area.	Unlikely There is no suitable habitat within the survey area.	Naturemap TPFL
Mammals							
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU	The Chuditch inhabits eucalypt forest (especially Jarrah, *E. marginata*), dry woodland, mallee shrublands, heaths, and desert, particularly in the south coast of WA. They also occur at lower densities in drier woodland and mallee shrubland in the goldfields and wheatbelt, as well as in Kalbarri National Park (translocated). Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) to survive (DCCEEW 2024). In Jarrah forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest (Van Dyck and Strahan 2008). The species can travel large distances, and for this reason requires habitats that are of a suitable size and not excessively fragmented.	Unlikely While the species is known from the wider region, the habitat is highly disturbed and fragmented and lacks understorey.	Unlikely While the species is known from the wider region, the habitat is highly disturbed and fragmented and lacks understorey.	Naturemap PMST TPFL
Falsistrellus mackenziei	Western False Pipistrelle	P4		The Western False Pipistrelle occurs in wet sclerophyll forest dominated by Karri (*Eucalyptus diversicolor*), and in the high rainfall zones of the Jarrah (*E. marginata*) and Tuart (*E. gomphocephala*) dry sclerophyll forests. The species is restricted to areas in or adjacent to stands of old growth forest. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (*E. calophylla*), Sheoak (*Casuarina huegeliana*) and Peppermint (*Agonis flexuosa*) trees are often co-dominant at its collection localities (Churchill 2008; McKenzie and Start 1999).	Unlikely No suitable habitat is present within the survey area.	Likely Limited suitable habitat is present within the survey area.	Naturemap TPFL
Isoodon fusciventer	Quenda	P4		The Quenda prefers dense scrubby, often swampy, vegetation with dense cover up to one metre high. However, it also occurs in woodlands, and may use less ideal habitat where this habitat occurs adjacent to the thicker, more desirable vegetation. The species often feeds in adjacent Jarrah and Wandoo forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover (DCCEEW 2024; Van Dyck & Strahan 2008).	Unlikely No suitable habitat is present within the survey area.	Likely Suitable habitat may be available within the survey area for foraging however there is limited dense understorey.	NatureMap TPFL
Notamacropus irma	Western Brush Wallaby	P4		The Western Brush Wallaby is found primarily in open forest or woodland, particularly favouring open, seasonally-wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DCCEEW 2024; Van Dyck and Strahan 2008).	Unlikely The Western Brush Wallaby is not commonly recorded in the Bunbury area. Large woodland areas are required to support this species. May occur as a possible visitor.	Unlikely The Western Brush Wallaby is not commonly recorded in the Bunbury area. Large woodland areas are required to support this species. May occur as a possible visitor.	TPFL
Phascogale tapoatafa wambenger	South-western Brush-tailed phascogale	CD		The South-western Brush-tailed Phascogale is found in dry, open sclerophyll forests and woodlands with a generally sparse ground-storey, which contain suitable nesting resources such as tree hollows, rotted stumps and tree cavities. In northern Australia all sightings are in drier habitats with recent records occurring in tall open forest of *Eucalyptus miniata* and *E. tetrodonta*. Records are less common in high rainfall areas in both the north and south of WA (DEC 2012). Foraging success is greatest on mature trees, large logs and dead standing trees with rough bark. An individual can use more than 40 nests in a single year, including hollow trees, rotted stumps, house ceilings and bird nests (Van Dyck & Strahan 2008).	Unlikely The survey area lacks suitable habitat and is largely cleared and fragmented.	Present An individual was recorded during nocturnal searches of the survey area in the Marri Open Forest habitat.	TPFL

Taxon	Common Name	Status		Description and habitat requirements	Likelihood of occurrence within the Project Area 1	Likelihood of occurrence within the Project Area 2	Source
		BC Act	EPBC Act				
Pseudocheirus occidentalis	Western Ringtail Possum	CR	VU	Ideal habitat for the Western Ringtail Possum comprises long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity; others comprise of jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) forests and woodlands with adequate hollows, coastal heath, myrtaceous heaths and shrublands, Bullich (*E. megacarpa*) dominated riparian zones and karri forests. Populations are associated with swamps, water courses or floodplains, and at topographic low points which provide cooler, often more fertile conditions. Their current distribution is patchy and largely restricted to the moister south-western corner of WA, especially in the Australind/Eaton area to Waychinicup National Park. The Upper Warren area east of Manjimup is the only place the possum survives in the absence of coastal peppermint. Persistence in translocation sites has only been at Karakamia Sanctuary, Perup Sanctuary and Yalgorup National Park (DPaW 2014 and Van Dyck & Strahan 2008).	Likely Limited suitable habitat is available within the survey area. An individual was recorded in nearby vegetation.	Present Suitable habitat is available within the survey area. Two individuals were recorded during targeted nocturnal searches.	NatureMap PMST TPFL
Setonix brachyurus	Quokka	VU	VU	The current distribution of the Quokka includes Rottnest and Bald Islands, and at least 25 sites on the mainland, including Two Peoples Bay Nature Reserve and Torndirrup, Mt Manypeaks and Walpole-Nornalup National Parks, and swamp areas through the south-west forests from Jarrahdale to Walpole. The last known population on the Swan Coastal Plain occurs in Muddy Lakes near Bunbury. Quokkas have also been reintroduced to Karakamia Sanctuary (DCCEEW 2024). They occupy dense forests and thickets, streamside vegetation, heaths, shrublands, *Agonis linearifolia*-dominated swamps in the Jarrah (*Eucalyptus marginata*) forest, and sometimes tea-tree thickets on sandy soils along creek systems. The northern extent on the mainland is in the Jarrah forest immediately south-east of the Perth metropolitan area, from where it extends southward through the southern Jarrah, Marri and Karri forests to the south coast, but largely confined throughout to areas receiving an annual rainfall of 1,000 mm or more (DCCEEW 2024; Van Dyck & Strahan 2008).	Highly unlikely The survey area does not contain suitable habitat to support this species	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST
Reptiles							
Ctenotus ora	Coastal Plains Skink	P3		The Coastal Plains Skink is locally restricted the sandy regions of the Swan Coastal Plain south of Perth. It inhabits open eucalypt woodland over Banksia, as well as sandy coastal plain and coastal dunes between Pinjarra and Yallingup Brook (Wilson and Swan 2021).	Unlikely No suitable habitat ius present to support this species.	Likely This species has previously been recorded in the local area. The survey area may contain suitable habitat to support this species (however limited).	NatureMap TPFL

Potential Black Cockatoo habitat trees recorded in the survey areas (proposed footprints and site walkover areas)

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Marri	750	1	20	15	upright	Possible	Yes	No	No	unknown if hollow, old red-tail foraging evidence	1582	-33.36407683	115.6917262
Marri	710	0					Yes	No	No	old red-tail foraging evidence		-33.36407465	115.6917843
Marri	530	0						No	No			-33.36422822	115.6916932
Marri	830	1	15	6	90 degree	unlikely		No	No		1587	-33.36425678	115.6916307
Flooded Gum	2500	1	10	5	upright	unlikely		No	No		1591	-33.3643503	115.6916235
Marri	800	0					Yes	No	No	Red-tail foraging evidence		-33.36439528	115.6916705
Flooded Gum	770	0						No	No			-33.36553857	115.6902286
Flooded Gum	1050	0						No	No			-33.36554583	115.6902217
Flooded Gum	520	0						No	No			-33.36555548	115.6901202
Flooded Gum	710	0						No	No			-33.36555963	115.6899698
Flooded Gum	930	0						No	No			-33.36572815	115.69005
Flooded Gum	1000	0						No	No			-33.3658596	115.6904706

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	610	0						No	No			-33.367161	115.6894655
Marri	610	0						No	No			-33.37055168	115.6885098
Marri	580	0					Yes	No	No	fresh red tail foraging		-33.37052682	115.688511
Marri	740	0						No	No			-33.37053813	115.6884267
Marri	780	0						No	No			-33.37066842	115.6883527
Stag	700	3	20, 15, <10	8-10	upright	Suitable		No	No	burnt stag, one suitable large hollow and multiple other small hollows, no fresh chews	1632	-33.37088455	115.6862319
Marri	590	0						No	No			-33.37114507	115.6855318
Marri	510	0						No	No			-33.37120193	115.6855239
Marri	580	0						No	No			-33.3712573	115.685222
Marri	730	0						No	No			-33.37159917	115.6854451
Marri	540	0					Yes	No	No	baudins and forest red foraging		-33.37120282	115.6855986
Marri	540	0					Yes	No	No	baudins and forest red foraging		-33.3712242	115.6856509
Marri	550	0						No	No			-33.3707975	115.6849373
Marri	570	0						No	No			-33.37081113	115.6849138
Marri	850	0					Yes	No	No	red tail foraging		-33.3706459	115.6848731
Marri	620	0					Yes	No	No	red tail foraging		-33.37056818	115.6848942
Marri	510	0						No	No			-33.37061905	115.6852733
Marri	570	0						No	No			-33.370775	115.6852838
Marri	570	0						No	No			-33.3706368	115.6853802
Marri	580	0						No	No			-33.37061473	115.6855098
Marri	1000	2	20	10	upright	Suitable	Yes	No	No	two active beehives, two large hollows, no chews, redtail foraging	1662	-33.37050544	115.6856671
Marri	760	0					Yes	No	No	red tail foraging		-33.37067488	115.6856813
Marri	540	0						No	No			-33.37078468	115.68568
Marri	520	0						No	No			-33.37084562	115.6856995
Marri	550	0						No	No			-33.37087045	115.6856319
Marri	540	0						No	No			-33.37087118	115.6856046
Marri	530	0					Yes	No	No	baudins foraging		-33.3708823	115.6855759
Marri	640	0					Yes	No	No	red tail foraging & baudins		-33.37059855	115.6859882
Marri	670	0					Yes	No	No	red tail foraging		-33.37078795	115.6868926
Marri	910	0						No	No			-33.37077305	115.6869621
Marri	720	0						No	No			-33.37068533	115.6870742
Marri	580	0						No	No			-33.37065337	115.6870592
Marri	960	0					Yes	No	No	fresh red tail foraging		-33.37053038	115.6869293
Marri	710	0						No	No			-33.37063513	115.6873149
Marri	670	0						No	No			-33.36436467	115.6920159
Marri	550	0						No	No			-33.3642887	115.6920405
Marri	540	0						No	No			-33.36426718	115.6920664
Marri	610	0						No	No			-33.36426718	115.6920664
Marri	770	0						No	No			-33.36427255	115.6921268
Flooded Gum	770	0						No	No			-33.36410083	115.692524
Flooded Gum	710	0						No	No			-33.36402143	115.6925725

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	640	0						No	No			-33.36414832	115.6927941
Flooded Gum	740	0						No	No			-33.36417555	115.6928567
Flooded Gum	550	0						No	No			-33.36408712	115.6928245
Flooded Gum	580	0						No	No			-33.3640826	115.6928435
Marri	730	0						No	No			-33.3640747	115.6929411
Flooded Gum	580	0						No	No			-33.36404657	115.6929837
Flooded Gum	850	0						No	No			-33.3640671	115.6931727
Flooded Gum	900	0						No	No			-33.36408924	115.6931549
Flooded Gum	950	0						No	No			-33.36408005	115.693159
Flooded Gum	900	1	20	15	upright	Suitable		No	No	no chews	1706	-33.36415555	115.6931816
Flooded Gum	950	0						No	No			-33.36415723	115.6930846
Flooded Gum	760	0						No	No			-33.36433233	115.6931237
Flooded Gum	580	0						No	No			-33.36436642	115.6930902
Flooded Gum	560	0						No	No			-33.3644107	115.6930733
Flooded Gum	640	0						No	No			-33.36439337	115.6931743
Flooded Gum	530	0						No	No			-33.36437792	115.6931499
Flooded Gum	730	1	10	5	upright	Suitable		No	No	no chews	1713	-33.36433978	115.6932388
Flooded Gum	580	0						No	No			-33.36428117	115.6932739
Flooded Gum	550	0						No	No			-33.36427093	115.6933101
Marri	850	0						No	No			-33.36447947	115.6930056
Marri	680	0						No	No			-33.36450818	115.6930895
Marri	650	0						No	No			-33.3645454	115.6930041
Marri	660	0					Yes	No	No	recent red tail foraging		-33.36458193	115.6929902
Marri	1180	0					Yes	No	No	fresh red tail foraging		-33.36471002	115.6929514
Flooded Gum	500	0						No	No			-33.36458548	115.6930355
Flooded Gum	570	0						No	No			-33.36459813	115.6930261
Flooded Gum	660	0						No	No			-33.3645806	115.6931606
Flooded Gum	600	0						No	No			-33.36446205	115.6932979
Flooded Gum	670	0						No	No			-33.36456168	115.6933384
Flooded Gum	620	0						No	No			-33.36465598	115.6933878
Flooded Gum	630	0						No	No			-33.364624	115.693376
Flooded Gum	890	0						No	No			-33.36470093	115.693323
Marri	780	0						No	No			-33.36466985	115.6932823
Marri	720	0						No	No			-33.36472722	115.6931179
Marri	1170	0					Yes	No	No			-33.36473748	115.6929771
Marri	660	0					Yes	No	No			-33.3647698	115.6929489
Marri	660	0						No	No			-33.36480087	115.6929557
Marri	620	0						No	No			-33.36487907	115.6929864
Marri	690	0						No	No			-33.3649253	115.692934
Marri	570	0						No	No			-33.36485318	115.6932921
Marri	550	0						No	No			-33.36478548	115.6932787
Marri	620	0						No	No			-33.36493775	115.6931936

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Marri	570	0						No	No			-33.3650307	115.6932237
Marri	1030	0						No	No			-33.36515115	115.6929069
Marri	700	0						No	No			-33.36513677	115.6928386
Marri	900	0						No	No			-33.36503425	115.6928523
Marri	940	0						No	No			-33.36499858	115.692827
Marri	520	0					Yes	No	No	red tail foraging		-33.36494002	115.6928606
Marri	720	0					Yes	No	No	red tail foraging		-33.36488892	115.6928651
Marri	520	0						No	No			-33.36502415	115.6928866
Flooded Gum	520	0						No	No			-33.36520657	115.6931439
Flooded Gum	600	0						No	No			-33.36518507	115.6931103
Marri	560	0						No	No			-33.36523558	115.6930132
Marri	680	0						No	No			-33.36523908	115.6930059
Flooded Gum	500	0						No	No			-33.36541647	115.6931168
Marri	530	0						No	No			-33.36546968	115.6930669
Marri	780	0					Yes	No	No	old red tail foraging		-33.36552108	115.6930663
Marri	780	0					Yes	No	No	old red tail foraging		-33.36557305	115.6929751
Marri	600	0					Yes	No	No	old red tail foraging		-33.3655697	115.6931186
Marri	840	0						No	No			-33.36564528	115.6930306
Marri	740	0						No	No			-33.36572033	115.69302
Marri	610	0						No	No			-33.36568927	115.6930386
Marri	590	0						No	No			-33.36576152	115.6929637
Marri	530	0						No	No			-33.36578235	115.6929605
Marri	530	0						No	No			-33.36592693	115.6929328
Marri	560	0					Yes	No	No	old red tail foraging		-33.36596157	115.6929308
Marri	930	0					Yes	No	No	old red tail foraging		-33.36596378	115.6929534
Marri	520	0					Yes	No	No	old red tail foraging		-33.36597512	115.6930517
Marri	670	0					Yes	No	No	old red tail foraging		-33.36613203	115.692992
Marri	580	0					Yes	No	No	old red tail foraging		-33.36618368	115.693002
Marri	1210	2	20	15	upright	Suitable		No	No	first hollow potential chews, other hollow, 20m up, upright, potential, 10cm	1718	-33.36626362	115.6928409
Flooded Gum	800	0						No	No			-33.36627753	115.6929354
Flooded Gum	600	0						No	No			-33.36644418	115.6930406
Flooded Gum	1210	1	15	15	upright	Possible		No	No	active beehive, may not be hollow	1721	-33.36649267	115.6930211
Flooded Gum	530	0						No	No			-33.36648352	115.6930656
Marri	850	0						No	No			-33.36643232	115.6928311
Marri	620	0					Yes	No	No	baudins & red tail		-33.36633112	115.692859
Flooded Gum	530	0						No	No			-33.36630575	115.6928252
Marri	500	0						No	No			-33.366524	115.6928454
Marri	1000	0						No	No			-33.36672798	115.6927348
Marri	640	0						No	No			-33.36678052	115.6927108
Marri	600	0						No	No			-33.36669595	115.6927128
Flooded Gum	540	0						No	No			-33.36676468	115.6928467

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	550	0						No	No			-33.36679615	115.6928491
Flooded Gum	550	0						No	No			-33.36675103	115.6930119
Flooded Gum	550	0						No	No			-33.36685655	115.6929443
Flooded Gum	500	0						No	No			-33.36703827	115.6927004
Flooded Gum	770	0						No	No			-33.3670044	115.6925412
Flooded Gum	870	0						No	No			-33.36701753	115.6925309
Marri	510	0						No	No			-33.36712047	115.6926739
Marri	540	0						No	No			-33.36709703	115.6926164
Marri	510	0						No	No			-33.36723188	115.6925915
Marri	580	0						No	No			-33.36731847	115.6926626
Flooded Gum	710	0						No	No			-33.36728633	115.6926235
Marri	530	0						No	No			-33.3673475	115.6925828
Flooded Gum	790	0						No	No			-33.36739703	115.6925279
Marri	570	0						No	No			-33.36746115	115.6924655
Flooded Gum	740	0						No	No			-33.36761082	115.6922995
Marri	730	0						No	No			-33.36766715	115.6922264
Marri	540	0						No	No			-33.36771528	115.6921792
Marri	610	0						No	No			-33.3677602	115.6922058
Marri	800	0						No	No			-33.36781405	115.6921825
Flooded Gum	829	0						No	No			-33.36785397	115.6925152
Flooded Gum	700	0						No	No			-33.36796742	115.6925111
Marri	550	0						No	No			-33.36777182	115.6924809
Marri	530	0						No	No			-33.36777215	115.6925662
Flooded Gum	610	0						No	No			-33.36754283	115.6921686
Flooded Gum	580	0						No	No			-33.36759235	115.6921883
Flooded Gum	920	0						No	No			-33.36754658	115.6921635
Flooded Gum	1020	0						No	No			-33.36748647	115.6922993
Marri	560	0						No	No			-33.3674046	115.692306
Marri	530	0						No	No			-33.36737083	115.6923367
Marri	670	0						No	No			-33.367381	115.6923686
Marri	630	0						No	No			-33.36726893	115.6922753
Marri	520	0						No	No			-33.36726972	115.692292
Marri	570	0						No	No			-33.36727337	115.6923544
Marri	650	0						No	No			-33.36720477	115.6923784
Marri	680	0						No	No			-33.36714792	115.692459
Marri	720	0						No	No			-33.36689062	115.6924719
Flooded Gum	700	0						No	No			-33.36547688	115.6862856
Flooded Gum	540	0						No	No			-33.365212	115.6865006
Flooded Gum	700	0						No	No			-33.3651326	115.686499
Flooded Gum	610	0						No	No			-33.36496875	115.6865801
Flooded Gum	750	0						No	No			-33.36499155	115.6866599
Flooded Gum	670	0						No	No			-33.36490793	115.6869949

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	880	0						No	No			-33.36489412	115.6869996
Flooded Gum	1050	0						No	No			-33.36486317	115.6869877
Flooded Gum	680	0						No	No			-33.36484447	115.6865078
Flooded Gum	620	0						No	No			-33.36486702	115.6849406
Flooded Gum	580	0						No	No			-33.36485627	115.6849223
Marri	560	0						No	No			-33.36553838	115.684538
Marri	600	0						No	No			-33.36538317	115.6849249
Marri	640	0						No	No			-33.36543285	115.6849681
Marri	590	0						No	No			-33.36553047	115.6851915
Marri	570	0						No	No			-33.36687822	115.6847651
Marri	610	0					Yes	No	No	active beehive, recent redtail foraging		-33.36699752	115.6845732
Flooded Gum	1010	0						No	No			-33.36563135	115.684357
Flooded Gum	550	0						No	No			-33.36526388	115.6914959
Flooded Gum	800	0						No	No			-33.36525217	115.6914908
Flooded Gum	900	0						No	No			-33.36520752	115.6916228
Flooded Gum	1050	0						No	No			-33.36515745	115.6916776
Flooded Gum	1050	0						No	No			-33.36509148	115.6917201
Flooded Gum	1150	0						No	No			-33.36506645	115.6917409
Flooded Gum	750	0						No	No			-33.3650505	115.691752
Flooded Gum	1400	0						No	No			-33.36508117	115.6917632
Flooded Gum	680	0						No	No			-33.36515198	115.6919694
Flooded Gum	600	0						No	No			-33.36520913	115.691963
Flooded Gum	650	0						No	No			-33.36522525	115.6919542
Flooded Gum	600	0						No	No			-33.36529932	115.6920326
Flooded Gum	900	0						No	No			-33.3653031	115.6920653
Flooded Gum	1000	0						No	No			-33.36532267	115.6921518
Flooded Gum	1270	0						No	No			-33.36534627	115.6921265
Marri	740	0						No	No			-33.36536327	115.692093
Flooded Gum	750	0						No	No			-33.3654186	115.692101
Flooded Gum	600	0						No	No			-33.36545702	115.692117
Flooded Gum	730	0						No	No			-33.36547918	115.6921552
Flooded Gum	790	0						No	No			-33.3655407	115.6922225
Marri	650	0						No	No			-33.36562703	115.6922055
Marri	740	0						No	No			-33.36559955	115.6920944
Marri	650	0						No	No			-33.36560007	115.6920464
Marri	660	0						No	No			-33.36559533	115.6920427
Marri	520	0						No	No			-33.3655629	115.6920092
Flooded Gum	550	0						No	No			-33.36521022	115.6921588
Flooded Gum	880	0						No	No			-33.36509487	115.692189
Flooded Gum	980	0						No	No			-33.3650424	115.692205
Flooded Gum	680	0						No	No			-33.36500965	115.6922376
Flooded Gum	620	0						No	No			-33.3650006	115.6921643

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	550	0						No	No			-33.36505447	115.6920511
Flooded Gum	580	0						No	No			-33.36506987	115.6920335
Flooded Gum	1000	0						No	No			-33.36495798	115.6919193
Flooded Gum	1260	0						No	No			-33.36493323	115.6919344
Flooded Gum	620	0						No	No			-33.36492957	115.6919302
Flooded Gum	630	0						No	No			-33.3649164	115.6919306
Flooded Gum	700	0						No	No			-33.364903	115.6919903
Flooded Gum	950	0						No	No			-33.36489703	115.6920353
Flooded Gum	1080	0						No	No			-33.36486418	115.692071
Flooded Gum	820	0						No	No			-33.36474065	115.692056
Flooded Gum	770	0						No	No			-33.36471058	115.6920076
Flooded Gum	910	0						No	No			-33.36470788	115.692014
Flooded Gum	1360	0						No	No			-33.36468118	115.6920232
Flooded Gum	830	0						No	No			-33.36467275	115.6920319
Flooded Gum	750	0						No	No			-33.36466547	115.6920473
Flooded Gum	790	0						No	No			-33.36466792	115.6920631
Marri	910	0					Yes	No	No	old red tail foraging		-33.36442622	115.6920474
Marri	690	0					Yes	No	No	old red tail foraging		-33.3643947	115.6920674
Marri	850	0						No	No			-33.36439202	115.6920713
Flooded Gum	700	0						No	No			-33.36438537	115.692306
Flooded Gum	700	0						No	No			-33.364639	115.6922385
Flooded Gum	720	0						No	No			-33.36464635	115.6922716
Flooded Gum	730	0						No	No			-33.36463932	115.6922933
Flooded Gum	980	0						No	No			-33.36467898	115.6922951
Flooded Gum	880	0						No	No			-33.36469747	115.6923108
Flooded Gum	1140	0						No	No			-33.36470553	115.6923269
Flooded Gum	880	0						No	No			-33.3647611	115.6922709
Marri	850	0					Yes	No	No	recent red tail foraging		-33.36464912	115.6927384
Marri	640	0					Yes	No	No	old red tail foraging		-33.36436433	115.6928167
Marri	860	0					Yes	No	No	old red tail foraging		-33.36437703	115.6928094
Flooded Gum	1120	0						No	No			-33.36476765	115.6923214
Flooded Gum	820	0						No	No			-33.36495383	115.6924331
Flooded Gum	570	0						No	No			-33.36495535	115.6924279
Flooded Gum	710	0						No	No			-33.36495368	115.6923874
Flooded Gum	1100	0						No	No			-33.36498642	115.6924012
Flooded Gum	590	0						No	No			-33.36501508	115.6923699
Flooded Gum	880	0						No	No			-33.36504608	115.6923991
Flooded Gum	1250	0						No	No			-33.36507467	115.6924212
Flooded Gum	640	0						No	No			-33.3651368	115.6924445
Flooded Gum	910	0						No	No			-33.36517217	115.6924623
Flooded Gum	680	0						No	No			-33.3652598	115.6924088
Flooded Gum	1000	0						No	No			-33.36529307	115.6923901

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	1200	0						No	No			-33.36534612	115.6924267
Flooded Gum	810	0						No	No			-33.36538825	115.6924312
Flooded Gum	700	0						No	No			-33.36541793	115.6924361
Flooded Gum	680	0						No	No			-33.36550348	115.6924004
Flooded Gum	730	0						No	No			-33.36555093	115.6923916
Flooded Gum	680	0						No	No			-33.36555165	115.6924247
Flooded Gum	720	0						No	No			-33.36556422	115.6924467
Flooded Gum	790	0						No	No			-33.3655847	115.692456
Flooded Gum	1800	0						No	No			-33.36548537	115.6895401
Marri	650	0						No	No			-33.36579172	115.6920647
Marri	900	0						No	No			-33.365831	115.6920951
Marri	750	0						No	No			-33.36587442	115.6921174
Marri	520	0						No	No			-33.3659189	115.6922736
Marri	510	0						No	No			-33.36592952	115.6922967
Marri	660	0						No	No			-33.36598765	115.6923101
Marri	660	0						No	No			-33.36606695	115.6923207
Marri	820	0						No	No			-33.36608783	115.6923503
Marri	780	0						No	No			-33.36612562	115.6923746
Flooded Gum	550	0						No	No			-33.36601155	115.6924444
Flooded Gum	750	0						No	No			-33.36602367	115.6925244
Flooded Gum	740	0						No	No			-33.36597547	115.6925186
Flooded Gum	560	0						No	No			-33.36591788	115.6925271
Flooded Gum	520	0						No	No			-33.36590435	115.6925229
Flooded Gum	530	0						No	No			-33.36590358	115.6925209
Flooded Gum	600	0						No	No			-33.3658849	115.6926056
Flooded Gum	780	0						No	No			-33.36586715	115.6925625
Flooded Gum	740	0						No	No			-33.36585053	115.6925355
Marri	750	0						No	No			-33.36579008	115.6926326
Flooded Gum	800	0						No	No			-33.36571895	115.6925427
Flooded Gum	750	0						No	No			-33.36573105	115.6924135
Flooded Gum	600	0						No	No			-33.36573598	115.6923683
Marri	900	0						No	No			-33.36579217	115.6922989
Marri	570	0						No	No			-33.36582725	115.6922491
Flooded Gum	570	0						No	No			-33.36586453	115.6923903
Flooded Gum	660	0						No	No			-33.36589113	115.6924032
Flooded Gum	520	0						No	No			-33.36592435	115.6924044
Marri	820	0						No	No			-33.36574983	115.6928096
Marri	870	0						No	No			-33.36591353	115.6927588
Marri	600	0						No	No			-33.36786847	115.6920811
Marri	520	0						No	No			-33.36787637	115.6921039
Marri	550	0						No	No			-33.36794302	115.6920855
Marri	710	0						No	No			-33.36789678	115.6920782

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Marri	590	0					Yes	No	No	baudins foraging		-33.36797447	115.6920239
Marri	540	0						No	No			-33.3680117	115.692004
Marri	540	0						No	No			-33.36805028	115.6919689
Marri	500	0						No	No			-33.36806243	115.6919644
Marri	710	0						No	No			-33.36807905	115.6919431
Marri	520	0						No	No			-33.36811143	115.6919482
Marri	540	0					Yes	No	No	recent red tail foraging		-33.36813287	115.6919632
Flooded Gum	510	0					Yes	No	No	recent red tail foraging		-33.36814218	115.6921145
Flooded Gum	720	0					Yes	No	No	recent red tail foraging		-33.36811667	115.6922793
Marri	570	0					Yes	No	No	recent red tail foraging		-33.36826063	115.6919775
Marri	700	0					Yes	No	No	recent red tail foraging & baudins		-33.36821703	115.6919163
Marri	670	0					Yes	No	No	recent red tail foraging & baudins		-33.36827953	115.6918931
Marri	570	0					Yes	No	No	recent red tail foraging & baudins		-33.36846642	115.6917998
Marri	750	0					Yes	No	No	recent red tail foraging & baudins		-33.36866368	115.6916426
Marri	900	0						No	No			-33.36854245	115.6914807
Marri	640	0						No	No			-33.36868507	115.6914221
Flooded Gum	900	0						No	No			-33.36872058	115.6915228
Flooded Gum	570	0						No	No			-33.36872323	115.6916597
Flooded Gum	530	0						No	No			-33.36864817	115.6917266
Flooded Gum	520	0						No	No			-33.36863557	115.6917503
Flooded Gum	610	0						No	No			-33.36855493	115.6919886
Flooded Gum	530	0						No	No			-33.36850232	115.6920662
Flooded Gum	520	0						No	No			-33.36848312	115.6920845
Flooded Gum	540	0						No	No			-33.36842182	115.6921046
Flooded Gum	610	0						No	No			-33.36842048	115.6920929
Flooded Gum	600	0						No	No			-33.36836648	115.6921693
Flooded Gum	810	0						No	No			-33.36826755	115.6922926
Marri	500	0						No	No			-33.36882687	115.6912373
Marri	640	0						No	No			-33.368862	115.6911783
Marri	580	0						No	No			-33.36888763	115.691152
Marri	620	0						No	No			-33.36890947	115.6910743
Marri	630	0						No	No			-33.36890915	115.691064
Flooded Gum	600	0						No	No			-33.36914882	115.6908135
Flooded Gum	510	0						No	No			-33.36915792	115.6907918
Marri	560	0					Yes	No	No	recent red tail foraging		-33.36917023	115.6906904
Marri	670	0					Yes	No	No	recent red tail foraging		-33.36916165	115.6906597
Marri	540	0						No	No			-33.36918537	115.690661
Marri	680	0						No	No			-33.36923817	115.6904711
Marri	530	0						No	No			-33.36926742	115.6904645
Marri	670	0						No	No			-33.36928695	115.6904605
Marri	530	0						No	No			-33.36938657	115.690559
Marri	670	0						No	No			-33.3694716	115.6905548

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Marri	690	0						No	No			-33.3695628	115.6904396
Marri	510	0						No	No			-33.3696278	115.6903868
Marri	550	0						No	No			-33.36963483	115.6903849
Flooded Gum	540	0						No	No			-33.36970915	115.6903988
Marri	520	0						No	No			-33.36982137	115.690299
Stag	1000	3	<10			Unsuitable		No	No	old stag w multiple small hollows, but none very suitable		-33.36992352	115.690232
Marri	640	0					Yes	No	No	old redtail foraging		-33.37011548	115.690217
Marri	580	0					Yes	No	No	old redtail foraging		-33.37014777	115.6901941
Flooded Gum	700	0						No	No			-33.37022996	115.6902728
Marri	510	0						No	No			-33.37020642	115.6901867
Marri	570	0						No	No			-33.37027233	115.6901378
Marri	730	0						No	No			-33.370386	115.690111
Marri	580	0					Yes	No	No	recent red tail foraging		-33.37042278	115.6901127
Marri	600	0					Yes	No	No	recent red tail foraging		-33.3705772	115.6900916
Marri	540	0						No	No			-33.37058173	115.6900695
Marri	580	0						No	No			-33.37058477	115.6899877
Marri	790	0						No	No			-33.37070045	115.6898572
Marri	610	0						No	No			-33.37075058	115.6898503
Marri	780	1	15	10		Suitable	Yes	No	No	chews, old red tail foraging	1728	-33.37075228	115.6897311
Marri	820	0						No	No			-33.37067755	115.6897382
Marri	1180	0						No	No			-33.37051055	115.6898115
Marri	570	0						No	No			-33.3704855	115.6897921
Marri	530	0					Yes	No	No	recent redtail foraging		-33.37046862	115.689919
Marri	660	0						No	No			-33.370736	115.6890818
Marri	760	0						No	No			-33.37077838	115.6890169
Marri	680	0						No	No			-33.3707719	115.6888945
Marri	850	0						No	No			-33.37075043	115.6887713
Marri	560	0						No	No			-33.36888625	115.6902134
Marri	840	0						No	No			-33.36871933	115.6904978
Marri	820	0						No	No			-33.36879625	115.6907687
Stag	900	3	10-30	5-8		Possible		No	No	burnt out stag w possible hollows, no chews	1732	-33.36873475	115.6909035
Marri	690	0						No	No			-33.368494	115.6912369
Marri	1170	0						No	No			-33.36815735	115.6913157
Marri	870	0						No	No			-33.36719523	115.6919099
Marri	700	0						No	No			-33.3671824	115.6917627
Marri	670	0						No	No			-33.36718047	115.6917095
Flooded Gum	550	0						No	No			-33.36711205	115.6907814
Flooded Gum	600	0						No	No			-33.36707183	115.6907158
Flooded Gum	580	0						No	No			-33.36705873	115.6903607
Flooded Gum	840	0						No	No			-33.36708715	115.6903413
Flooded Gum	520	0						No	No			-33.36709333	115.6903259
Flooded Gum	910	0						No	No			-33.36711043	115.6903026

Tree Species	DBH	No. Hollows	Hollow size	Hollow Height	Hollow angle	Hollow Suitability	Feeding evidence	Breeding evidence	Roosting evidence	Notes	Photo ID	Latitude	Longitude
Flooded Gum	610	0						No	No			-33.3671252	115.6902619
Flooded Gum	570	0						No	No			-33.36719732	115.6901163
Flooded Gum	890	0						No	No			-33.3672655	115.6900576
Flooded Gum	1050	0						No	No			-33.36730743	115.6900594
Flooded Gum	1150	0						No	No			-33.36736385	115.6899476
Flooded Gum	700	0						No	No			-33.36768282	115.6899985
Flooded Gum	650	0						No	No			-33.36737282	115.6896606
Flooded Gum	610	0						No	No			-33.36715847	115.6894473
Flooded Gum	510	0						No	No			-33.3670667	115.6896725
Flooded Gum	630	0						No	No			-33.36701787	115.6897042
Flooded Gum	580	0						No	No			-33.36690822	115.6896668
Flooded Gum	510	0						No	No	multi stemmed		-33.36691205	115.6895337
Flooded Gum	500	0						No	No			-33.3670126	115.6895055
Flooded Gum	560	0						No	No			-33.36698743	115.6897884
Flooded Gum	510	0						No	No			-33.36694313	115.6897996
Flooded Gum	710	0						No	No			-33.36688202	115.6899651
Flooded Gum	500	0						No	No			-33.36691258	115.6900215
Flooded Gum	560	0						No	No			-33.36706265	115.6900397
Flooded Gum	500	0						No	No			-33.3670729	115.6901235
Flooded Gum	800	0						No	No			-33.36685573	115.6903475
Flooded Gum	910	0						No	No			-33.36686223	115.6903581
Flooded Gum	650	0						No	No			-33.3668776	115.6903852
Flooded Gum	710	0						No	No			-33.36675048	115.6905442
Flooded Gum	940	0						No	No			-33.36662983	115.6903753
Flooded Gum	700	0						No	No			-33.36663605	115.6903283
Flooded Gum	850	0						No	No			-33.36662802	115.6902928
Flooded Gum	560	0						No	No			-33.36666182	115.6902602
Flooded Gum	570	0						No	No			-33.36668618	115.690269
Flooded Gum	790	0						No	No			-33.3667197	115.6902721
Flooded Gum	550	0						No	No			-33.3666496	115.6902297
Flooded Gum	910	0						No	No			-33.36665677	115.6901545
Flooded Gum	880	0						No	No			-33.36667607	115.6900636
Flooded Gum	500	0						No	No			-33.3666858	115.6899899
Flooded Gum	1020	0						No	No			-33.36672025	115.6899421
Flooded Gum	510	0						No	No			-33.36674497	115.6898919
Flooded Gum	520	0						No	No			-33.3667605	115.6898524
Marri	670	0						No	No			-33.36645637	115.6902624
Marri	640	0						No	No			-33.3662691	115.6918979


GHD