

Appendix G – Environmental Management Plan

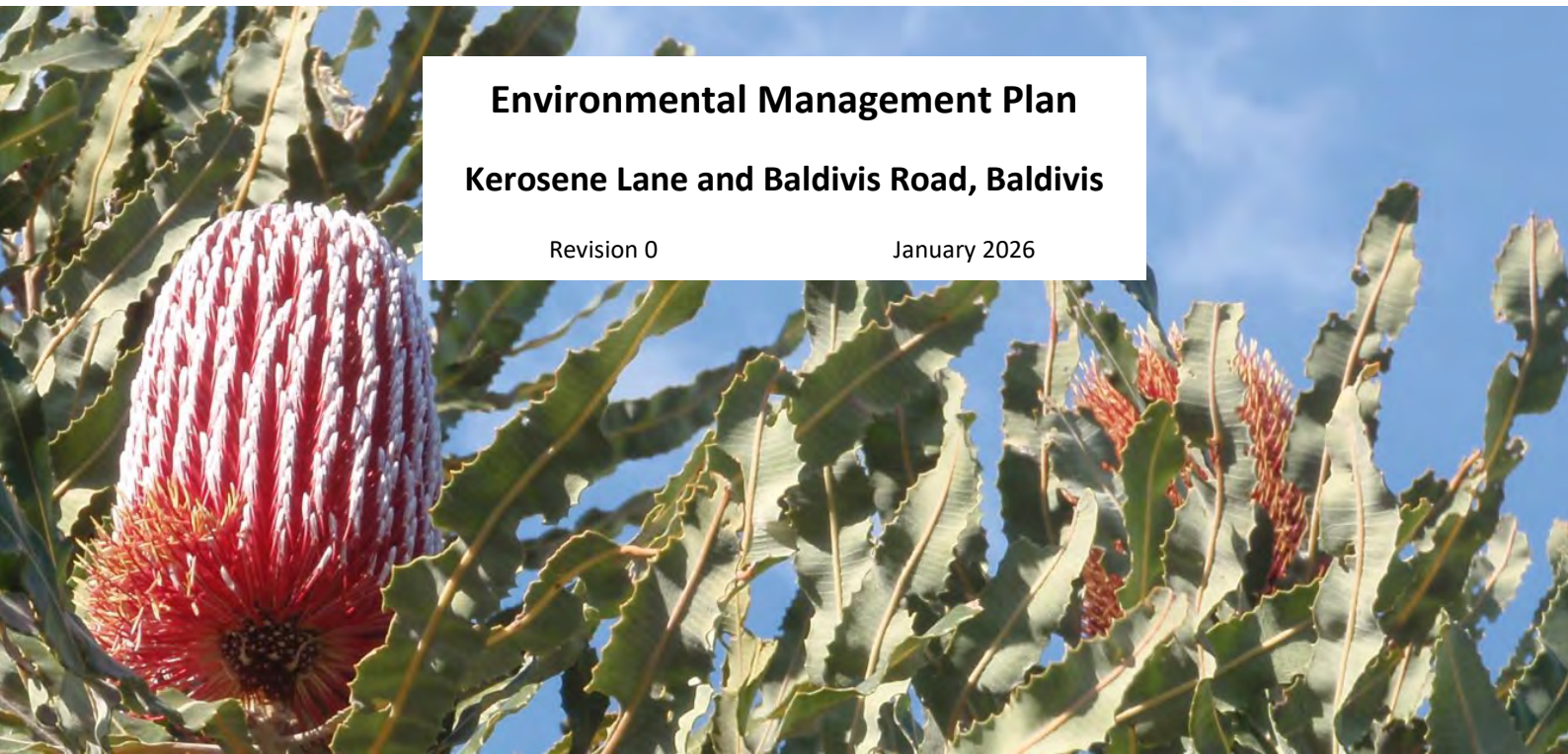


COTERRA
ENVIRONMENT

Environmental Management Plan
Kerosene Lane and Baldivis Road, Baldivis

Revision 0

January 2026



CALIBRE | COMMITMENT | COLLABORATION

This report was prepared by: Coterra Pty Ltd trading as COTERRA ENVIRONMENT
ABN: ABN: 92 143 411 456
Our Ref: CWMKER02
Author(s): C. Norman
Reviewer: K. Watts
Report Version: Revision 0
Date: January 2026

This report was prepared for:
CWM Property Holdings
C/- Element Advisory Pty Ltd
L18, 191 St Georges Terrace
Perth WA 6000

Contents

1	Introduction.....	7
1.1	Background	7
1.2	Planning Context and Existing Land Use	7
1.3	Purpose of Report	7
1.4	Relevant Legislation, Guidance and Policies	7
1.4.1	State Legislation	7
1.4.2	Federal Legislation.....	8
1.4.3	City of Rockingham Guidance and Policies.....	8
2	Existing Environment	9
2.1	Climate	9
2.1.1	Rainfall.....	9
2.1.2	Wind	9
2.2	Topography and Landform.....	12
2.3	Geology and Soils	13
2.3.1	Geotechnical Investigation.....	13
2.4	Hydrology	14
2.4.1	Groundwater	14
2.4.2	Surface Water.....	14
2.5	Flora and Vegetation	15
2.5.1	Vegetation Association.....	15
2.5.2	Vegetation Complex	17
2.5.3	Flora and Vegetation Assessment	17
2.6	Fauna and Habitat	19
2.6.1	Fauna and Habitat Site Assessment	19
2.6.2	Black Cockatoos.....	19
2.7	Conservation Areas	21
2.8	Bushfire Risk	21
2.9	Contaminated Sites and Land Use History	22
2.9.1	Contaminated Sites	22
2.9.2	Historical Land Uses	22
2.10	Heritage	23
2.10.1	European Heritage	23
2.10.2	Aboriginal Heritage.....	23
2.11	Surrounding Land Uses.....	24
3	Proposed Works and Excavation Program	25
3.1	Overview	25
3.2	Excavation Management.....	25
3.2.1	Resource Extraction.....	25
3.2.2	Processing.....	25
3.2.3	Stages	25
3.2.4	Site Facilities, Machinery and Equipment	26
3.2.5	Water and Energy Usage	26
3.2.6	Fuel Use and Storage.....	26



3.2.7	Access and Transport	26
3.3	Post Extraction Land Use	27
4	Potential Environmental Impacts and Proposed Management	28
4.1	Native Vegetation	28
4.1.1	Potential Impacts	28
4.1.2	Management and Mitigation	29
4.2	Fauna and Habitat Disturbance.....	29
4.2.1	Potential Impacts	29
4.2.2	Management and Mitigation	30
4.3	Water Supply.....	30
4.3.1	Potential Impacts	30
4.3.2	Management.....	30
4.4	Topsoil and Overburden.....	30
4.4.1	Potential Impacts	30
4.4.2	Management and Mitigation	31
4.5	Noise Generation	31
4.5.1	Potential Impacts	31
4.5.2	Management and Mitigation	31
4.6	Air Quality	32
4.6.1	Potential Impacts	32
4.6.2	Management and Mitigation	32
4.7	Contamination.....	33
4.7.1	Potential Impacts	33
4.7.2	Management and Mitigation	33
4.8	Drainage	34
4.8.1	Potential Impacts	34
4.8.2	Management and Mitigation	34
4.9	Waste and Rubbish	34
4.9.1	Potential Impacts	34
4.9.2	Management and Mitigation	34
4.10	Surrounding Land Uses.....	35
4.10.1	Potential Impacts	35
4.10.2	Management and Mitigation	35
4.11	Visual Amenity.....	35
4.11.1	Potential Impacts	35
4.11.2	Management and Mitigation	35
4.12	Heritage.....	36
4.12.1	Potential Impacts	36
4.12.2	Management and Mitigation	36
4.13	Fire.....	36
4.13.1	Potential Impacts	36
4.13.2	Management and Mitigation	36
4.14	Traffic Impacts.....	36
5	Implementation Summary	38
6	References	40

Tables

Table 2-1: Land Degradation Risk Categories	13
Table 2-2: Pre-European Vegetation Statistics	16
Table 2-3: Karrakatta Complex – Central and South Vegetation Statistics.....	17
Table 2-4: Trees with potentially suitable hollows	20
Table 4-1: Vegetation extent within extraction area	28
Table 5-1: Implementation Summary	38

Plates

Plate 2-1: Mean Maximum temperature and Mean Rainfall – Jandakot Aero.....	9
Plate 2-2: January 9 am Wind Rose	10
Plate 2-3: January 3 pm Wind Rose	10
Plate 2-4: July 9 am Wind Rose.....	11
Plate 2-5: July 3 pm Wind Rose.....	11
Plate 2-6: Typical Site landform	12
Plate 2-7: Typical Site Landform	12
Plate 2-8: Surface water storage areas within Lot 293	15
Plate 2-9: Vegetation Association mapping.....	16
Plate 2-10: Native Vegetation Type mapping	18
Plate 2-11: Black Cockatoo Habitat Trees.....	21
Plate 2-12: Bush Fire Prone Areas	22
Plate 2-13: Aboriginal Heritage.....	23

Figures

Figure 1	Site Location
Figure 2	Topography and Soils
Figure 3	Flora and Vegetation
Figure 4	Fauna and Habitat

Appendices

Appendix 1	Biological Assessment (Ecoscape, 2024)
Appendix 2	Stage 1 Hollow Inspection (Harewood, 2025)
Appendix 3	Site Levels Plan



Appendix 4 Injured Fauna Protocol

Appendix 5 Dust Assessment

1 Introduction

1.1 Background

CWM Property Holdings are proposing to undertake sand and limestone extraction across multiple lots on Kerosene Lane and Baldivis Road, Baldivis within an 11.75 ha extraction area. The overall site extends over approximately 21 ha and comprises the following lots (Figure 1):

- Lot 293 (No. 249) Kerosene Lane, Baldivis
- Lot 1214 (No. 220) Baldivis Rd, Baldivis
- Lot 1215 (No. 206) Baldivis Rd, Baldivis
- Portion of Lot 800 on DP072939.

The site is located approximately 35 kilometres (km) south of the Perth Central Business District (CBD), within the City of Rockingham (Figure 1).

1.2 Planning Context and Existing Land Use

All properties within the site are currently zoned 'Rural' under both the Metropolitan Region Scheme (MRS) and the City of Rockingham's Town Planning Scheme No. 2 (TPS2). Under the Perth and Peel @ 3.5 Million framework, the properties within the site are zoned 'Urban Investigation' (CoR, 2024).

The site and has historically been used for agricultural purposes, with current land uses visible on Figure 1.

1.3 Purpose of Report

This report has been prepared to provide information on the existing environmental values of the site and surrounds, identify potential environmental impacts associated with the proposed development and to outline actions proposed to mitigate and manage these matters.

1.4 Relevant Legislation, Guidance and Policies

1.4.1 State Legislation

1.4.1.1 Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the pre-eminent environmental legislation in Western Australia. The EP Act has a number of Environmental Protection Policies and Regulations which provide guidance on environmental management.

1.4.1.2 Environmental Protection (Clearing of Native Vegetation) Regulations 2004

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* regulate the clearing of native vegetation in Western Australia. The regulations identify the requirements for obtaining a Native Vegetation Clearing Permit and identify potential exemptions.

1.4.1.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) and *Biodiversity Conservation Regulations 2018* provide protection for Western Australia's biodiversity, including threatened species and threatened ecological communities. They identify the requirements for approvals relating to impacts to flora, fauna and ecological communities, reporting and development of environmental plans and agreements.

1.4.1.4 State Policies and Guidance

The following State Planning Policies are potentially relevant to development proposed at the site:

- State Planning Policy (SPP) 2.0 – Environment and Natural Resources Policy (WAPC, 2003)
- SPP 2.4 – Planning for Basic Raw Materials (DPLH & WAPC, 2021a), and the associated Planning for Basic Raw Materials Guidelines (DPLH & WAPC, 2021b)
- SPP 2.9 –Water, and the associated Planning for Water Guidelines (DPLH & WAPC, 2025)
- SPP 3.7 - Planning in bushfire prone areas (DoP & WAPC, 2015).

In addition, the following Environmental Protection Authority (EPA) technical guidance document have been considered in the preparation of this report:

- Separation Distances Between Industrial and Sensitive Land Uses (EPA, 2005)
- Flora and Vegetation surveys for Environmental Impact Assessment (EPA, 2016)
- Terrestrial vertebrate surveys for Environmental Impact Assessment (EPA, 2020).

1.4.2 Federal Legislation

1.4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect and manage nine Matters of National Environmental Significance (MNES) throughout Australia, including:

- World Heritage Properties
- National Heritage Places
- Wetlands of international importance (listed under the Ramsar Convention)
- Nationally threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth Marine Areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- Water resources, that relate to unconventional gas development and large coal mining development.

Referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) under this Act is required where an action may have a significant impact on any MNES.

1.4.3 City of Rockingham Guidance and Policies

The City of Rockingham has developed several local planning policies (LPP) and environmental guidance documents which are relevant to planning and environmental matters related to the site, including:

- Planning Policy No. 3.1.1 – Rural Land Strategy
- Planning Policy No. 7.2 – Local Bushland Strategy
- Planning Procedure 1.9 – Dust Management
- Planning Procedure 1.10 – Extractive Industries
- Planning Procedure 1.23 – Environmental Assessment.

2 Existing Environment

2.1 Climate

The Perth metropolitan region experiences a Mediterranean climate with warm dry summers and cooler, wet winters. The closest Bureau of Meteorology (BoM) weather station to the site is the Jandakot Aero Station (Site No. 009172), located approximately 20 km north of the site (BoM, 2025).

2.1.1 Rainfall

Jandakot experiences an annual mean rainfall of 812.0 millimetres (mm), with highest mean rainfall experienced in July (average 175.00 mm) and lowest mean rainfall in December (9.8 mm) (Plate 2-1; BoM, 2025).

Mean maximum temperatures are highest in February (31.7°C) and mean minimum temperatures are lowest in July (7.2°C) (Plate 2-1; BoM, 2025).

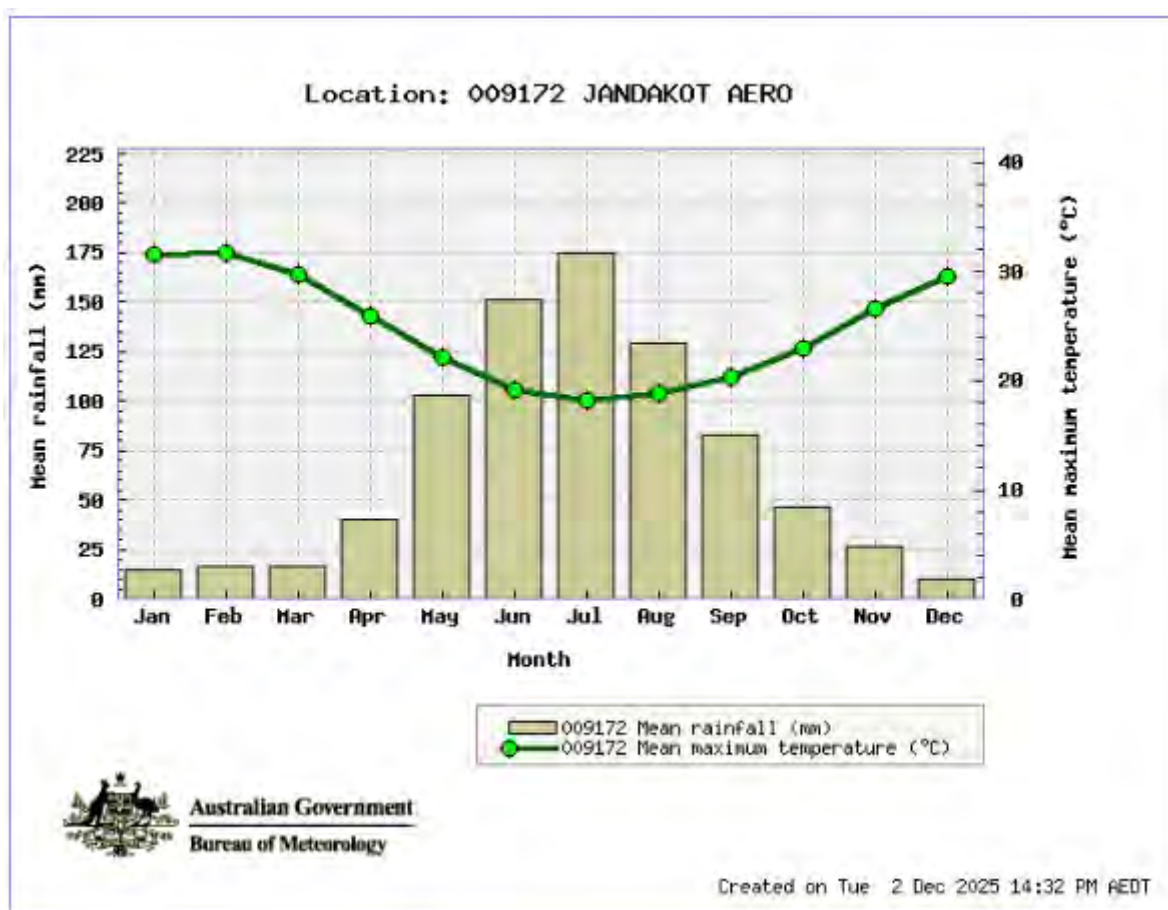
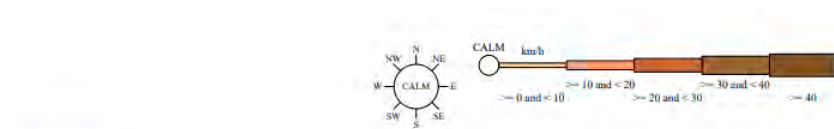


Plate 2-1: Mean Maximum temperature and Mean Rainfall – Jandakot Aero

Source: BoM, 2025

2.1.2 Wind

Strongest winds experienced in this location are summer morning easterlies and afternoon south-westerlies. In winter, strongest winds in the morning arise from a north and north-easterly direction, and afternoon westerly winds (Plate 2-2 to Plate 2-5; BoM, 2025).



9 am Jan
1051 Total Observations

Calm 1%

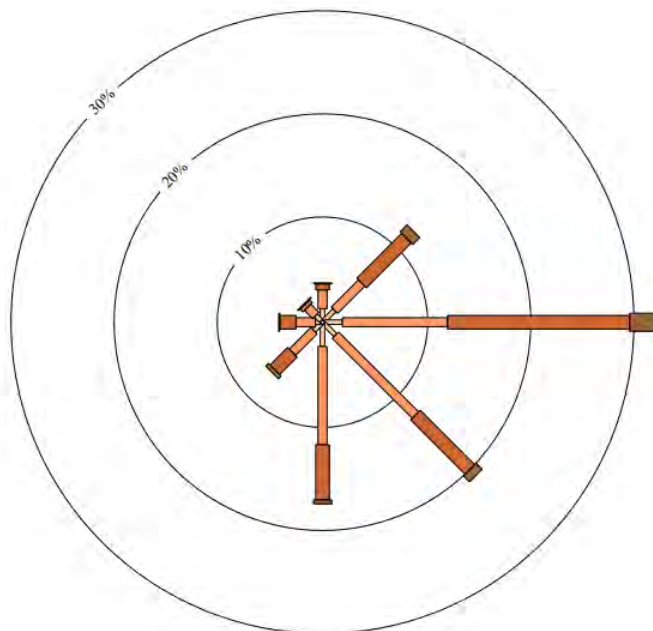
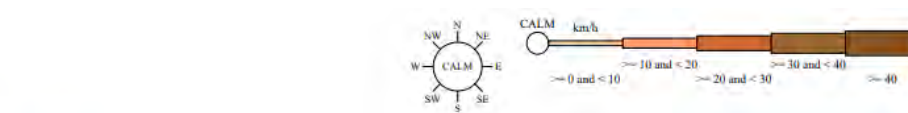


Plate 2-2: January 9 am Wind Rose



3 pm Jan
1000 Total Observations

Calm *

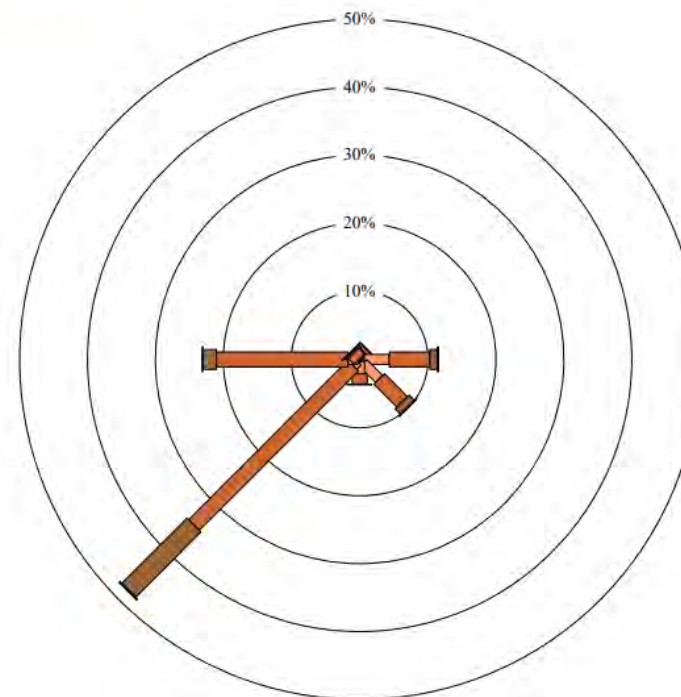
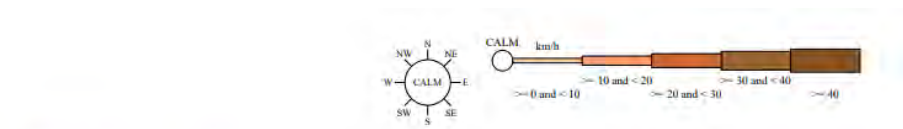


Plate 2-3: January 3 pm Wind Rose



9 am Jul
1083 Total Observations

Calm 9%

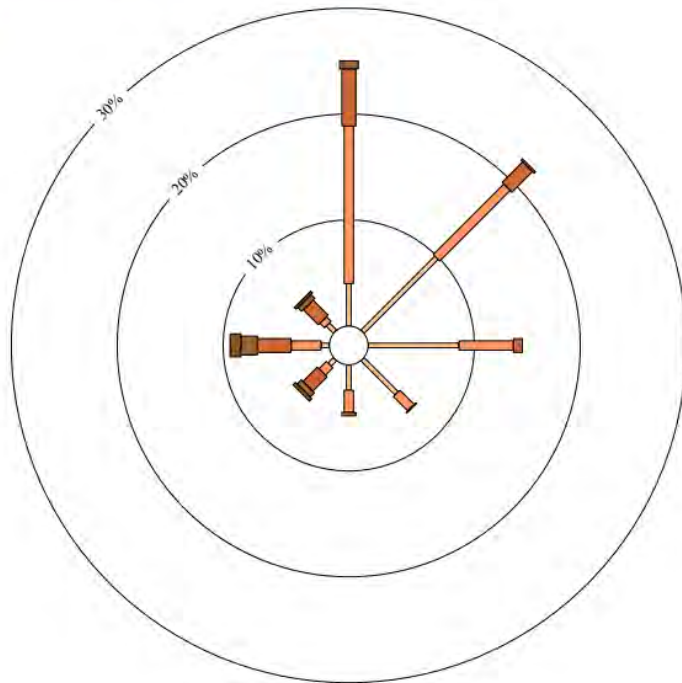
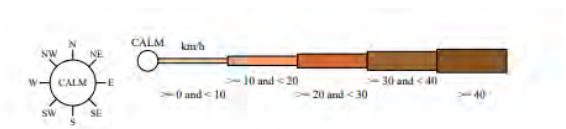


Plate 2-4: July 9 am Wind Rose

Source: BoM, 2025



3 pm Jul
1037 Total Observations

Calm 1%

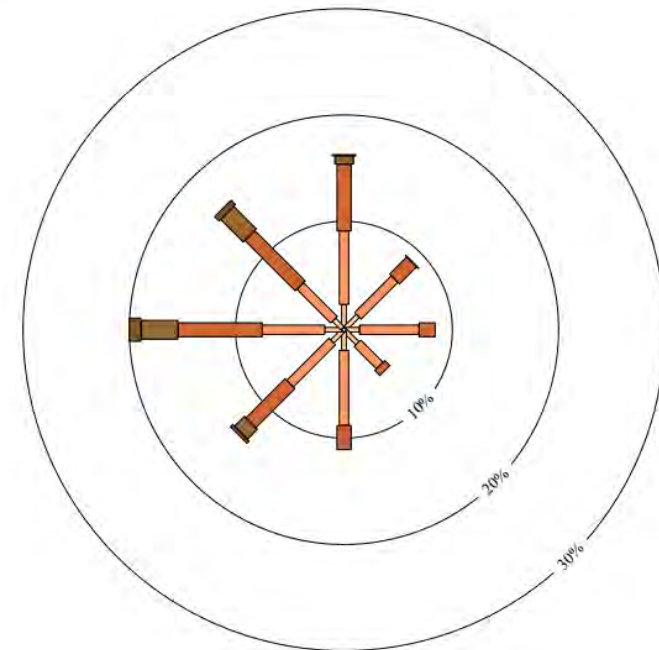


Plate 2-5: July 3 pm Wind Rose

2.2 Topography and Landform

Topography at the site ranges from approximately 6 metres Australian Height Datum (mAHD) in the east, to 28 mAHD at its highest point (MNG, 2025; Figure 2). Typical landform present at the site is shown below (Plate 2-6 and Plate 2-7).



Plate 2-6: Typical Site landform



Plate 2-7: Typical Site Landform

Source: Coterra Environment, 19 February 2025

2.3 Geology and Soils

Geological mapping indicates soils at the site comprise the following units (Gozzard, 1983; Figure 2):

- LS1: Limestone – pale yellowish brown, fine to coarse-grained, sub-angular to well-rounded quartz, trace of feldspar, shell debris, variable lithified, surface kankar, of eolian origin
- S7: Sand – pale yellowish brown, medium to coarse-grained, sub-angular quartz, trace of feldspar, moderately sorted, of residual origin.

Both the LS1 and S7 geological units are considered compatible with excavation (mining and quarrying) (Gozzard, 1983).

These soils comprise part of the Spearwood System, which is described as ‘Yellow Deep Sands, Pale Deep Sands and Yellow/ brown Shallow Sands’ (MNG Access, 2025). Soil subsystems at the site are mapped as the following units (DPIRD, 2025):

- Spearwood S1b Phase (unit 211Sp_S1b): Dune ridges with deep siliceous yellow brown sands of pale sands with yellow-brown subsoil and slopes up to 15% [*Located across the majority of the site*]
- Spearwood S2a Phase (unit 211Sp_S2a): Lower slopes (1-5%) of dune ridge with moderately deep to seep siliceous yellow-brown sands of pale sands with yellow-brown subsoils and minor limestone outcrop [*Located along the eastern boundary of the site*].

The Department of Primary Industries and Regional Development (DPIRD) outlines the below land degradation risk categories for each mapped phase (DPIRD, 2024; Table 2-1).

Table 2-1: Land Degradation Risk Categories

Land Degradation Risk Category	211Sp_S1b Phase	211Sp_S2a Phase
Water Erosion	0% of map unit has very high to extreme hazard	2% of map unit has very high to extreme hazard
Wind Erosion	100% of map unit has a high to extreme hazard	99% of map unit has a high to extreme hazard
Flood Hazard	0% of the map unit has a moderate to extreme hazard	0% of the map unit has a moderate to extreme hazard
Salinity Hazard	0% of the map unit has a moderate hazard	0% of the map unit has a moderate hazard
Waterlogging and Inundation	0% of map unit has a moderate to very high risk	0% of map unit has a moderate to very high risk

Source: DPIRD, 2025

2.3.1 Geotechnical Investigation

Galt Geotechnics have undertaken a geotechnical study for the site. Key outcomes include (Galt Geotechnics, 2025):

- The topsoil comprises sand to depths of 0.1 m, over surficial loose, and becoming medium dense to very dense with depths sand, over limestone, very weakly cemented.
- Groundwater was not encountered during field work.
- The site appeared to be generally clean sand, however some areas of uncontrolled fill were present.

The geotechnical report ultimately determined that sand on site contains only trace amounts of fines, however some sand with a fines context exceeding 5% are anticipated, and therefore would not be considered ‘free-draining’ sand as when compacted has a low permeability (Galt Geotechnics, 2025).

2.4 Hydrology

2.4.1 Groundwater

Regional scale water table contour mapping does not extend over the site. Targeted depth to groundwater searches for specific points within the online DWER Perth Groundwater Map indicates that maximum groundwater levels are likely to occur at approximately 2 to 3 mAHD (DWER, 2025a). This equates to a separation distance of between 4 to 27 m below ground level.

The site is underlain by the following aquifers (DWER, 2025b):

- Perth – Superficial Swan Aquifer (Stakehill area, Tamworth Swamp subarea): Allocation available
- Perth – Leederville Aquifer (Stakehill area, Stakehill Confined subarea): Fully allocated
- Perth - Yarragadee North Aquifer (Stakehill area, Stakehill Confined subarea): Limited Information.

The site currently contains two active groundwater licences (DWER, 2025b):

- Lot 293: Groundwater Licence Number 167607
 - Licence allocation of 4500KL annually from the Perth-Superficial Swan aquifer
 - Expiry date 4/11/2028
- Lot 800: Groundwater Licence Number 153582
 - Licence allocation of 20,000KL annually from the Perth-Superficial Swan aquifer
 - Expiry date 11/12/2032

2.4.2 Surface Water

The site does not contain any outstanding surface water features, including wetlands. The closest mapped wetland is located approximately 50 m immediately east of the site, being the Multiple Use Wetland (MUW) Unique Feature ID 16,021 (Landgate, 2025a). MUW's are the lowest category of wetland management and are assigned to those wetlands with few important ecological attributes and functions remaining (EPA, 2008). Retention of MUWs and provision of buffer zones is generally not required. These consideration are applicable to Conservation Category Wetlands (CCW) and Resource Enhancement Wetlands (REW). The closest CCW is over 1 km from the site.

The site contains several surface water storage areas associated with historic marron dams. These dams are currently unused and remain lined (Plate 2-8).



Plate 2-8: Surface water storage areas within Lot 293

Source: MNG, 2025 (Aerial date August 2025)

2.5 Flora and Vegetation

2.5.1 Vegetation Association

Broad scale mapping of pre-European vegetation within the Perth region was undertaken by Beard (1975) which recorded major categories of plants. Shepherd et al. (2002) reassessed Beard's mapping and divided some of the larger vegetation units into smaller units, which then resulted in a total of 819 vegetation units being mapped across the state.

The site is mapped containing the following broad vegetation types (Plate 2-9) (Landgate, 2025a):

- Spearwood 998: Medium woodland; tuart
- Spearwood 1001: Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina
- Pinjarra 968: Medium woodland; jarrah, marri & wandoo.

The remaining extent of these vegetation associations is summarised below (Table 2-2).

Table 2-2: Pre-European Vegetation Statistics

Area	Pre-European Extent	Current Extent	Current Extent managed in DBCA lands (proportion of Pre-European Extent)
Spearwood 998			
Western Australia (1B)	48,441.77 ha	17,667.16 ha (36.47%)	8,838.83 ha (21.24%)
Swan Coastal Plain (2B)	48,293.94 ha	17,666.85 ha (36.58%)	8,838.83 ha (21.30%)
City of Rockingham (4B)	5,319.33 ha	1,674.39 ha (31.48%)	-
Spearwood 1001			
Western Australia (1B)	3,566.72 ha	1,169.29 ha (32.78%)	2.25 ha (0.47%)
Swan Coastal Plain (2B)	3,566.72 ha	1,169.29 ha (32.78%)	2.25 ha (0.47%)
City of Rockingham (4B)	2,029.06 ha	858.99 ha (42.33%)	-
Pinjarra 968			
Western Australia (1B)	137,184.58 ha	9,172.10 ha (6.69%)	2009.62 ha (1.87%)
Swan Coastal Plain (2B)	135,999.02 ha	8,996.33 ha (6.61%)	1,948.40 ha (1.43%)
City of Rockingham (4B)	4,013.82 ha	148.11 ha (3.69%)	-

Source: GoWA, 2019a

**Plate 2-9: Vegetation Association mapping**

Source: Landgate, 2025

2.5.2 Vegetation Complex

Vegetation across the entire site is historically representative of the Karrakatta Complex – Central and South. This complex is described as ‘Predominantly open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) and woodland of *Eucalyptus marginata* (Jarrah) - *Banksia* species. *Agonis flexuosa* (Peppermint) is co-dominant south of the Capel River’ (Landgate, 2025a).

The remaining extent of the Karrakatta Complex – Central and South is summarised below (Table 2-3).

Table 2-3: Karrakatta Complex – Central and South Vegetation Statistics

Region	Pre-European Extent	Current Extent	Current Extent Secure for Conservation (EPA Definition)
Swan Coastal Plain	53,080.99 ha	12,467.20 ha (23.49%)	2,447.39 ha (4.61%)
Perth Metropolitan Region	34,596.71 ha	4,291.55 ha (12.40%)	480.41 ha (1.39%)
City of Rockingham	4,275.59 ha	1,129.95 ha (26.43%)	-

Source: GoWA, 2019b

2.5.3 Flora and Vegetation Assessment

Ecoscape undertook a Detailed Flora and Vegetation Survey of the site and broader landholdings from 29 to 30 October 2024, totalling an area of 22.12 ha (Appendix 1). A total of 65 vascular species were recorded, comprising 37 introduced species (57%). Two native vegetation types were recorded from within the survey area, being (Ecoscape, 2025; Plate 2-10):

- CcMOF (0.58 ha) – *Corymbia calophylla* mid open forest from isolated patches (located within site boundary)
- CcEgEmMOF (3.88 ha) – *Corymbia calophylla*, *Eucalyptus gomphocephala* and *Eucalyptus marginata* subsp. *marginata* mid open forest (not located within site boundary).

The majority of the survey area was devoid of native vegetation, except a few isolated native trees, and was predominantly covered by weedy grasses (Ecoscape, 2025).

A combination of the Ecoscape (2025) native vegetation type mapping plus identification of the vegetation/flora types associated with the paddock trees is provided on Figure 3.

The vegetation condition within the survey area was recorded as ‘Degraded’ and ‘Completely Degraded’, with areas considered not representative of intact native vegetation determined to be ‘Not vegetated/not native vegetation’ (Ecoscape, 2025; Figure 3).

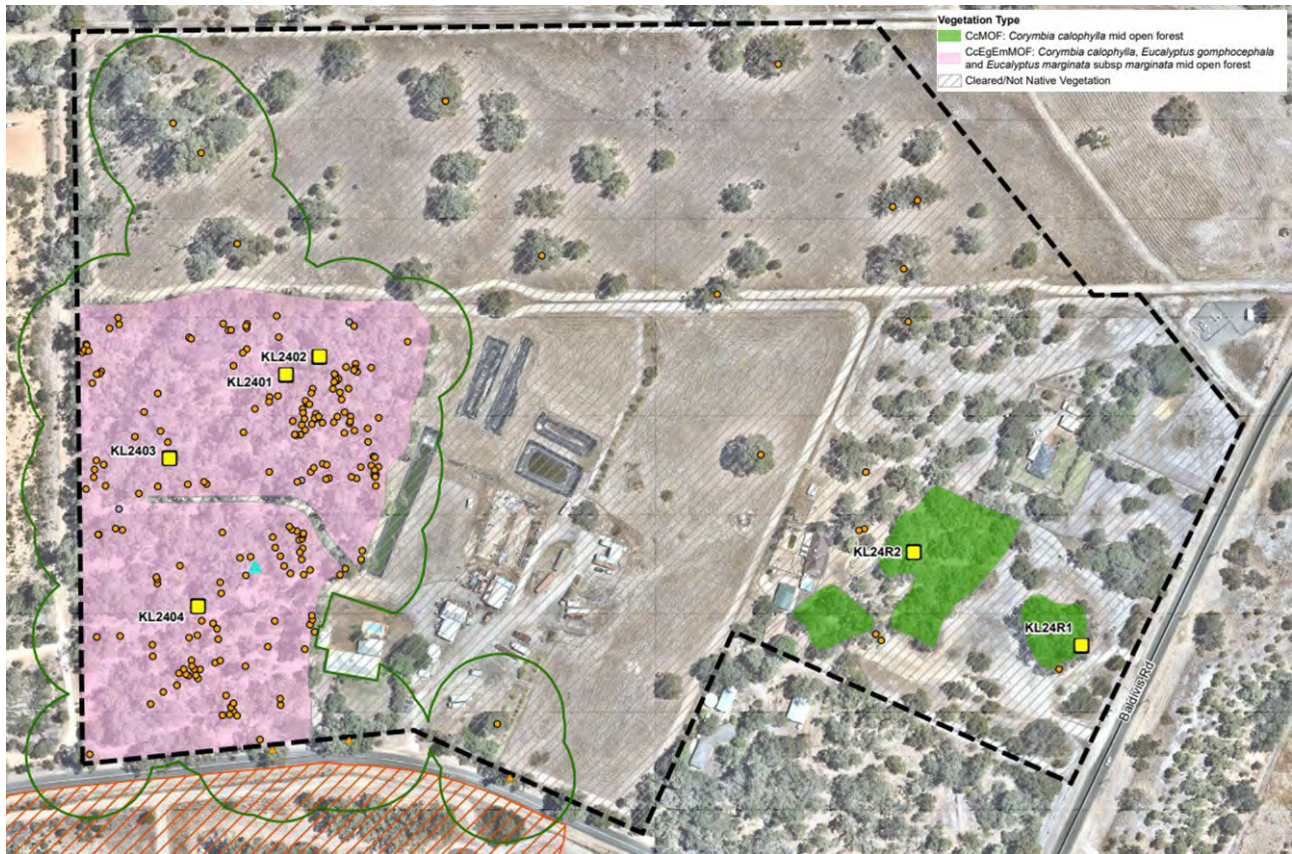


Plate 2-10: Native Vegetation Type mapping

Source: Ecoscape, 2025

2.5.3.1 Introduced Flora

A total of 37 introduced flora species were recorded during the field survey, comprising approximately 57% of the total flora inventory. Key findings in relation to weed species included (Ecoscape, 2025):

- *Zantedeschia aethiopica* (Arum Lily) was recorded in all quadrats, and comprised 95% of the ground cover in quadrat KL2403
- *Ehrharta calycina* (Perennial Veldt Grass) was recorded in three quadrats
- Two Declared Pest plants were recorded (*Arum Lily* and *Asparagus asparagoides* [Bridal Creeper]), however are in the 'Exempt' management category and therefore do not have any management requirements.

2.5.3.2 Conservation Significant Flora

Key outcomes from the survey in relation to conservation significant flora include (Ecoscape, 2025):

- No flora listed under the EPBC Act or the BC Act were recorded during the survey.
- No taxa that were not identifiable with certainty resembled any currently described Threatened or Priority flora
- No flora of general taxonomic interest were observed during the survey.

2.5.3.3 Threatened Ecological Communities

The desktop assessment of the survey area indicated that two Threatened Ecological Communities (TECs) could potentially occur within the survey area, being the Banksia Woodlands of the Swan Coastal Plain TEC

(Banksia Woodlands TEC) and Tuart Woodlands and Forests of the Swan Coastal Plain TEC (Tuart Woodlands TEC).

Following completion of the field work the south-western portion of the survey area was identified to be representative of the Tuart Woodlands TEC, with the area present being part of a broader patch located south of Kerosene Lane (Ecoscape, 2025; Figure 3). Vegetation representative of the Banksia Woodlands TEC was not found to be present onsite.

The Tuart TEC is listed as a TEC under the EPBC Act, and is recognised as a Priority Ecological Community (PEC) by the Department of Biodiversity, Conservation and Attractions (DBCA). Areas of impact of the Tuart TEC from the proposed action are limited to clearing of one tuart tree on the southern border of the site.

The Floristic Community Type (FCT) analysis confirmed that three of four quadrats assessed at the site were aligned with FCT 24 *Northern Spearwood shrublands & woodlands*, which when characterised by Tuart may be included as the Tuart TEC/PEC (Ecoscape, 2025).

2.6 Fauna and Habitat

2.6.1 Fauna and Habitat Site Assessment

On 29 and 30 October 2024, Ecoscape undertook a fauna and habitat assessment, and targeted black cockatoo habitat assessment for the broader 22.12 ha survey area (Appendix 1). Two fauna habitat types were observed, being (Ecoscape, 2025; Figure 4):

- Eucalypt Woodland (4.8 ha)
- Isolated Trees over Grassland (15.22 ha).

The Eucalypt woodland habitat type was observed to have the greatest fauna habitat significance, including for Quenda (*Isodon fusciventer*), but lacked structural diversity and was mostly devoid of mid-storey cover (Ecoscape, 2025).

A total of 32 vertebrate fauna species were recorded during the field survey, with most (29) being bird species that were insectivorous or carnivorous, reflecting the lack of diversity of seed-producing plants within the survey area. Two mammals were recorded (Quenda and Echidna; *Tachyglossus aculeatus*), however it is considered likely that other mammals such as Common Brushtail Possums (*Trichosurus vulpecula*) and feral species such as foxes (*Vulpes vulpes*) are present. One reptile was observed (Buchanan's Snake-Eyed Skink; *Cryptoblepharus buechananii*), however it is considered likely that other reptiles such as skinks, geckoes, goannas and snakes are present, but in low numbers due to the high proportion of predator bird species which were observed (Ecoscape, 2025).

2.6.2 Black Cockatoos

Ecoscape undertook a targeted Black Cockatoo assessment for the survey area on 29 and 30 October 2024, and determined that the site has habitat suitable for Carnaby's Black Cockatoo (CBC; *Zanda latirostris*) and Forest Red-tailed Black Cockatoo (FRTBC; *Calyptrorhynchus banksii naso*).

It was determined that both CBC and FRTBC are unlikely to utilise the survey area for breeding or roosting, and would be occasional, transient foraging visitors at most. Both species are considered not dependant on the resources present within the survey area, based on the lack of significant resources within the survey area and presence of larger, predatory birds (i.e., White-bellied Sea Eagles) (Ecoscape, 2025).

2.6.2.1 Black Cockatoo Foraging Habitat

A single individual CBC was observed during the field survey, but no evidence of CBC foraging was observed. Foraging evidence of FRTBC was observed in both habitat types (Ecoscape, 2024), and individuals have been observed on site since the time of the survey (during Coterra Environment site inspections on 19 February 2025 and 28 November 2025).

Foraging value for black cockatoos within the site is described as (Ecoscape, 2025):

- According to the Department of Agriculture, Water and the Environment foraging value scale (DAWE, 2022), foraging value is high for CBC and FRTBC
- According to the Bamford foraging value scale (BCE, 2023), foraging value is moderate – high for CBC and FRTBC
- Marri, Jarrah and spare/occasional Banksia species are the only foraging species present in the Eucalypt woodland for CBC
- Marri, Jarrah, Tuart and sparse *Allocasuarina fraseriana* are the only foraging species present within the Eucalypt woodland for FRTBC
- Lupins, scattered Eucalypt trees and Peppermint provide low value foraging habitat for both species within the Isolated Trees over Grassland habitat type.

2.6.2.2 Black Cockatoo Breeding Habitat

A total of 19 trees within the survey area were observed to contain hollows potentially suitable for black cockatoo breeding (rank 3) as shown on Plate 2-11 (Ecoscape, 2025). Of these, four are within the site boundary and were re-assessed utilising a drone by Greg Harewood in October 2025 (see summary results provided at Appendix 2). Key details on these trees are presented in Table 2-4.

In addition, a total of 45 trees within the site boundary were observed to meet the minimum size to be considered able to form black cockatoo breeding hollows (i.e., has a diameter at breast height of >50 cm), however no hollows were observed from these trees. These trees are classed as 'Rank 5' (Ecoscape, 2025).

Table 2-4: Trees with potentially suitable hollows

Tree ID	Species	Comments	Pre-inspection Rank (Ecoscape, 2024)	Post-inspection Rank (Harewood, 2025)
293	Tuart	Large side entry hollow, occupied by Eastern Long-billed Corella (introduced species). Large vertical hollow, no evidence of Black Cockatoo use and unlikely to be used given Corella presence.	3	2-3
343	Tuart	Two obvious hollows, one occupied by bees and is horizontal and too small for black cockatoos. Lower hollow considered to be potentially suitable but could not be confirmed.	3	3
353	Tuart	Three potential hollows identified but were all unsuitable due to being too small, filled with debris or having no depth.	3	4
C1	Marri	No hollow present when observed at 'hollow' height.	3	4

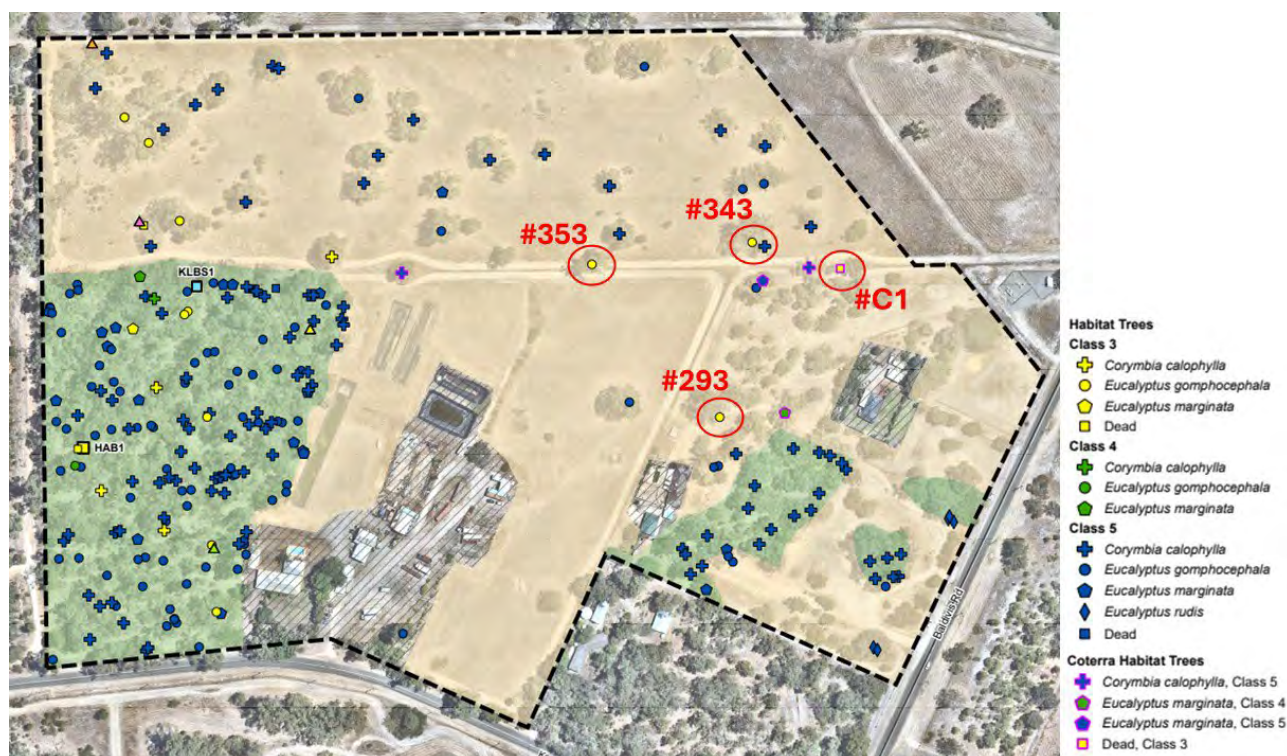


Plate 2-11: Black Cockatoo Habitat Trees

Source: Ecoscape, 2025

2.6.2.3 Black Cockatoo Roosting Habitat

The survey area contained tall trees which may be suitable for roosting activities by FRTBC and CBC, however no roosting evidence was observed (Ecoscape, 2024).

The presence of White-bellied Sea Eagles nesting on site, and defending their nesting territory has the potential to dissuade other large species from nesting in adjacent areas (Ecoscape, 2024).

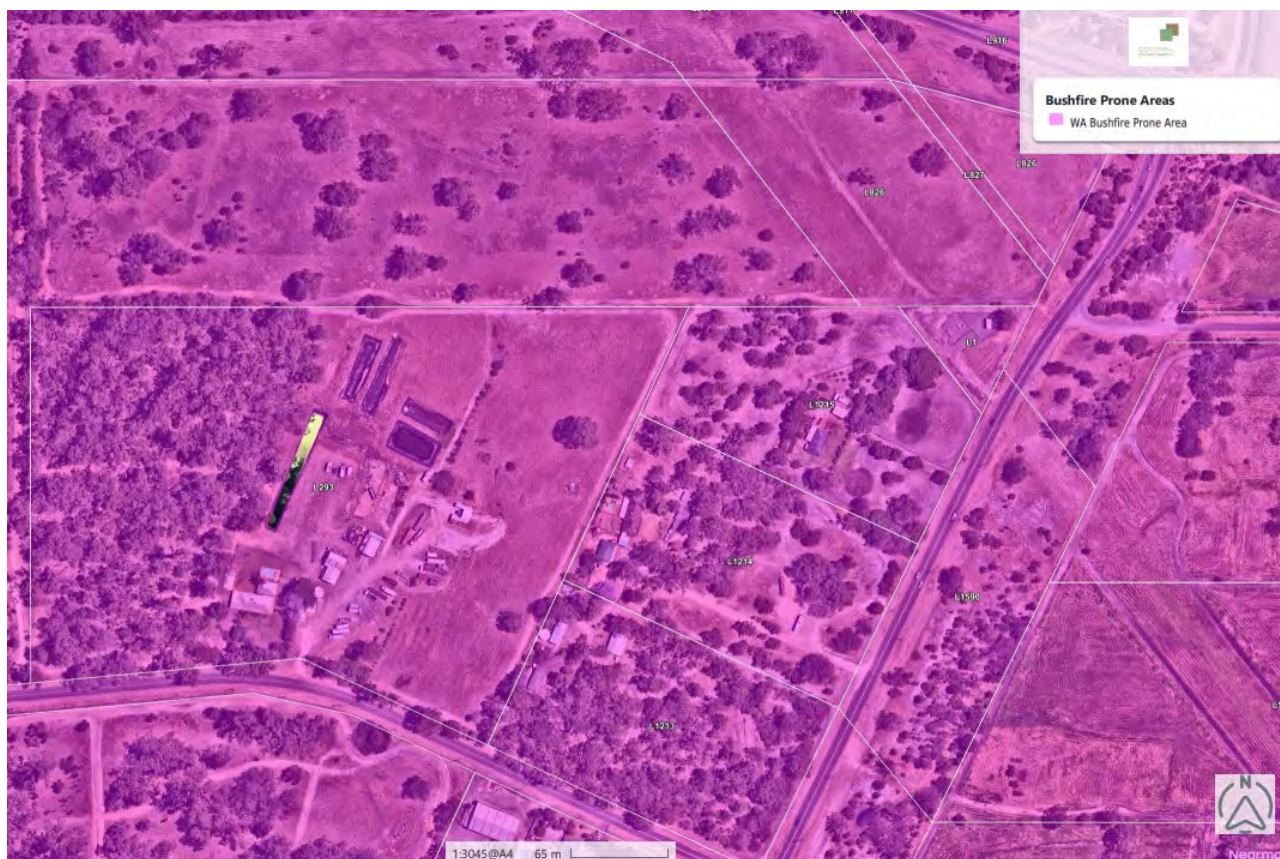
2.7 Conservation Areas

The site does not form part of any Bush Forever (BF) areas, with the closest BF site located approximately 900 m northwest of the site (BF 349; Leda and Adjacent Bushland) (Landgate, 2025a).

Ecological linkages were historically mapped across the Perth region to highlight areas of connecting remnant vegetation which may act as stepping stones between habitats. The site is partially within the Ecological Linkage Link ID 74, which extends across approximately 20 km from Wellard in the north to Stake Hill in the south. This ecological linkage passes over various land uses, including naturally formed wetlands, residential estates and the Kwinana Freeway (WALGA, 2004).

2.8 Bushfire Risk

The entirety of the site, with the exception of an approximately 600 m² central area associated with a mapped constructed surface water feature, is mapped as a Bush Fire Prone Area (Plate 2-12). Bush Fire Prone areas are defined as being subject to, or likely subject to bushfire attack and are identified by the presence of and proximity to bushfire prone vegetation and includes both the area containing the bushfire prone vegetation and a 100 m buffer zone immediately surrounding it (Landgate, 2025a).



Source: MNG, 2025

2.9.1 Contaminated Sites

- Lot 824 on Plan 77252
- Lot 915 on Plan 77252
- Lot 820 on Plan 77252

The contamination identified in these sites is isolated and will not impact the proposed development of the site.

A review of the historical imagery available through Landgate indicates the following key points in relation to the environmental values of the site (Landgate, 2025b):

- The eastern portion of Lot 800 (i.e., the area within the site) was partially cleared in the 1970's
- Lot 1214 and 1215 were partially cleared and developed for singular dwellings between 1960 and 1970

- The eastern side of Lot 239 was predominantly cleared between 1974 and 1977
- Between 1985 and 1989 the regrowth of vegetation over the previously cleared area and all remaining trees on Lot 293 was cleared
- In 1995 it is apparent the eastern portion of Lot 293 was used for market gardens or orchards, with surface water storage areas and other infrastructure installed between 1989 and 1995

The land use has not markedly changed for any lots since this time, with rural residential uses being the current land use.

2.10 Heritage

2.10.1 European Heritage

No European Heritage places have been identified by the State's InHerit database, or the City of Rockingham's Municipal Heritage Inventory as occurring within the site boundary (Heritage Council, 2025; CoR, 2018).

2.10.2 Aboriginal Heritage

The site is partially intercepted by the mapped extent of a historic record of Aboriginal Artefacts/ Scatter (ID 4348), known as 'Baldivis Road South' (Landgate, 2025a; Plate 2-13).

It is noted that although this record is 'historic' all persons on site will be made aware of their obligations under the *Aboriginal Heritage Act 1972*, should any unexpected finds be encountered.



Plate 2-13: Aboriginal Heritage

Source: MNG, 2025

2.11 Surrounding Land Uses

The site forms part of a rural residential suite of land uses typical of the Baldivis area, with surrounding land uses including:

- Rural residential properties
- Urban residential properties
- Adjacent limestone quarry (located to the immediate west, forming part of Lot 800, however the current quarrying operations are not located within the site)
- Land owned by the Western Australian Planning Commission
- Farming and agricultural land uses
- City of Rockingham Landfill and Recycling Facility and WA Limestone located north of Kulija Road.

The following residences occur within 300 m of the extraction boundary:

- Lot 1213 (No. 267) Kerosene Lane: located approximately 30 m from extractive boundary
- Lot 1212 (No. 268) Kerosene Lane: located approximately 125 m from extractive boundary
- Lot 1211 (No. 250) Baldivis Road: Located approximately 230 m from extractive boundary
- Lot 1210 (No. 256) Baldivis Road: Located approximately 300 m from extractive boundary.

3 Proposed Works and Excavation Program

3.1 Overview

It is anticipated that approximately 1,523,000 cubic metres of sand and limestone will be extracted from the site. These extraction work will occur within an 11.75 ha area, to a maximum depth of 6 mAH. This maintains an approximate separation to groundwater of at least 3 m.

The proposed works will consist of the following:

- Extraction of sand and high-quality limestone within a total site area of 21 ha and an excavation footprint of 11.75 ha.
- Use of equipment onsite and storage of equipment.
- Dispatch of the extracted sand and limestone off-site in laden trucks.
- Gates will be installed on the access road and perimeter fences will be erected and maintained.
- Tree protection zones for all trees that are being retained will be established before commencing works.
- Topsoil bunds to be located along the interface of the site and Lot 1213 (1:3 bunding).

3.2 Excavation Management

3.2.1 Resource Extraction

It is proposed that a total of 1,523,000 m³ will be extracted over a five year period. The proposed extraction levels are shown on Appendix 3, indicating that the lowest point of the extraction pit will be 6 mAH, with batters proposed between the base and sides of the pit within the extraction area only.

3.2.2 Processing

The sand and limestone resource will be dry screened via a mobile dry screening plant onsite. Vegetation and rocks will be separated from the resource material using a mobile screening plant onsite prior to offsite dispatch.

All cleared vegetation will be mulched and removed from the site. Topsoil and overburden will be stockpiled onsite for reuse following completion of resource extraction works.

3.2.3 Stages

The operations of the proposed extraction have been designed to be undertaken on a staged basis (Figure 1). Within the overall 11.75 ha extraction area, the following stages will occur:

- Stage 1: 2 ha
- Stage 2: 0.92 ha
- Stage 3: 1.24 ha
- Stage 4: 2 ha
- Stage 5: 2 ha
- Stage 6: 2 ha
- Stage 7: 1.59 ha.

3.2.4 Site Facilities, Machinery and Equipment

The main plant, equipment and infrastructure on site will include:

- Fencing and security gates
- Wheel wash facility
- Small site office
- Staff amenities facilities
- Weighbridge
- Internal access track
- Mixture of mobile equipment including:
 - Front end loader
 - Grader
 - Diesel power generator
 - Mobile screening plant
 - 15 KL Water Cart.

3.2.5 Water and Energy Usage

Water may be required at the site for the following uses:

- Dust suppression
- Equipment clean down
- Staff amenities.

As the site is not connected to a reticulated water supply, water is to be supplied via the existing groundwater licence or supplied by an external source via filling of the 15 KL watercart which will be located onsite. Water to fill the cart will be sourced from an offsite sources.

The site will be connected to the Western Power energy transmission network, but a diesel generator will also be available onsite to provide power to the site and screening plant, as required.

3.2.6 Fuel Use and Storage

No hydrocarbons for refuelling are to be stored onsite at any time, with the refuelling of machines to occur from an authorised service vehicle.

All machinery onsite will be serviced by an authorised service vehicle which is to arrive onsite as required. Major servicing is to occur offsite with machinery being transported to offsite premises. Each service and maintenance vehicle is to contain a hydrocarbon spill kit to prevent any potential contamination of the site in the event that a spill was to occur.

3.2.7 Access and Transport

Access and transport arrangements for the site will include:

- Access to the site will be facilitated by a crossover proposed to be constructed through Lot 1214, connecting directly to Baldivis Road.
- Internal access will be provided along the central access track, which diverts to a south (Stages 1 to 5) and north track (Stages 6 and 7) within the site, constructed from limestone.



- Gates and perimeter fences will be erected and maintained to prevent unauthorised access along internal access roads. When the site is not occupied the gates will be securely locked. Warning and security signs will be erected in accordance with the City of Rockingham requirements.
- Truck movements are variable from the site in response to the demand for the resource. During peak haulage periods, there is expected to be a maximum of 20 trucks (in and out) per hour, Monday to Saturday.
- All trucks will have covered trays to prevent spillage on roads.

3.3 Post Extraction Land Use

Following the five year period of resource extraction, the site is likely to be used for 'Light Industrial' purposes. The future land use will be assessed through the rezoning process.

Post-excavation levels are anticipated to be maintained at 6 mAHD.

Following the completion of each stage, the finished areas will be planted with a grass crop to assist with soil stabilisation prior to the final land use works commencing.

4 Potential Environmental Impacts and Proposed Management

Potential environmental impacts associated with onsite operation have been identified, with proposed design, management and mitigation actions detailed below. Responsibility for implementation of these actions will remain with the project proponent.

4.1 Native Vegetation

4.1.1 Potential Impacts

Site development will involve clearing of 1.93 ha of vegetation which may represent the Karrakatta Complex – Central and South which has 23.49% remaining with the Swan Coastal Plain bioregion. The Environmental Protection Authority (EPA) target for retention of vegetation complexes is 30% of the pre-European extent, or 10% of the pre-European extent in constrained areas including the Perth Metropolitan Region (EPA, 2008). As such the clearing proposed will not reduce the vegetation to below the 10% EPA target within the Perth Metropolitan Region.

The extent of vegetation clearing on site has been determined using the vegetation mapped by Ecoscape (2025), the digitised canopy extent of the Black Cockatoo trees observed on site (Ecoscape, 2025) and site observations made by Coterra Environment. The total extent of vegetation within the extraction boundary is detailed below (Table 4-1). All vegetation is in ‘Completely Degraded’ condition.

In addition to the below vegetation units being cleared, one tree which contributes to the Tuart TEC within the site is also proposed to be removed. Removal of this tree will reduce the mapped Tuart TEC extent in this area.

Table 4-1: Vegetation extent within extraction area

Vegetation Description	Source	Extent
<i>Corymbia calophylla</i> mid open forest	Ecoscape (2025)	0.58 ha
Jarrah (<i>Eucalyptus marginata</i>)	Digitised tree canopies based on Ecoscape (2025) tree data	0.1 ha
Marri (<i>Corymbia calophylla</i>)	Digitised tree canopies based on Ecoscape (2025) tree data and Coterra Environment site observations	0.51 ha
Marri/Banksia/Sheoak	Digitised tree canopies based on Ecoscape (2025) tree data and Coterra Environment site observations	0.03 ha
Marri/Sheoak/Peppermint grove	Digitised tree canopies based on Ecoscape (2025) tree data and Coterra Environment site observations	0.32 ha
Isolated Peppermints	Coterra Environment site observations	0.02 ha
Peppermint/Banksia/ Pricklybark (<i>Eucalyptus tottiana</i>)	Coterra Environment site observations	0.04 ha
Tuart	Digitised tree canopies based on Ecoscape (2025) tree data and Coterra Environment site observations	0.33 ha
Total		1.93 ha

Areas of retained vegetation have the potential to be degraded through impacts including weed and pathogen invasion, unauthorised vehicle disturbance, fly tipping etc.

The site has not been assessed for dieback presence, and no trees on site appeared to be dying back. However, machinery and footwear have the potential to spread dieback from external sources onto the site.

4.1.2 Management and Mitigation

The following design, management and mitigation actions are proposed to reduce impacts to vegetation and flora:

- Boundaries of the site and the retained vegetation will be surveyed and clearly marked prior to the commencement of clearing to avoid inadvertent damage to vegetation identified for retention.
- Clearing extent will be restricted to the open area required to facilitate extraction for the stages set to be extracted in the following 12 months.
- A Native Vegetation Clearing Permit (NVCP) will be sought from DWER for the proposed clearing of vegetation onsite. It is noted that the provision of environmental offsets to the satisfaction of DWER is likely to form part of the NVCP assessment and approval process.

The following management actions will be undertaken to protect and manage retained vegetation onsite:

- Fencing will be installed around the perimeter of the site to prevent unauthorised access
- The site access gate will be locked outside of operating hours
- Vehicle movements will be restricted to excavation areas and designated access tracks only
- Excavation depth will remain at least 0.5 m above the maximum groundwater table and groundwater is not proposed to be abstracted from the site to avoid hydrological changes which may impact vegetation health.

Should any vegetation management works be undertaken in retained vegetation areas, vehicles accessing these areas will be clean on entry to the site.

Site fencing and access gates will be inspected regularly by the site manager and any damage will be repaired. Any visitors to the site must sign in and will be advised of where access is permitted/not permitted.

The following actions will be undertaken to avoid the potential spread of dieback onsite:

- Boundary fencing and gates will be maintained to prevent unauthorised site access.
- Site access tracks will comprise of a limestone base. Limestone has a high pH and as such is suppressive of *Phytophthora* dieback.
- Haulage trucks offsite will generally run along bitumen roads to their destination and return which is anticipated to be associated with a lower risk of dieback spread. Recognising this, but as a precaution, haulage trucks are restricted to dedicated tracks only.
- Access to areas with retained vegetation will be restricted to authorised personnel only. Vehicles entering these areas must be free of plant material and soil.
- All vehicles and equipment being used during land clearing or land reinstatement are to be clean and free from soil or plant material prior to arriving at the site.
- Construction works entry points will be minimised to only where required.

4.2 Fauna and Habitat Disturbance

4.2.1 Potential Impacts

Development of the site may result in the following impacts to fauna and habitat:

- Clearing of 1.93 ha of native vegetation, within the following areas:
 - 0.62 ha of habitat type Eucalypt Woodland, representing moderate to high value foraging habitat for Carnaby's Black Cockatoo and Forest Red-tailed Black Cockatoos

- 9.35 ha of habitat type Isolated Trees over Grassland, representing low-value habitat for Carnaby's Black Cockatoo and Forest red-tailed Black Cockatoos
- Clearing of 49 trees present onsite with a DBH >500 mm which based on their size may have the potential to support black cockatoo breeding should suitable hollows form
- Removal of foraging and breeding habitat for a range of raptor species, including the White-bellied Sea Eagle (listed Marine under the EPBC Act)
- Potential injuries to fauna during vegetation clearing
- Displacement of fauna into isolated patches.

4.2.2 Management and Mitigation

The following design, management and mitigation actions are proposed to reduce impacts to fauna and habitat:

- Clearing extent will be restricted to the open area required to facilitate extraction over the coming 12 months.
- A fauna relocater will be engaged to undertake fauna capture and relocation prior to and during vegetation clearing, which will include inspection of trees and hollows. A Licence to take or disturb Fauna for the purpose of relocating will be submitted to the DBCA prior to vegetation clearing commencing to ensure compliance with this requirement.
- Clearing will be undertaken slowly in the direction of existing bushland to give any potentially remaining fauna the opportunity to relocate.
- If any fauna is located and not moving away from clearing/site works on their own and/or injured at the site, the site manager will contact the project environmental consultant, fauna relocation consultant or DBCA Wildcare helpline (**9474 9055**) for instructions.

Additional fauna management actions as well as an injured fauna protocol which will guide operations at the site is provided in Appendix 4. A NVCP will be sought from DWER for the proposed clearing of vegetation and fauna habitat onsite. As noted above, provision of environmental offsets to the satisfaction of DWER is likely to form part of the NVCP assessment and approval process.

4.3 Water Supply

4.3.1 Potential Impacts

If adequate water supply is not available during site works, environmental impacts such as dust generation may not be appropriately addressed.

4.3.2 Management

Site Manager to organise adequate water supply prior to any works commencing. This may be through the existing groundwater licence within the site, or may be through external water supply to the site via water carts.

4.4 Topsoil and Overburden

4.4.1 Potential Impacts

Stripping of topsoil and overburden can result in the following potential impacts:

- Dust generation

- Noise generation
- Loss of organic material and seed bank.

4.4.2 Management and Mitigation

Topsoil and overburden are a resource which can be reused at the site post-excavation to stabilise the landscape. This material will be stockpiled following stripping for re-use.

Noise and dust management will be undertaken as part of all activities undertaken onsite. This is further discussed below.

4.5 Noise Generation

4.5.1 Potential Impacts

During operating hours noise has the potential to be generated from the following sources:

- Vehicle, plant and equipment operation
- Screening, should this occur
- Vegetation clearing and mulching.

Noise emissions have the potential to disturb neighbouring residents or land users if they are too loud. As outlined in Section 2.11, several residential houses are within 300 m of the extraction boundary.

4.5.2 Management and Mitigation

The following actions will be undertaken to minimise noise generation and potential impacts:

- The maximum truck speed on site to be 20 km/hr with the engine speed maintained below maximum revolution.
- Hours of operation are only permitted between 7 am to 6 pm, Monday to Friday, 7 am to 12 pm Saturday with no works to occur on Sundays and public holidays
- Earthen bunds between phases 1, 3 and 5 in the excavation area and Lot 1213 will serve to further reduce noise emissions to surrounding residents
- Operations, including screening, will be undertaken within the base of the pits whenever possible, to assist to minimise noise exposure external to this area
- Access road to be maintained in a good condition to ensure limitation of “banging” noise from empty trucks travelling over rough terrain.
- Equipment used on site is the quietest available.
- Noise testing of plant and equipment will occur to identify any extraordinary items of high noise emissions.
- Equipment is to be well maintained and in a good operating condition.
- All vehicle engines will be switched off when not in use.
- There will be no unnecessary sounding of horns whilst onsite.

Awareness of noise issues and management requirements will be included in the site induction information, with any noise generation will be observed by the Site Manager.

Any noise complaints will be registered in the site complaints register stating:

- Where the complaint was from.

- Where and what was the equipment operating.
- If a verbal response was given to the complainant, the details of the liaison will be recorded including if the complainant satisfied with the response.

After the complaint has been received and responded to, noise emissions from the offending item(s) of equipment should be investigated. If noise levels from offending item/s are found to be excessive, then the item will either be repaired, replaced with a quieter item or noise control applied.

The complaints register will be made available to the City of Rockingham if requested.

4.6 Air Quality

4.6.1 Potential Impacts

Dust has the potential to be generated from operation onsite including clearing and mulching of vegetation, stripping of topsoil and overburden, resource extraction, stockpiling of materials and resource transport.

As identified in Section 2.11, several residences occur within 300 m of the proposed extraction boundary and these are generally located to the south and south-west of the site. Potential impacts from dust generation include:

- Nuisance dust entering neighbouring properties and impacting residents
- Deposition on retained vegetation.

As noted in Section 2.1.2, the strongest winds experienced at the site are the summer afternoon south-westerly winds and the summer morning easterly winds. Residential properties and other sensitive land uses which are generally located to the south and south-west of the site and would therefore not be impacted by dust based on direction of these winds. Dense vegetation is present to the west and northeast of the site in the direction of these prevailing winds.

An assessment of the potential dust generation has been undertaken using the guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities (DEC 2011). A copy of the assessment is provided in Appendix 5.

This assessment has concluded that the site has a Site Classification Score of 2 which indicates a low dust risk.

4.6.2 Management and Mitigation

The following actions may be undertaken to minimise dust generation and potential impacts:

- Water trucks are to water down unsealed roads during operation to reduce dust generation.
- Trucks transporting extracted resources are to use tarpaulins to ensure dust is not released from loaded sand or limestone product during transport on and off site.
- Water trucks are to be available during site operations to water the site on the observation of dust generation.
- Should any screening activities be undertaken onsite, a sprinkler or water truck will be available for use in dust suppression, if required.
- Maximum speed limit onsite will be restricted to 20 km/hr.
- Site access roads/tracks will be maintained in a condition to minimise dust generation.
- Operations will be undertaken on the pit floor whenever possible to avoid exposure to surface winds.
- Topsoil and overburden stripping will be scheduled for low wind and/or damp weather conditions when dust generation risk is minimised.

- A bund/s for dust and noise suppression will be located between phases 1, 3 and 5 in the excavation area and Lot 1213. This will separate the majority of properties with residential premises from the site operational area.
- Awareness of dust issues and management requirements will be included in the site induction information.
- Following completion of extraction in each stage, these areas will be planted with a grass crop to assist with temporary surface stabilisation.

Should significant dust generation offsite be observed during site operations, activities causing the dust generation will be suspended until climatic conditions improve to reduce this risk.

Visual monitoring of dust generation will be undertaken by the Site Manager.

A complaints register will be maintained for the site. Should any complaints regarding dust emissions be received the following will be recorded and actioned:

- Where the complaint was from.
- Where and what was the equipment operating.
- If a verbal response was given to the complainant, the details of the liaison will be recorded including if the complainant satisfied with the response.

After the complaint has been received and responded to, dust emissions should be investigated and actions to minimize the emissions undertaken, as necessary.

The complaints register will be made available to the City of Rockingham upon request.

4.7 Contamination

4.7.1 Potential Impacts

The risk of groundwater contamination associated with the extraction activities is considered low on the basis of the following:

- Extraction areas where machinery will be working will maintain a minimum separation distance to groundwater of 0.5 m
- There will be no storage of fuel onsite.

The site is not identified as having any areas of exiting soil or groundwater contamination. An inspection will be undertaken to confirm no soil staining is evident associated with the current site activities prior to works commencing.

4.7.2 Management and Mitigation

The following actions will be undertaken to minimise the risk of hydrocarbon spillages:

- Vehicle and Equipment Maintenance
 - All non-major machinery onsite will be serviced by an authorised service vehicle which is to arrive onsite as required.
 - Each service and maintenance vehicle will contain a hydrocarbon spill kit to prevent any potential contamination of the site in the event of a spill occurring.
 - All major servicing of vehicles will be conducted off site.
 - Waste material derived from maintenance works will be disposed of offsite.
- Refuelling

- No hydrocarbons for refuelling are to be stored onsite at any time, with the refuelling of machines to occur from authorised service vehicles.
- Incident Response
 - Equipment for the containment and clean-up of spills is to be available onsite.
 - Any potential spillage will be contained in plant and working areas by shutting down plants or equipment if the plant or equipment is the source of the spill.
 - In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.
 - Areas of soil impacted by spillages will be removed immediately. This may be undertaken by a hand shovel or use of mechanical equipment, if necessary.

All significant adverse incidents (such as a fuel spill of >5 litres), will be recorded, investigated and remediated. A record is to be kept of incidents which will be available for inspection by the City of Rockingham and DWER, if required.

The site manager will arrange for refuelling and vehicle servicing, as required. All workers will be made aware of the incident response procedure.

4.8 Drainage

4.8.1 Potential Impacts

The drainage strategy is largely based on on-site infiltration, however drainage management need to be considered in the context of runoff and containment within the site.

4.8.2 Management and Mitigation

Drainage management will include:

- As the site is proposed to be at a lower level than existing levels (due to proposed extraction) it is not anticipated that any runoff will occur offsite
- All stormwater is contained and infiltrated onsite
- The entry road is not kerbed which facilitates infiltration of runoff at source
- Rainfall falling on the site office roof is directed to the rainwater storage tanks or to the ground for infiltration.
- Any ponding on compacted access ways will drain via infiltration at slower rates, evaporation or runoff to the side of the tracks as is the case in most rural areas.

4.9 Waste and Rubbish

4.9.1 Potential Impacts

A minor volume of waste may be generated onsite, primarily related to staff amenities, office materials and maintenance works. Unmanaged waste has the potential to result in litter or contamination of the environment.

4.9.2 Management and Mitigation

Waste management at the site will include:

- Hydrocarbons and chemical containers will be regularly removed from site for disposal at a licensed landfill facility.

- Portable toilets will be available onsite with sewage waste to be transported off-site for treatment and disposal by a licensed contractor. No effluent will be released onsite.
- General housekeeping onsite will be explained to, and expected to be followed by, all personnel onsite.
- Mobile service vehicles will store any waste oil removed from machinery and remove it from-site daily.
- Any waste bins will be covered to prevent access by wildlife.

4.10 Surrounding Land Uses

4.10.1 Potential Impacts

The closest sensitive land uses are located approximately 120 m southeast (Lot 1212 Kerosene Lane) of the proposed extraction area extent, noting Lot 1213 is currently unoccupied. This is less than the EPA buffer distance guidance to avoid potential disturbance which the EPA identifies are associated with potential noise and dust impacts (EPA, 2005).

4.10.2 Management and Mitigation

The following actions will be undertaken to reduce potential impacts to surrounding land uses:

- A buffer ranging between 20 m and 40 m from the excavation area to the site boundary will be maintained on all boundaries of the site.
- Earthen bunds along the southwestern edge of phases 1, 3 and 5 in the excavation area will serve to further reduce noise emissions
- The dominant winds in this location are the summer south westerly (afternoon) and easterly (morning) winds. The closest sensitive land uses are not downgradient of the site in these directions.
- Management practices which will be put in place specifically relating to noise and dust emissions.

Management actions proposed in relation to noise and dust emissions are further discussed above, which will minimise impacts to surrounding land uses.

4.11 Visual Amenity

4.11.1 Potential Impacts

The site is located in a rural area where quarrying activities are already present (e.g., the remainder of Lot 800, adjacent to, but not within, the site boundary). The visual aspects of the site will not vary significantly from other nearby similar sites.

4.11.2 Management and Mitigation

Visual amenity will be addressed by:

- Maintenance of an undisturbed zone (between 20 to 40 m) around the perimeter of the site
- Boundary fencing and gates will be compatible with the rural style of the area.
- The location of the site office building will be in an area of low visual impact.
- Earthen bunds along the southwestern edge of phases 1, 3 and 5 in the excavation area will serve to further reduce noise emissions

- Workers will be inducted on good housekeeping practices which will be implemented throughout the project's lifetime.

The site will not operate at night. As such there is no potential for visual impacts associated with light spill.

4.12 Heritage

4.12.1 Potential Impacts

The site is partially intercepted by the mapped extent of a historic record of Aboriginal Artefacts/ Scatter (ID 4348), known as 'Baldivis Road South'.

As this record is recorded as historic, it is unlikely that any impacts will occur as a part of the proposed development.

4.12.2 Management and Mitigation

Should any evidence of early aboriginal occupation including presence of potential artefacts be uncovered during works, all activities will be stopped in compliance with the *Aboriginal Heritage Act 1972 (AH Act)* pending an assessment and advice from the Department of Lands and Heritage (DPLH).

Site workers will be made aware of their obligations under the AH Act to avoid disturbance of and to ensure reporting of any potential sites/artefacts of cultural heritage significance.

4.13 Fire

4.13.1 Potential Impacts

Fires onsite have the potential to cause injury to site occupants and to damage structures, equipment as well as vegetation.

4.13.2 Management and Mitigation

The following actions will be undertaken in relation to fire risk management:

The site will comply with the requirements of the City of Rockingham 2025/26 Fire Control Notice (and any subsequent notices) which currently requires firebreaks to be:

- No less than three (3) metres wide immediately inside and along all boundaries (including on boundaries adjacent to roads, rail and drain reserves and all public open space reserves)
- Not more than four (4) metres wide (further width extensions may be considered upon written application for approval by the City)
- Must have a vertical clearance height of four (4) metres, with all overhanging vegetation trimmed back clear of the firebreak
- Must be a mineral earth firebreak with a continuous trafficable surface for a 4WD vehicle, clear of any obstructions and must not terminate in a cul-de-sac (dead end)
- Maintained and living lawns are acceptable in conjunction with, or in lieu of mineral earth firebreaks, provided that the same width and height requirements for a firebreak are maintained.

Annual firebreak maintenance will be arranged by the Site Manager.

4.14 Traffic Impacts

The proposal will require haulage of 19 m trucks, being up to 20 trucks in/out per hour during peak hours. This level of vehicle movement is considered to be 'moderate impact' and the Transport Impact Statement



undertaken for the site concluded that it is not expected that the proposed development will have an adverse impact on road safety or traffic operations in the surrounding area (PTG, 2025).

5 Implementation Summary

Table 5-1 provides a summary of the implementation actions proposed to support the pre, during and post development stages of the resource extraction project.

Responsibility for implementation of these actions will rest with the project proponent CWM Property Holdings until these tasks are completed.

Table 5-1: Implementation Summary

Topic	Action	Timing
Native Vegetation	Boundaries of each Stage are to be clearly marked prior the commencement of clearing.	Pre and during extraction
	NVCP application submission, assessment and obtain approval.	Pre-extraction
	Installation and maintenance of site fencing and access gates.	Pre-extraction
	Regulate site access control by utilising a visitor registry and briefing all site visitors on permitted and restricted access areas.	During extraction
	Ensure vehicle movement will be limited to designated access tracks and the excavation areas.	
	If any access is required within the retained vegetation areas, vehicles are to be cleaned on entry to the site.	
	All vehicles entering site will be clean and free from adhered soil and plant material.	
Fauna and habitat disturbance	Obtain a licence to take or disturb fauna from the DBCA prior vegetation clearing commencing.	Pre-extraction
	Clearing is only to occur in stages which are intended to be extracted in the coming 12 months, occurring toward retained vegetation (i.e., east to west).	Pre and during extraction.
	A fauna relocater is to be present during vegetation removal works to manage/attend to any fauna which may be impacted by these works.	During extraction
	Fauna relocation to be in accordance with DBCA licence conditions.	During extraction. Post-completion works report to be submitted to the DBCA by fauna relocater (per anticipated permit condition).
	Contractors to abide by the Injured Fauna Protocol, should injured fauna be encountered on site.	During extraction
Water Supply	Ensure adequate water supply is available for impact mitigation (i.e., dust suppression).	Pre and during extraction.
Topsoil and overburden removal	Topsoil and overburden are to be stockpiled following stripping for reuse post-excavation.	Pre, during and post extraction
Noise	Noise management will be implemented and undertaken as part of all site works.	During and post extraction



Topic	Action	Timing
	A complaint register is to be maintained and will be made available to the City of Rockingham upon request.	
Air quality (Dust)	Dust management will be implemented and undertaken as part of all site works.	During and post extraction
	A complaint register is to be maintained and will be made available to the City of Rockingham upon request.	
Contamination	All non-major machinery will be serviced on-site by an authorised service vehicle equipped with a hydrocarbon spill kit.	During extraction
	Waste materials from spills are to be disposed of off-site by a licensed waste contractor.	
	All machinery will be refuelled directly from authorised service vehicles.	
	Strict reporting protocol for all significant incidents will be required.	
	Any fuel spills exceeding 5 L will be recorded, investigated and remediated promptly.	
	The incident log will be made available for inspection by the City of Rockingham and DWER if requested.	
Drainage Management	Any drainage issues to be addressed promptly.	During extraction
Waste Management	All waste is to be contained appropriately.	Pre and during extraction
	A waste management contractor will be engaged to assist with waste removal from the site.	
Surrounding Land Uses	Maintenance of the buffer area from the southern side of excavation area to the site boundary.	During extraction
	Construction of bunds to provide buffering to Lot 1213.	
Visual Amenity	Visual assessment of bunds, stockpiles, security fencing and housekeeping to be undertaken regularly.	Pre and during extraction
Aboriginal Cultural Heritage	All contractors working onsite will be made aware of their obligations under the <i>Aboriginal Heritage Act 1972</i> . Should any potential Aboriginal heritage areas or artefacts be identified during site works, activities in this area will cease until advice from DPLH is received.	Pre and during extraction
Fire Management	Fire risk management to be implemented.	Pre, during and post extraction
	Annual firebreak maintenance to be arranged and implemented per the City of Rockingham requirements.	
Traffic Impacts	Ensure no additional impacts to traffic in the surrounding area occur as a result of the proposal (i.e., ensure vehicle movements are the same as those modelled within the Transport Impact Statement; PTG, 2025).	Pre, during and post extraction.

6 References

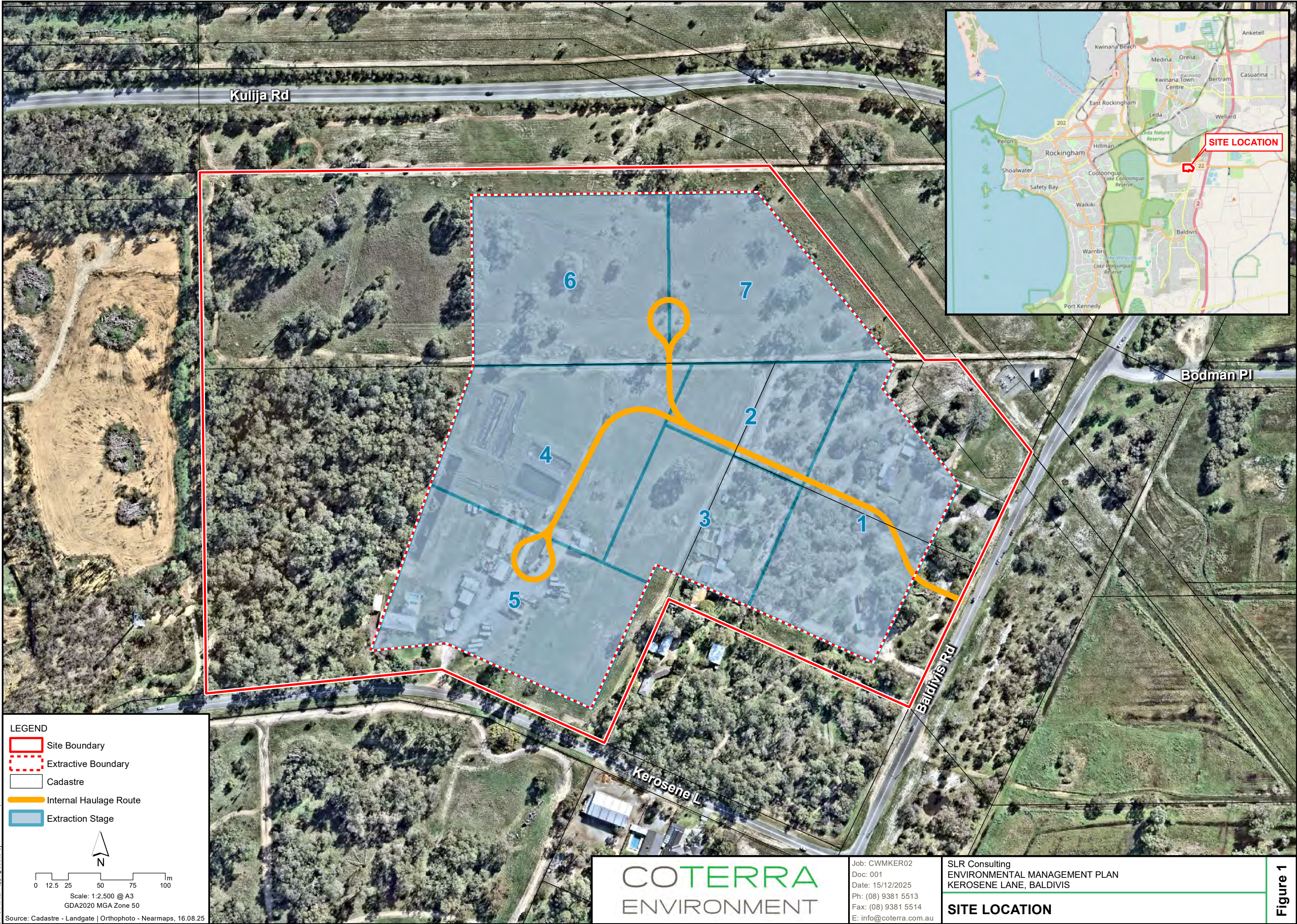
- Beard, J.S. (1975). *The Vegetation Survey of Western Australia*. Plant Ecology 30, 179–187 (1975). [Online]. Available at: <https://doi.org/10.1007/BF02389706>.
- Bureau of Meteorology (2025). *Climate Data Online*. Australian Government, Canberra, Australian Capital Territory. [Online]. Available at: [Climate Data Online - Map search \(bom.gov.au\)](https://climate.data.bom.gov.au/).
- City of Rockingham (2018). *Municipal Heritage Inventory Review*.
- City of Rockingham (2024). *Online Mapping System*. Available via: <https://maps.rockingham.wa.gov.au/intramaps910/>
- City of Rockingham (2025). *City of Rockingham Online Mapping*. Available via: <https://maps.rockingham.wa.gov.au/intramaps23A/>
- Department of Primary Industries and Regional Development (DPIRD) (2025). *Natural Resource Information (WA)*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [Natural Resource Information \(WA\)](https://www.dpir.wa.gov.au/natural-resource-information).
- Department of Water and Environmental Regulation (DWER) (2025a). *Perth Groundwater Map*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [Perth Groundwater Map](https://maps.water.wa.gov.au/#/webmap/register).
- Department of Water and Environmental Regulation (DWER) (2025b). *Water Register*. Government of Western Australia, Perth, Western Australia. Available at: <https://maps.water.wa.gov.au/#/webmap/register>
- Department of Water and Environmental Regulation (DWER) (2025c). *Contaminated Sites Database*. Government of Western Australia, Perth, Western Australia. [Online] Available at: <https://www.der.wa.gov.au/your-environment/contaminated-sites>.
- Ecoscape (2025). *Kerosene Lane/Baldivis Road, Baldivis Biological Survey*. Report prepared for Coterra Environment
- Environmental Protection Authority (EPA) (2005). *Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [GS3-Separation-distances-270605.pdf](https://www.epa.wa.gov.au/sites/default/files/2018-05/GS3-Separation-distances-270605.pdf)
- Environmental Protection Authority (EPA) (2016). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [EPA Technical Guidance - Flora and Vegetation survey Dec13.pdf](https://www.epa.wa.gov.au/sites/default/files/2018-05/EPA_Technical_Guidance_-_Flora_and_Vegetation_survey_Dec13.pdf).
- Environmental Protection Authority (EPA) (2016). *Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [FINAL fauna technical guide \(epa.wa.gov.au\)](https://www.epa.wa.gov.au/sites/default/files/2018-05/FINAL_fauna_technical_guide_epa.wa.gov.au).
- Galt Geotechnics (2025). *Preliminary Geotechnical Study Sand and Limestone Quarry – lots 293, 1214, 1215 and Part Lot 800 Baldivis Road, Baldivis*. Report prepared for Element Advisory Pty Ltd.
- Government of Western Australia (2019a). *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth, Western Australia. [Online]. Available at: [DBCA Statewide Vegetation Statistics - 2018 Statewide Vegetation Statistics - Full report - data.wa.gov.au](https://data.wa.gov.au/dataset/2018-statewide-vegetation-statistics-incorporating-the-car-reserve-analysis).
- Government of Western Australia (2019b). *2018 South West Vegetation Complex Statistics. Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth, Western Australia. [Online]. Available at: [DBCA South West Vegetation Complex Statistics - 2018 South West Vegetation Complex Statistics Report - data.wa.gov.au](https://data.wa.gov.au/dataset/2018-south-west-vegetation-complex-statistics).
- Gozzard, J.R. (1983). *Rockingham Part Sheets 2033 III and 2033 II, Perth Metropolitan Region. 1:50,000. Environmental Geology Series*. Geological Society of Western Australia, Perth, Western Australia.

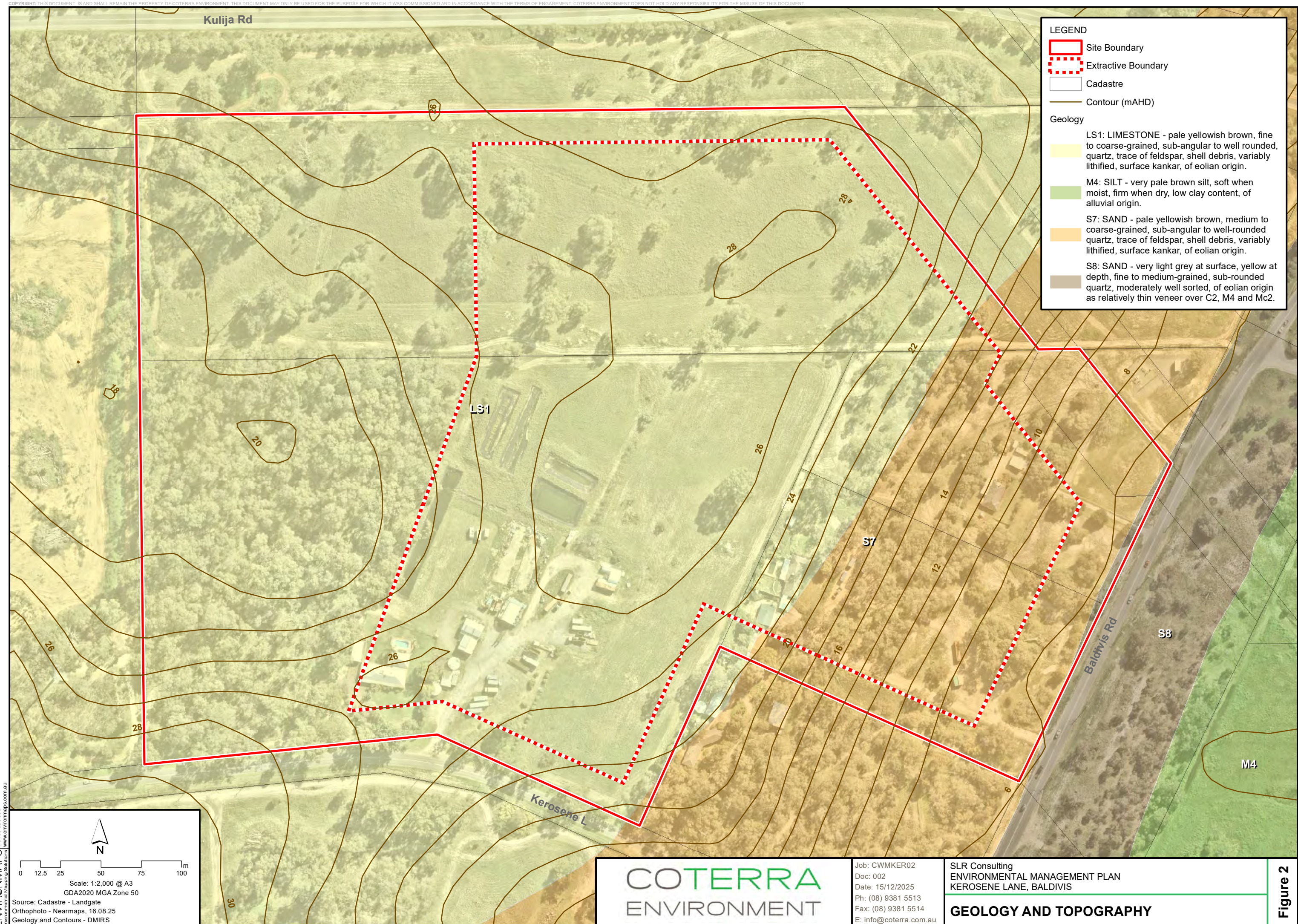


- Heritage Council (2025). *inHerit – Our Heritage Places*. Government of Western Australia, Perth, Western Australia. Available at: <http://inherit.stateheritage.wa.gov.au/Public/>.
- Landgate (2025a). *Shared Land Information Platform (SLIP) – Locate V5*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [Locate V5 \(slip.wa.gov.au\)](https://slip.wa.gov.au).
- Landgate (2025b). *Map Viewer Plus*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: [Landgate Map Viewer Plus](#).
- MNG Access (20205). *MNG Maps*. Available via: <https://www.mngaccess.com.au/>
- Shepherd, D. P., Beeston, G. R., and Hopkins, A. J. (2002). *Native Vegetation in Western Australia: Extent, Type and Status* (Report 249). Department of Primary Industries and Regional Development, Government of Western Australia. Perth, Western Australia. Available at: <https://library.dpir.wa.gov.au/rmtr/235>.
- PTG (2025). *Transport Impact Statement Lot 293, 800, 1213, 1215 Baldivis Road, Baldivis*. Unpublished report prepared for the Mostert Family Trust.
- Western Australian Local Government Authority (WALGA) (2004). *Perth Regional Ecological Linkages*. Data available from: <https://catalogue.data.wa.gov.au/dataset/perth-regional-ecological-linkages>
- Western Australian Planning Commission (WAPC) (2003). *Statement of Planning Policy 2.0 Environment and Natural Resources Policy*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: Statement of planning policy no. 2 environment and natural resources policy
- Western Australian Planning Commission (WAPC) (2025). *State Planning Policy 2.9 Water*, Government of Western Australia, Perth, Western Australia. [Online]. Available at: <https://www.planning.wa.gov.au/state-planning-policy-2.9-water> .
- Western Australian Planning Commission (WAPC) (2021). *Guidelines for Planning in Bushfire Prone Areas version 1.4*. Western Australian Planning Commission, Perth, Western Australia. [Online]. Available at: www.wa.gov.au/system/files/2022-05/Guidelines-for-planning-in-bushfire-prone-areas-version-1.4_0.pdf.
- Western Australian Planning Commission (WAPC) (2021). *State Planning Policy 2.4 – Planning for Basic Raw Materials Guidelines*. Government of Western Australia, Perth, Western Australia. [Online]. Available at: State planning policy 2.4 Planning for basic raw materials guidelines



Figures





LEGEND

Site Boundary

Extractive Boundary

Cadastral

Contour (mAHd)

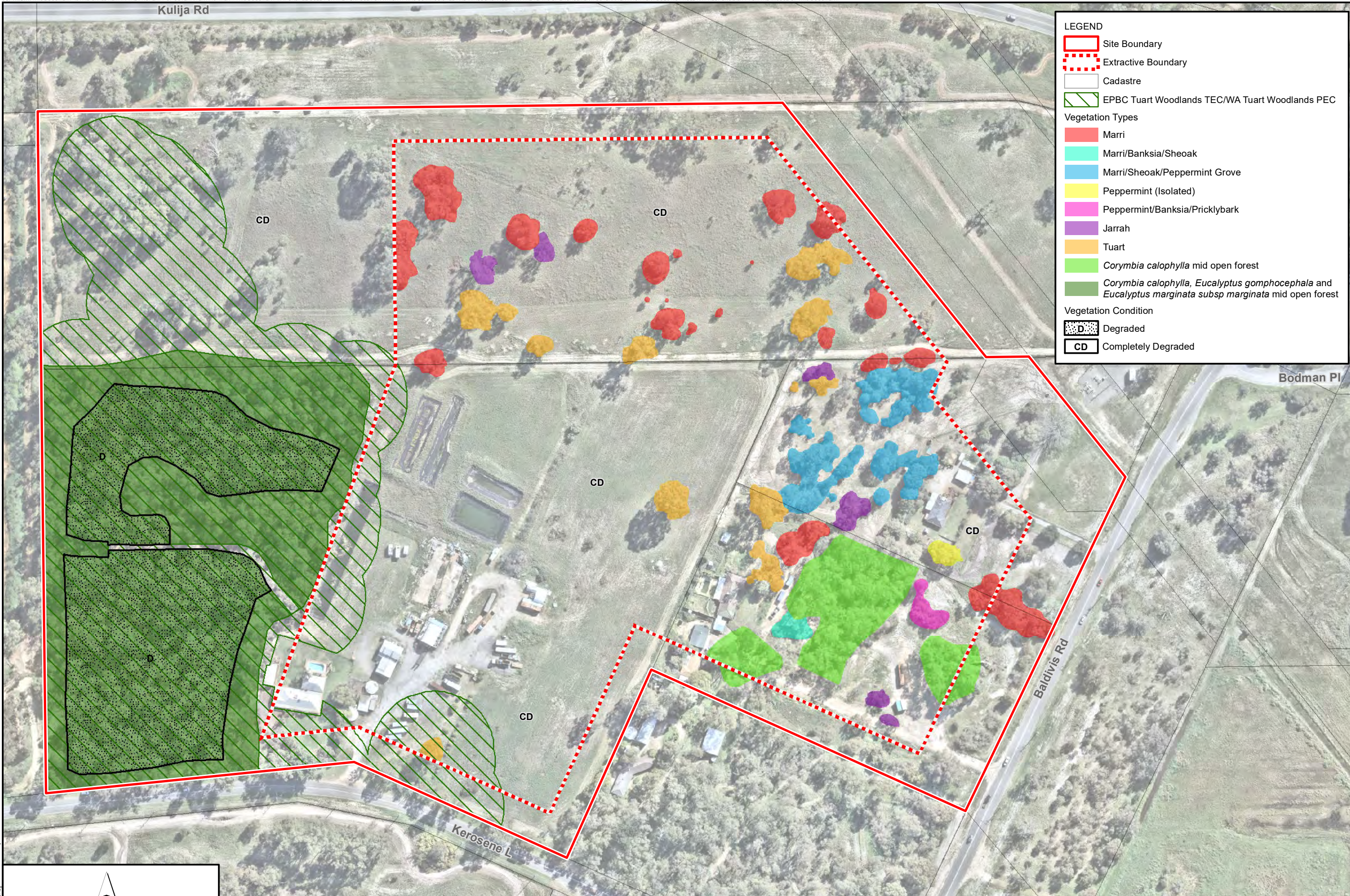
Geology

LS1: LIMESTONE - pale yellowish brown, fine to coarse-grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin.

M4: SILT - very pale brown silt, soft when moist, firm when dry, low clay content, of alluvial origin.

S7: SAND - pale yellowish brown, medium to coarse-grained, sub-angular to well-rounded quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin.

S8: SAND - very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted, of eolian origin as relatively thin veneer over C2, M4 and Mc2.



LEGEND

Site Boundary

Extractive Boundary

Cadastre

EPBC Tuart Woodlands TEC/WA Tuart Woodlands PEC

Vegetation Types

Marri

Marri/Banksia/Sheoak

Marri/Sheoak/Peppermint Grove

Peppermint (Isolated)

Peppermint/Banksia/Pricklybark

Jarrah

Tuart

Corymbia calophylla mid open forest

Corymbia calophylla, *Eucalyptus gomphocephala* and *Eucalyptus marginata subsp marginata* mid open forest

Vegetation Condition

Degraded

Completely Degraded

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA2020 MGA Zone 50

Source: Cadastre - Landgate | Orthophoto - Nearmaps, 16.08.25

Job: CWMKER02
Doc: 003
Date: 10/12/2025
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

SLR Consulting
ENVIRONMENTAL MANAGEMENT PLAN
KEROSENE LANE, BALDIVIS

VEGETATION TYPE AND CONDITION

Figure 3



LEGEND

- Site Boundary
- Extractive Boundary
- Cadastre
- Fauna Habitat**
 - Isolated Trees over Grassland
 - Eucalypt Woodland
 - Not habitat
- Potential Black Cockatoo Breeding Trees**
 - Corymbia calophylla*
 - Eucalyptus gomphocephala*
 - Eucalyptus marginata*
 - Eucalyptus rudis*
 - Other
 - Dead

0 12.5 25 50 75 100m

Scale: 1:2,000 @ A3
GDA2020 MGA Zone 50

Source: Cadastre - Landgate | Orthophoto - Nearmaps, 16.08.25

Job: CWMKER02
Doc: 004
Date: 10/12/2025
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

SLR Consulting
ENVIRONMENTAL MANAGEMENT PLAN
KEROSENE LANE, BALDIVIS

FAUNA HABITAT

Figure 4

Appendix 1 Biological Assessment (Ecoscape, 2024)

KEROSENE LANE / BALDIVIS ROAD, BALDIVIS BIOLOGICAL SURVEY

Coterra Environment

ecoscape



COPYRIGHT STATEMENT FOR:
Kerosene Lane / Baldvis Road, Baldvis Biological Survey
Our Reference: 5057-24
Copyright © 1987-2025
Ecoscape (Australia) Pty Ltd
ABN 70 070 128 675

Except as permitted under the Copyright Act 1968 (Cth), the whole or any part of this document may not be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owner, Ecoscape (Australia) Pty Ltd. This includes microcopying, photocopying or recording of any parts of the report.

Revision	Author	QA Reviewer	Approved	Date
Draft	Lyn Atkins	SK	SK	31/03/2025
Final	Lyn Atkins	PJ	PJ	29/04/2025

Direct all inquiries to:
Ecoscape (Australia) Pty Ltd
Lvl 1 38 Adelaide Street Fremantle (Walyalup) WA 6160
Whadjuk Boodja
Ph: (08) 9430 8955
Prepared for Coterra Environment

This document should be cited as 'Ecoscape (Australia) Pty Ltd (2025) *Kerosene Lane / Baldvis Road, Baldvis Biological Survey*, prepared for Coterra Environment

TABLE OF CONTENTS

Executive Summary.....	1
1 Introduction.....	3
1.1 Background	3
1.2 Survey Area.....	3
1.3 Survey Requirements.....	4
1.4 Compliance	4
2 Desktop Assessment	6
2.1 Physical Environment.....	6
2.1.1 Climate	6
2.1.2 Land Systems.....	7
2.1.3 Wetlands and Drainage.....	7
2.1.4 Environmentally Sensitive Areas.....	7
2.1.5 Conservation Lands	7
2.2 Biological Environment.....	7
2.2.1 Biogeographic Region	7
2.2.2 Pre-European Vegetation.....	8
2.2.3 Heddle Vegetation Complex	8
2.2.4 Threatened and Priority Ecological Communities	9
2.2.5 Threatened and Priority Flora	10
2.2.6 Fauna Assemblage	12
2.2.7 Threatened and Priority Fauna	12
2.3 Relevant Literature	14
2.3.1 Previous Surveys	14
2.3.2 IBSA Data Search	15
3 Methods.....	17
3.1 Survey Aims	17
3.2 Guiding Principles	17
3.3 Flora and Vegetation Field Survey.....	17
3.3.1 Field Survey Methods.....	17
3.3.2 Data Management and Analysis	19
3.4 Fauna Field Survey	20
3.4.1 Fauna Survey Methods	20
3.4.2 Targeted Survey Methods	21
3.4.3 Post-survey Likelihood Assessment	22
4 Field Survey Results	23
4.1 Flora and Vegetation Survey.....	23
4.1.1 Flora	23
4.1.2 Vegetation	25
4.1.3 Vegetation Significance.....	27
4.1.4 Statistical Analysis.....	29
4.1.5 Vegetation Condition	30
4.1.6 Botanical Survey Limitations	31
4.2 Vertebrate Fauna Survey	33
4.2.1 Fauna Habitat.....	33
4.2.2 Fauna Assemblage	34

4.2.3	Significant Fauna and Associated Habitat	35
4.2.4	Fauna Survey Limitations.....	41
5	Discussion	42
5.1	Flora Significance	42
5.1.1	Flora Significance	42
5.2	Vegetation Significance	43
5.2.1	Assessment Against TEC Criteria	44
5.2.2	Priority Ecological Communities	44
5.2.3	Local and Regional Significance of Vegetation	44
5.2.4	Vegetation Condition	44
5.3	Fauna Significance	45
5.3.1	Fauna Habitat Types	45
5.3.2	Fauna Assemblage	45
5.3.3	Post-survey Likelihood Assessment	47
6	Conclusions	49
	References	50
	Maps.....	55
	Appendix One Acronyms and Abbreviations.....	62
	Appendix Two Legislative Context, Definitions and Criteria.....	64
	Commonwealth Environment Protection and Biodiversity Conservation Act 1999	64
	Western Australian Environmental Protection Act 1986.....	65
	Western Australian Biodiversity Conservation Act 2016	66
	Flora Criteria	70
	Vegetation Criteria	71
	Environmentally Sensitive Areas	72
	Conservation Estate	72
	Appendix Three Field Survey Criteria	73
	Appendix Four TEC Assessment Criteria.....	81
	Banksia Woodlands TEC.....	81
	Tuart Woodlands TEC	82
	Appendix Five Desktop Assessment Results and Likelihood Assessments	84
	Appendix Six Field Survey Results (Flora).....	90
	Appendix Seven Floristic Quadrat Data.....	97
	Appendix Eight FCT Analysis Dendrogram.....	110
	Appendix Nine Field Survey Results (Fauna)	112
	Appendix Ten Class 3 Black Cockatoo Habitat Trees	121

FIGURES

Figure 1: Survey area location.....	3
Figure 2: Rainfall and temperature data from near the survey area (BoM 2024a)	6
Figure 3: Survey area floristic analysis	29

Figure 4: Species accumulation curve.....	30
Figure 5: Rainfall deciles for the 6 months prior to the field survey (BoM 2024b)	32
Figure 6: Black Cockatoo habitat trees; species and diameter classes	36
Figure 7: Black Cockatoo potential habitat class (according to Bamford (BCE 2025)) by tree species	37

TABLES

Table 1: Pre-European vegetation association representation (DBCA 2019)	8
Table 2: Karrakatta Complex – central and south original and current extents (Government of Western Australia 2019).....	9
Table 3: TECs and PECs identified by PMST and DBCA database searches	9
Table 4: Categories for likelihood of occurrence of TF and PF	11
Table 5: Categories for likelihood of occurrence of conservation-listed fauna.....	13
Table 6: Vegetation types.....	26
Table 7: Diagnostic criteria (from Section 3.2.1 in Approved Conservation Advice (DotEE 2019)).....	28
Table 8: Vegetation condition	30
Table 9: Botanical limitations.....	31
Table 10: Fauna habitat types	33
Table 11: Foraging habitat scoring tool – Baudin’s Cockatoo	38
Table 12: Foraging habitat scoring tool – Carnaby’s Cockatoo	38
Table 13: Foraging habitat scoring tool – Forest Red-tailed Black Cockatoo	39
Table 14: Black Cockatoo foraging value (BCE 2023)	40
Table 15: Fauna survey limitations	41
Table 16: Acronyms and abbreviations	62
Table 17: EPBC Act categories for flora, fauna and ecological communities	64
Table 18: Conservation category definitions for Western Australian flora and fauna (DBCA 2023b).....	66
Table 19: DBCA definitions and criteria for TECs and PECs (DBCA 2023d)	69
Table 20: NVIS structural formation terminology, terrestrial vegetation (NVIS Technical Working Group & DotEE 2017)	73
Table 21: NVIS height classes (NVIS Technical Working Group & DotEE 2017).....	74
Table 22: Vegetation condition scale for the South West and Interzone Botanical Provinces (EPA 2016a) and Keighery (1994)	74
Table 23: Grading system for the assessment of potential nest trees for Black Cockatoos (BCE 2025) (BCE 2025).....	75
Table 24: Black Cockatoo foraging quality scoring tool (DAWE 2022)	76
Table 25: Black Cockatoo foraging value scoring system (BCE 2023).....	77

Table 26: Condition categories and thresholds for inclusion in the Banksia Woodlands TEC (TSSC 2016)	81
Table 27: Condition categories and thresholds for inclusion in the Tuart Woodlands TEC (DotEE 2019)	82
Table 28: Flora database search results, habitat and likelihood assessment	84
Table 29: Fauna database results and likelihood assessments	86
Table 30: Excluded species and reason for exclusion	89
Table 31: Flora inventory (site x species matrix)	90
Table 32: Tuart tree locations (in Tuart Woodlands TEC/PEC) (Zone 50 GDA94)	93
Table 33: Fauna inventory	112
Table 34: Habitat assessment point	113
Table 35: Black Cockatoo habitat tree locations (GDA94, Zone 50)	114

MAPS

Map 1: Pre-European vegetation, Environmentally Sensitive Areas, Bush Forever and DBCA lands	56
Map 2: DBCA database searches – flora and communities	57
Map 3: DBCA database search results – fauna, Black Cockatoo trees	58
Map 4: Vegetation types and Tuart tree locations	59
Map 5: Vegetation condition, significant weeds and survey tracks	60
Map 6: Fauna habitat, Black Cockatoo trees and fauna locations	61

IMAGES

Image 1: <i>*Asparagus asparagoides</i> (Bridal Creeper)	24
Image 2: <i>*Zantedeschia aethiopica</i> (Arum Lily)	24
Image 3: 'Epiphytic' <i>*Zantedeschia aethiopica</i> (Arum Lily)	24
Image 4: Sea-eagle nest	35
Image 5: Raptor nest	35
Image 6: Forest Red-tailed Black Cockatoo foraging evidence	39

EXECUTIVE SUMMARY

The owner of Lot 293 (No. 249) Kerosene Lane and Lots 1214 (No. 220) and 1215 (No. 206) Baldvis Road, Baldvis, and in association with the owner of part of Lot 800 Kerosene Lane, is proposing development of these locations. Coterra Environment was appointed to coordinate the environmental approvals process and in turn appointed Ecoscape to undertake an ecological survey of the above location to inform this process.

The desktop assessment identified the following significant features of the survey area:

- no wetlands or drainage features, environmentally sensitive areas or conservation lands intersect the survey area
- three pre-European vegetation associations intersect the survey area (DPIRD 2019, DBCA 2019):
 - association 968 has between 36.35% (at IBRA region and subregion level) and 3.69% at local government area level although there is very little native vegetation within the survey area in this portion
 - association 998 has between 36.35% (at IBRA subregion level) and 31.48% at local government level
 - association 1001 that has 38.32% at local government level and 22.05% at all other scales
- the Heddle (1980) vegetation complex within which the survey area is located (Karrakatta Complex – Central and South) has 23.49% of its original extent remaining within the Swan Coastal Plain region (Government of Western Australia 2019)
- two conservation-listed ecological communities (EC) have been mapped as potentially occurring in the location, according to the Department of Biodiversity, Conservation and Attractions (DBCA) database search being:
 - *Banksia Woodlands of the Swan Coastal Plain* (Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)-listed Threatened Ecological Community (TEC) and DBCA-listed Priority Ecological Community (PEC)), abbreviated to Banksia Woodlands TEC hereafter
 - *Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain* (EPBC Act TEC and DBCA-listed PEC), abbreviated to Tuart Woodlands TEC hereafter
- no conservation-listed flora species are known to occur within the survey area, with 26 having been recorded from within 10 km (DBCA database search results)
- no conservation-listed fauna species are known to occur from within the survey area, with 35 having been recorded from within 10 km (DBCA database search results).

A Detailed flora and vegetation, Basic terrestrial vertebrate fauna survey and Targeted Black Cockatoo Survey were undertaken during 29-30 October 2024, with some supplementary data recorded by Coterra Environment on 19 February 2025.

The flora and vegetation survey and subsequent analysis identified:

- 64 vascular flora species recorded from four floristic quadrats, two descriptive relevés in Completely Degraded condition and opportunistic observations
- no conservation-listed flora were recorded, nor were any considered likely to occur based on site conditions and survey effort
- more than half of the recorded flora species were introduced (37 species; 56.9%) including two Declared Pest plants: **Asparagus asparagoides* (Bridal Creeper) (also a Weed of National Significance) and **Zantedeschia aethiopica* (Arum Lily)
- the majority of the survey area was not native vegetation and consisted largely of paddocks with isolated trees or domestic/urban gardens (17.66 ha; 79.8%)
- two native vegetation types were identified:
 - **CcMOF**; *Corymbia calophylla* mid open forest from isolated patches in the eastern portion of the survey area (0.58 ha)
 - **CcEgEmMOF**; *Corymbia calophylla*, *Eucalyptus gomphocephala* and *Eucalyptus marginata* subsp. *marginata* mid open forest, occupying the vegetated south-western portion of the survey area (3.88 ha)
- vegetation type **CcEgEmMOF** was assessed as being:

- representative of the Tuart Woodlands TEC extent on site, with additional areas outside of the vegetation type being identified using the assessment methodology in the Approved Conservation Advice for the community (Department of the Environment and Energy [DotEE] 2019), the TEC occupies 6.48 ha of the survey area and for a further 1.53 ha extending outside the survey area and contiguous with a larger extent to the south
- representative of two Swan Coastal Plain floristic community types (FCT 24 and FCT 19b) both of which are acknowledged as being incorporated into the Tuart Woodlands TEC in the Approved Conservation Advice (DotEE 2019), noting that FCT 19b can also be representative of the *Sedgelands in Holocene Dune Swales of the southern Swan Coastal Plain* TEC (not applicable in this case)
- the vegetation condition of the survey area is Degraded (2.25 ha; 10.17%), Completely Degraded (2.20 ha; 9.95%) or not native vegetation (17.66 ha; 79.87%).

The Basic fauna survey, which incorporated a Targeted Black Cockatoo survey, identified:

- two fauna habitat types: Eucalypt woodland (4.80 ha; 21.69%) and Isolated Trees over Grassland (15.22 ha; 68.84%), with houses and gardens not considered as habitat types
- 32 vertebrate fauna species were recorded, consisting of:
 - two mammals, including Quenda (*Isoodon fusciventer*), listed as Priority 4 by DBCA
 - 29 birds including: Carnaby's Cockatoo (*Zanda latirostris*); EPBC and BC-listed EN and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*); EPBC and BC-listed VU, and marine species White-bellied Sea-Eagle (*Haliaeetus leucogaster*); EPBC-listed MA
 - one reptile
- 239 trees were of suitable species and of sufficient size to be potential Black Cockatoo habitat (breeding) trees, although only 19 had hollows that were potentially suitable for nesting. No evidence of current or previous Black Cockatoo nesting was recorded.
- the survey area included trees that were suitable for use as night roosts
- the Eucalypt woodland habitat was considered to represent foraging habitat for Black Cockatoo species, particularly for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo; the Isolated Trees over Grassland habitat was considered as moderate-low value foraging habitat for Forest Red-tailed Black Cockatoo and low value for Carnaby's Cockatoo
- based on habitat availability and survey effort, no conservation-listed fauna species (other than those recorded) were considered likely to occur within the survey area.

Both the Tuart Woodlands TEC and Black Cockatoo species are Matters of National Environmental Significance (MNES) protected under the EPBC Act

1 INTRODUCTION

1.1 BACKGROUND

The owner of Lot 293 (No. 249) Kerosene Lane and Lots 1214 (No. 220) and 1215 (No. 206) Baldvis Road, Baldvis, and in association with the owner of part of Lot 800 Kerosene Lane, is proposing development of these lots (herein referred to as the 'survey area'). Coterra Environment was appointed to coordinate the environmental approvals process and in turn appointed Ecoscape to undertake an ecological assessment of the survey area to inform this process.

1.2 SURVEY AREA

The survey area is located within the City of Rockingham in the Swan Coastal Plain bioregion, approximately 38 km south of the Perth CBD (**Figure 1**). The survey area consists of lands that are partly ('parkland') cleared for rural housing, cleared lands used in part for a transport yard and grazing (current and historic use) and uncleared although disturbed native vegetation (part of Lot 293).

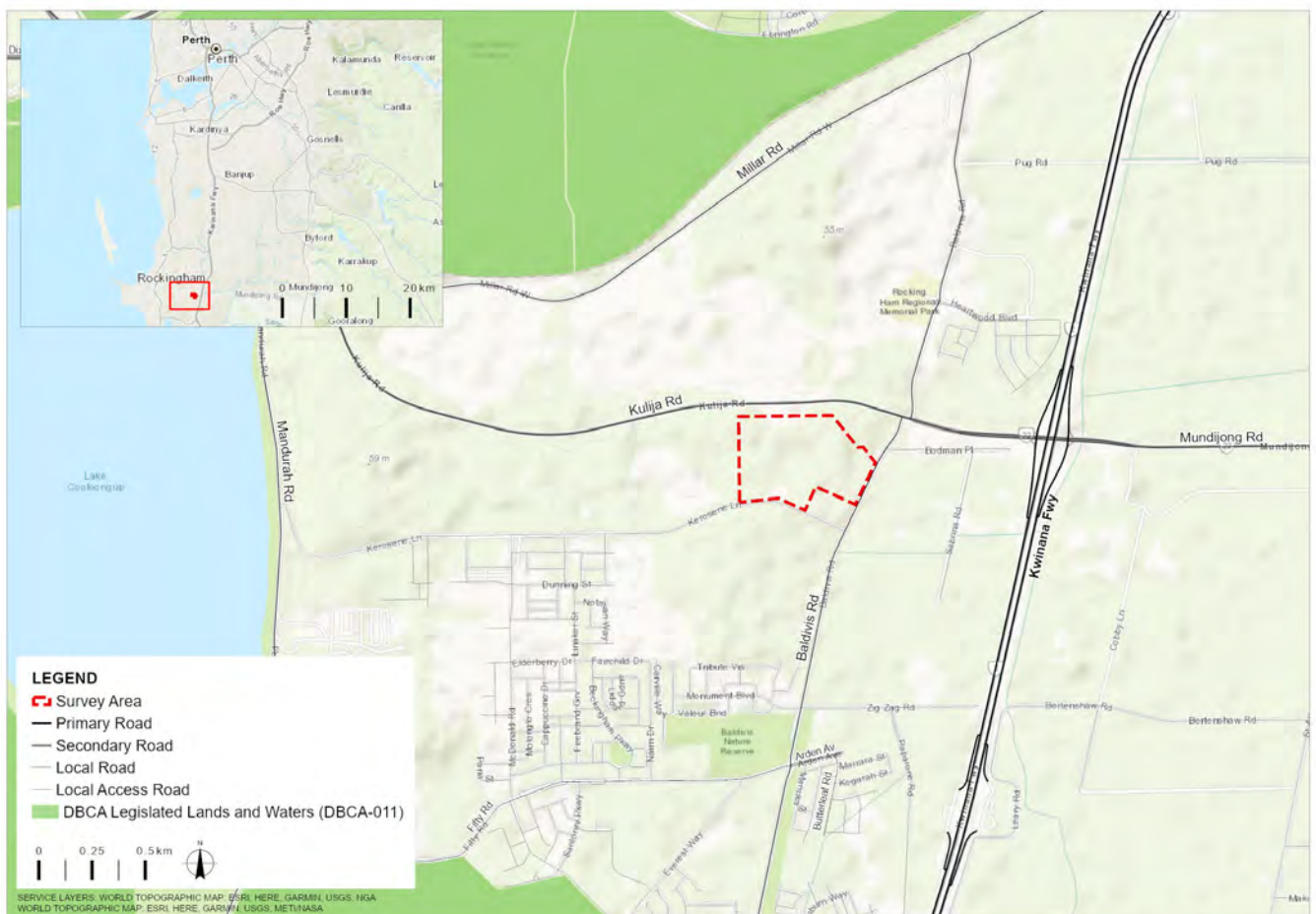


Figure 1: Survey area location

1.3 SURVEY REQUIREMENTS

The requirements of the survey were to undertake:

- a Detailed flora and vegetation survey that was compliant with the Environmental Protection Authority (EPA2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, known herein as the Flora and Vegetation Technical Guidance
- a Basic terrestrial vertebrate fauna survey that was compliant with the EPA (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*, known herein as the Fauna Technical Guidance
- a Targeted Black Cockatoo survey informed by the Department of Agriculture Water and the Environment (DAWE 2022) *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo*.

1.4 COMPLIANCE

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

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Western Australian *Environmental Protection Act 1986* (EP Act)
- Western Australian *Biodiversity Conservation Act 2016* (BC Act)
- Western Australian *Biodiversity Conservation Regulations 2018*
- Department of Environment, Water, Heritage and the Arts (DEWHA 2009) *Matters of National Environmental Significance. Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*
- Department of Sustainability Environment Water Population and Communities (DSEWPac 2011a) *Survey guidelines for Australia's threatened mammals*
- DSEWPac (2011b) *Survey guidelines for Australia's threatened reptiles*
- DEWHA (2010a) *Survey guidelines for Australia's threatened bats*
- DEWHA (2010b) *Survey guidelines for Australia's threatened birds*
- DAWE (2022) *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo*
- Environmental Protection Authority (EPA 2019) *EPA Advice: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region*
- Threatened Species Scientific Committee (TSSC 2016) *Approved conservation advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community*
- Department of the Environment and Energy (DotEE 2019) *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community*.

Summaries of the main Acts under which this assessment was conducted, and related criteria and definitions, are available in **Appendix Two**.

As well as those listed above, the assessment complied with Environmental Protection Authority (EPA) requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2016b) *Environmental Factor Guideline – Flora and Vegetation*
- EPA (2016c) *Environmental Factor Guideline – Terrestrial Fauna*
- EPA (2021) *Statement of environmental principles, factors, objectives and aims of EIA*.

The following also formed part of the Black Cockatoo assessment:

- Bamford Consulting Ecologists (BCE 2025) *Approach to the valuation of nesting habitat for black-cockatoos (revised 9th April 2025)*

- Bamford (2023) *Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos*.
Revised 6th February 2023.

Additional details (definitions and criteria) relevant to these works are available in **Appendix Two**.

2 DESKTOP ASSESSMENT

2.1 PHYSICAL ENVIRONMENT

2.1.1 CLIMATE

The southwest of Western Australia is generally described as having a Mediterranean-type climate of mild, wet winters and warm to hot, dry summers. The climate of the region is strongly influenced by the position of a band of high pressure known as the sub-tropical ridge. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north, allowing cold fronts to pass over the west coast and deliver much of the annual rainfall (Beard 1990).

According to the Köppen-Geiger climate classification, the survey area has a temperate climate with hot, dry summers (Class Csa) (Peel, Finlayson & McMahon 2007). This classification is considered to represent a Mediterranean climate where average summer maximum temperatures exceed 22°C and the average coldest month maximum is between 18° and -3°C, and summer rainfall is less than one third of winter rainfall.

The closest Bureau of Meteorology (BoM) station with long term records is Jandakot Aero (BoM 2024a station 9172, operating since 1972) which is located approximately 23 km north of the survey area. The mean annual rainfall is 812.7 mm falling predominantly in the late autumn (May) and winter period (June-August). The rainfall during the 6-month period prior to the field survey was 105.6% of the long-term average for this period.

February is the hottest month with a mean maximum temperature of 31.7°C and mean minimum of 17.3°C. July is the coldest month with a mean maximum of 18.1°C and mean minimum of 7.2°C.

Figure 2 shows the average rainfall and temperatures recorded by BoM at the nearest recording location to the survey area, with rainfall for the months preceding the field survey.

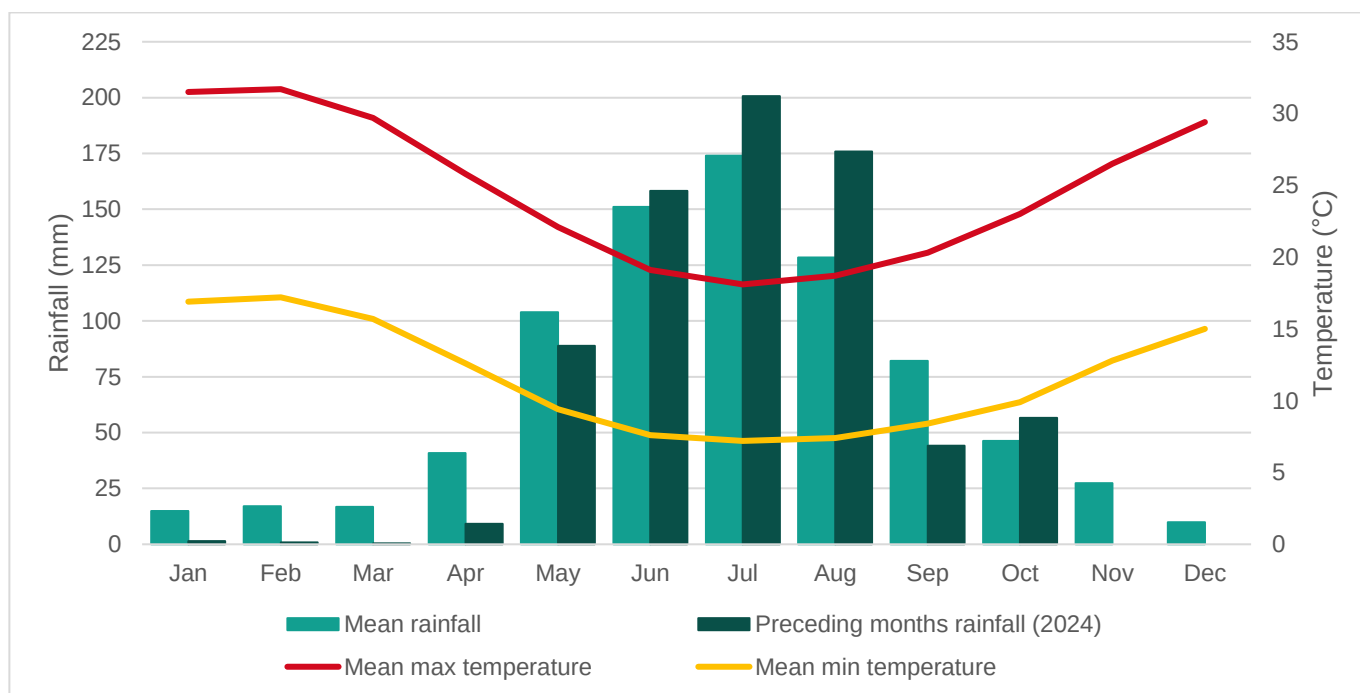


Figure 2: Rainfall and temperature data from near the survey area (BoM 2024a)

2.1.2 LAND SYSTEMS

According to the Department of Primary Industries and Regional Development (DPIRD 2020) soil landscape mapping, one land system intersects the survey area: Spearwood (211Sp) described as *Sand dunes and plains. Yellow deep sands, pale deep sands and yellow/brown shallow sands*.

2.1.3 WETLANDS AND DRAINAGE

The survey area is in the Murray River catchment (Department of Water and Environmental Regulation [DWER] 2018a), in two sub-catchments of the Lower Serpentine River (DWER 2018b).

There are no wetlands or drainage features within the survey area. The nearest wetlands are the Conservation Category Wetland (CCW) Kerosene Lane Swamp (UFI 6,617) located approximately 1.2 km to the west and an unnamed Multiple Use Wetland (UFI 16,021) located less than 50 m east. The nearest waterway is the Peel Main Drain located approximately 0.9 km to the east.

2.1.4 ENVIRONMENTALLY SENSITIVE AREAS

The survey area does not intersect any mapped Environmentally Sensitive Areas (ESAs) (DWER 2021); ESAs are shown on **Map 1**.

The nearest ESAs are approximately:

- 1 km to the north, corresponding with Leda Nature Reserve that also incorporates several conservation category wetlands (CCW)
- 1.2 km to the west, corresponding with Kerosene Lane Swamp, which is a CCW, and its associated buffer
- a number of Environmentally Sensitive Areas 1-1.2 km to the west potentially correspond with TECs and associated buffers.

2.1.5 CONSERVATION LANDS

The nearest land managed by the Department of Biodiversity, Conservation and Attractions (DBCA) is Leda Nature reserve, located approximately 1 km to the north.

Regionally significant bushland included as Bush Forever Areas (BFA) and protected under *State Planning Policy 2.8* (Western Australian Planning Commission 2010) are also located nearby, including:

- BFA 349 (Leda and Adjacent Bushland, Leda), 900 m north-west
- BFA 356 (Lake Cooloongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy), 1.6 km west
- BFA 418 (Folly Pool, Baldivis), 2.1 km south-east.

Map 1 shows nearby DBCA lands and bush Forever sites.

2.2 BIOLOGICAL ENVIRONMENT

2.2.1 BIOGEOGRAPHIC REGION

Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna and are defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Department of Agriculture Water and the Environment 2020).

The survey area is located in the Swan Coastal Plain IBRA region in the Perth subregion (SWA2), described by Mitchell, Williams and Desmond (2002) as:

The Swan Coastal Plain is a low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, Casuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by C. obesa-marri woodlands and Melaleuca shrublands, are extensive only in the south.

The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah- Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean. The subregional area is 1,333,901 ha.

2.2.2 PRE-EUROPEAN VEGETATION

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia at a scale of 1:250,000 in the south-west and at a scale of 1:1,000,000 in less developed areas.

Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps have since been developed in digital form by Shepherd, Beeston & Hopkins (2002), updated by DPIRD (2019) and published by the DBCA (2019). This mapping indicates that the survey area intersects three pre-European vegetation units:

- Association 968: Woodland southwest (Jarrah, marri and wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*)
- Association 998: Woodland southwest (Jarrah, marri and wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*)
- Association 1001: Low forest, woodland or low woodland with scattered trees (Jarrah, banksia or casuarina *Eucalyptus marginata*, *Banksia* spp., *Allocasuarina* spp.).

The pre-European vegetation association/s identified from the survey area (DPIRD 2019) and their pre-European and current extents are listed in **Table 1** (DBCA 2019, 'a' report data) and shown on **Map 1**.

Table 1: Pre-European vegetation association representation (DBCA 2019)

Region	Vegetation association	Original extent (ha)	Current extent (ha)	% remaining
Western Australia	968	296,877.84	95,048.82	32.02
	998	51,015.33	18,492.63	36.25
	1001	57,410.23	12,660.76	22.05
IBRA biogeographic region (Swan Coastal Plain)	968	136,188.20	9,017.32	6.62
	998	50,867.50	18,492.32	36.35
	1001	57,410.23	12,660.76	22.05
IBRA biogeographic sub-region (SWA2 Perth)	968	136,188.20	9,017.32	6.62
	998	50,867.50	18,492.32	36.35
	1001	57,410.23	12,660.76	22.05
LGA (City of Rockingham)	968	4,013.82	148.11	3.69
	998	5,319.33	1,674.39	31.48
	1001	3,010.32	1,153.53	38.32

2.2.3 HEDDLE VEGETATION COMPLEX

Hedde *et al.* (1980) divided the Swan Coastal Plain into medium to large areas based on soil and landform units, with the vegetation within these areas defined in terms of floristic composition, growth-form dominance, species composition and stratal structure.

According to Hedde *et al.* (1980), one vegetation complex intersects the survey area:

- Karrakatta Complex – Central and South, described as *Mosaic of woodland of Eucalyptus gomphocephala* (Tuart) and open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri); closed heath on the Limestone outcrops.

Its pre-European and current extent (Government of Western Australia 2019) is indicated in **Table 2**.

Table 2: Karrakatta Complex – central and south original and current extents (Government of Western Australia 2019)

Region	Original extent (ha)	Current extent (ha)	% remaining
Swan Coastal Plain	53,080.99	12,467.20	23.49
Perth Metropolitan Region	34,596.71	4,291.55	12.40
City of Rockingham	4,275.59	1,129.95	26.43

2.2.4 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Threatened and Priority Ecological Communities (TECs and PECs) intersecting the survey area and nearby were identified by a *Protected Matters Search Tool* (PMST) search (DCCEEW 2024, using a 10 km buffer) (EPBC-listed TECs) and DBCA database search request (search reference 15-1024EC_Baldivis, using a 10 km buffer around an approximately central point) for Western Australian-listed TECs and PECs.

The results of these searches are indicated in **Table 3** and, for the DBCA data, shown on **Map 2**.

Table 3: TECs and PECs identified by PMST and DBCA database searches

PMST*	DBCA database**	Ecological Community	EPBC status	WA status
Likely (in feature area)	Intersecting	<i>Banksia Woodlands of the Swan Coastal Plain ecological community</i> (EPBC-listed TEC and WA PEC of the same name) incorporating the following WA PECs: • <i>Low lying Banksia attenuata woodlands or shrublands</i> (SCP21c) • <i>Banksia ilicifolia woodlands</i> (SCP22)	EN	P3 PEC
-	x	<i>Callitris preissii</i> (or <i>Melaleuca lanceolata</i>) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson et al. 1994)		CR TEC
-	x	<i>Casuarina obesa</i> Association		P1 PEC
Likely (in buffer)	x	<i>Clay pans of the Swan Coastal Plain</i> (EPBC-listed TEC) incorporating: • <i>Herb rich shrublands in clay pans</i> (floristic community type 8 as originally described in Gibson et al. 1994) • <i>Dense shrublands on clay flats</i> (floristic community type 9 as originally described in Gibson et al. 1994)	EN	EN TEC
-	x	<i>Coastal shrublands on shallow sands</i>		P3 PEC
Known (in buffer)	x	<i>Communities of Tumulus Springs</i> (Organic Mound Springs, Swan Coastal Plain) (EPBC equivalent: <i>Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain</i>)	EN	CR TEC
Known (in buffer)	-	<i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain	EN	
Known (in buffer)	x	<i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in Gibson et al. 1994)	EN	EN TEC
May (in buffer)	-	<i>Empodisma</i> peatlands of southwestern Australia	EN	

PMST*	DBCA database**	Ecological Community	EPBC status	WA status
Likely (in feature area)	x	<i>Melaleuca huegelii</i> - <i>M. systema</i> shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994) (EPBC equivalent: <i>Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion</i>)	CR	CR TEC
-	x	<i>Microbial community of a coastal saline lake (Lake Walyungup)</i>		P1 PEC
-	x	<i>Northern Spearwood shrublands and woodlands</i>		P3 PEC
Known (in buffer)	x	<i>Sedgeland in Holocene dune swales of the southern Swan Coastal Plain</i> (EPBC-listed TEC) incorporating the Western Australian: <i>Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in Gibson et al. 1994) SCP19a</i> <i>Woodlands over Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in Gibson et al. 1994) SCP19b</i>	EN	EN TEC
-	x	<i>Southern Eucalyptus gomphocephala-Agonis flexuosa</i> woodlands		P3 PEC
Known (in buffer)	x	<i>Stromatolite like microbialite community of coastal freshwater lakes (Lake Richmond)</i> (EPBC equivalent: <i>Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)</i>)	EN	CR TEC
-	x	<i>Subtropical and Temperate Coastal Saltmarsh</i>	VU	P3 PEC
Likely (in feature area)	Intersecting	<i>Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain</i>	CR	P3 PEC

* PMST presence

** X = occurs within the 10 km search buffer; 'intersecting' occurs within parts of the survey area.

Two EPBC listed TECs which are Western Australian-listed PECs have been mapped as occurring, or co-occurring as they correspond, within the survey area:

- *Banksia Woodlands of the Swan Coastal Plain* TEC, abbreviated to Banksia Woodlands TEC/PEC hereafter
- *Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain*, abbreviated to Tuart Woodlands TEC/PEC hereafter.

Both have detailed assessment methodologies to determine if vegetation is representative of the TEC/PEC, summarised in **Appendix Four**.

The Western Australian TEC *Melaleuca huegelii* - *M. systema* shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994) and its EPBC equivalent (EPBC equivalent: *Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion*) is considered unlikely to occur as the definitive landform of limestone ridges occur in areas closer to the coast than the survey area.

2.2.5 THREATENED AND PRIORITY FLORA

The PMST search (as above) identified 17 EPBC-listed Threatened Flora (TF) that are known to occur within the 10 km search buffer area, two as 'species or habitat known to occur within area', six as 'species or habitat likely to occur within area' and nine as 'species or species habitat may occur within area'.

The requested DBCA databases (search reference 24-1024FL) was conducted using a 10 km buffer around an approximate central point of the survey area. The DBCA results are provided as two lists: 'TPFL' that incorporates Threatened and Priority Flora Report Forms and DBCA surveys, and 'WAHerb' taken from vouchered specimens held in the Western Australian Herbarium (WAH). **Map 2** shows the locations of the 26 conservation-listed flora identified by the DBCA database search.

The combined database searches identified 39 species, listed in **Table 28** in **Appendix Five**, consisting of 18 TF (five from DBCA records known to occur within the database search buffer and a further 13 only from the PMST where associated habitat may occur), three P1, two P2, eight P3 and eight P4.

No previous surveys have been known to intersect the current survey area.

2.2.5.1 Threatened and Priority Flora Likelihood Assessment

Ecoscape conducted a likelihood assessment to identify the TF and Priority Flora (PF) species that have potential to occur within the survey area. Information to assess the likelihood of a species occurring includes the species' ecology (habitat and associated vegetation) as listed on *FloraBase* and with vouchered collection data (WAH 1998a-2024, 2024), as well as surveyor's experience in similar areas.

The attributes taken into consideration were:

- broad soil type usually associated with the species
- broad landform usually associated with the species
- usual vegetation (characteristic species) with which the species is usually associated
- species having previously been recorded near the survey area ('proximity' or 'close proximity'; see **Table 4**) taking locational accuracy into consideration
- time since recorded (i.e. within the previous 25 years), taking into consideration land use changes since record collection
- reliability of record: species identified by only a TPFL record, without an accompanying verified vouchered specimen, may have been incorrectly identified or been subject to taxonomic updates since the record was entered
- number of records for the species
- if the record is for a not naturally occurring population (planted).

The likelihood rating is assigned using the categories listed in **Table 4**.

Table 4: Categories for likelihood of occurrence of TF and PF

Likelihood Category	Criteria
Known to occur	Species previously recorded within the survey area.
Likely to occur	Suitable habitat is known to occur within the survey area and multiple records of the species exist within close proximity*
May occur	Suitable habitat is expected to occur within the survey area and the species has previously been recorded within proximity**
Unlikely to occur	Suitable habitat is expected to occur within the survey area however previous records are limited and/or historic and/or not in proximity** OR Suitable habitat is not expected to occur within the survey area although previous records exist in proximity**
Very Unlikely to occur	Suitable habitat is not expected to occur in the survey area AND/OR previous records are limited and/or historic and/or not in proximity**

* close proximity = 2.5 km (¼ of the distance of the database search buffer)

** proximity = 5 km (½ of the distance of the database search buffer)

The likelihood assessment is available in **Table 28** in **Appendix Five**. None have been previously recorded from within the survey area. One P1 (*Acacia* sp. Binningup (G. Cockerton *et al.* WB 37784)), one P3 (*Pimelea*

calvicola) and two P4 (*Dodonaea hackettiana*, *Eucalyptus foecunda* subsp. *foecunda*) were identified as being Likely to occur based on the information available during the desktop assessment.

2.2.6 FAUNA ASSEMBLAGE

An *Atlas of Living Australia* (ALA 2024) search of a 10 km radius from an approximate central point of the survey area identified 447 vertebrates, consisting of 40 mammals, 321 birds, 72 reptiles and 14 amphibians have been recorded, inclusive of marine species. A 1 km radius search identified 37 vertebrates from the search area, consisting of one mammal, 32 birds and four reptiles.

2.2.7 THREATENED AND PRIORITY FAUNA

Combined database search results are incorporated into **Table 29** in **Appendix Five**.

Species identified by these database searches that are excluded from the field survey and further assessments (including likelihood assessments) are listed in **Table 30** along with the reason for their exclusion (e.g. marine species where suitable habitat does not occur within the survey area; invertebrates that are not within the scope of the survey; birds that may overfly the survey area but are unlikely to occur within it due to lack of suitable habitat).

Such excluded species are not further referenced in this document.

2.2.7.1 EPBC-listed Threatened Fauna

The PMST search (DCCEEW 2024a, using a 10 km buffer), identified the following as having been recorded or having potential to occur within the search area buffer i.e. 'species or species habitat known to occur within the area' (or buffer) or 'species or species habitat likely to (or may) occur within area' (or buffer):

- five mammals
- 33 birds.

A search of the DBCA databases was conducted (search reference: 20-1024FA) using a 10 km buffer around a point approximating the centre of the survey area (**Map 3**). Thirty-five conservation-listed species were identified as having previously been recorded from within the search area buffer, consisting of:

- six mammals
- 25 birds
- three reptiles.

2.2.7.2 Threatened and Priority Fauna Likelihood Assessment

The likelihood of conservation-listed fauna species, as identified by the database and literature searches, occurring within the survey area was assessed using the following criteria:

- suitability of habitat types likely to be present within the survey area
- distance between previous record of conservation-listed species and the survey area
- frequency and number of records in the region
- date of record of conservation-listed species (recent or historical)
- the record is naturally occurring (not from a sanctuary or translocated population).

The following were also taken into consideration during the assessment:

- sufficiency of information
- behavioural and ecological characteristics such as cryptic behaviours, size and mobility of species
- record certainty.

The categories of likelihood of occurrence, assessed using the above criteria, are shown in **Table 5**.

Table 5: Categories for likelihood of occurrence of conservation-listed fauna

Likelihood Category	Criteria
Known to occur	Species previously recorded within the survey area within 25 years.
Likely to occur	Suitable habitat is expected to occur within the survey area and records of the species within 25 years exist within close proximity*
May occur	Suitable habitat is expected to occur within the survey area and historic records of the species exist within close proximity* OR Suitable habitat is expected to occur within the survey area and recent (<25yrs) records exist within the database search buffer but not in close proximity*
Unlikely to occur	Suitable habitat is expected to occur within the survey area however previous records are limited and/or historic and/or not in proximity** OR Suitable habitat is not expected to occur within the survey area and recent (<25yrs) records do not occur in close proximity*
Very Unlikely to occur	Suitable habitat is not expected to occur in the survey area AND/OR previous records are limited and/or historic and/or not in proximity**

* close proximity = 2.5 km (¼ of the distance of the database search buffer)

** proximity = 5 km (½ of the distance of the database search buffer)

The likelihood of species occurring within the survey area are indicated in **Table 29** in **Appendix Five**.. Three species were assessed as being Likely to occur within the survey area:

- *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) – EPBC- and BC Act VU
- *Zanda latirostris* (Carnaby's Cockatoo) – EPBC- and BC Act VU
- *Isoodon fusciventer* (Quenda, Southwestern Brown Bandicoot) – DBCA P4.

Likelihood of occurrence does not take into consideration factors such as frequency that a species occurs (or may occur), the duration that such species occupies (or may occupy) the survey area or dependence on habitat or resources within the survey area. Highly mobile species potentially only occur within (or for birds, overflying) the survey area for very brief periods and/or on very infrequent intervals. If a previous observation included in the database search records corresponds with this event it is listed as 'Known'; if such a transient visitation is possible in the future the likelihood of such species occurring is likely listed as 'Likely'.

2.2.7.3 Black Cockatoos

According to DAWE (2022) the survey area is located within:

- the 'likely to occur' distribution of Baudin's Cockatoo
- the breeding range of Carnaby's Cockatoo
- the 'likely to occur' range of Forest Red-tailed Black Cockatoo.

According to DBCA mapping the survey area is located approximately:

- 24 km southeast of confirmed Carnaby's Cockatoo breeding areas (DBCA 2018a)
- 7.8 km north of unconfirmed (indicative) Carnaby's Cockatoo breeding areas (DBCA 2018b)
- 1.2 km east of a confirmed Carnaby's Cockatoo roost sites (DBCA 2018c).

Areas under investigation as Carnaby's Cockatoo feeding habitat (DBCA 2018d) intersect the survey area.

Figure 2 in EPA (2019) indicates approximate breeding zones for Carnaby's Cockatoo have not been identified from within 100 km of the survey area.

Birdlife Australia (2024) *Birddata* indicates:

- no nearby (<1 km) records of Baudin's Cockatoo, and only two records from within 5 km, from the Alcoa wetland approximately 1.6 km east of the survey area (1998 and 2010)
- two nearby (<1 km) records of Carnaby's Cockatoo sightings from 2014 and 2018 and numerous sightings from the Alcoa Wellard wetlands approximately 1 km to the east

- one nearby (<1 km) record of Forest Red-tailed Black Cockatoo from 2024 and numerous sightings from the Alcoa Wellard wetlands approximately 1 km to the east.

2.3 RELEVANT LITERATURE

2.3.1 PREVIOUS SURVEYS

There are no previous records of ecological surveys being undertaken within the survey area.

The lands immediately south of the survey area (47.23 ha) are proposed for development as a residential subdivision and are currently under assessment (EPBC 2021/9006) under the EPBC Act pertaining to threatened species and communities. The supporting documents of the adjacent EPBC assessment (flora and vegetation, and fauna assessments) have been reviewed and the significant findings are summarised below.

Emerge Associates (2021a) *Basic Fauna and Targeted Black Cockatoo Assessment, Lots 55, 56, 294, and 772 Kerosene Lane and Lot 295 Baldivis Road, Baldivis*:

- the majority of the site was not native vegetation and had limited value as fauna habitat
- 30 native fauna species were recorded during the 7 days of field survey including Carnaby's Cockatoo (EPBC and BC Act-listed EN), Forest Red-tailed Black Cockatoo (EPBC and BC Act-listed VU) and Quenda (DBCA-listed P4)
- 546 habitat trees were recorded (three with 'suitable hollows' and three with 'potentially suitable hollows') but no evidence of breeding was recorded
- roosting habitat occurs but no evidence of roosting was recorded
- the survey identified 16.14 ha of suitable foraging habitat for Carnaby's Cockatoo, 16.20 ha of suitable foraging habitat for Baudin's Cockatoo (although this species was considered an infrequent visitor only) and 17.55 ha of foraging habitat for Forest Red-tailed Black Cockatoo.

Emerge Associates (2021b) *Detailed Flora and Vegetation Assessment, Lots 55, 56, 294, and 772 Kerosene Lane and Lot 295 Baldivis Road, Baldivis*:

- the majority of the site was non-native vegetation
- 44 native species and 54 non-native (weed) species were recorded during the 4 days of field survey (March 2015; September, October, December 2020)
- no TF or PF species were recorded nor considered likely to occur
- three vegetation types, all characterised by *Eucalyptus gomphocephala* (Tuart) and in Degraded condition were recorded
- 36.83 ha of vegetation considered representative of the Tuart Woodlands TEC/PEC was recorded.

The following documents have been identified as having relevance to current survey:

- GHD (2018) *Proposed Baldivis District Sporting Complex Flora and Vegetation Assessment*. Located approximately 6 km south south-west of the survey area, the survey identified two native vegetation types including a *Eucalyptus gomphocephala* (Tuart) woodland that was likely to be representative of the Tuart Woodlands TEC/PEC, but did not identify any conservation-listed flora species from the 87 species recorded.
- Western Botanical (2018) *Flora and Vegetation Assessment, Mandurah Road, Baldivis*. This survey area was located approximately 2 km west of the survey area. The linear survey area was *Eucalyptus gomphocephala* (Tuart) woodland in Degraded condition; there was no assessment for representation of this community as a PEC, which was the conservation status at the time of survey. Twenty-four flora species were recorded, none of them conservation-listed.
- PGV Environmental (2012) *The Village at Wellard Stages 32-40 Flora and Vegetation Survey*. Located approximately 2 km north of the survey area, the assessment identified 113 flora species, none of which were conservation-listed, seven vegetation associations (three dominated by *Eucalyptus gomphocephala*

(Tuart)) with the majority in Degraded condition but no determination of representation as any conservation-listed ecological community was made due to the vegetation condition.

- Terrestrial Ecosystems (2013) *Level 1 Fauna Risk Assessment for the Wellard Village Site*. The fauna assessment of the above site identified four fauna habitat types (three woodland types and one cleared area), with the majority being considered as very good habitat. Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo were recorded (the latter was potentially nesting).
- ENV Australia (2011) *Bollard Bulrush East Fauna Assessment*. Located approximately 4.3 km north of the survey area, this assessment was of a dampland that lacked significant fauna habitat value due to degradation, including lack of large trees. Twenty-nine fauna species were recorded during the 1 day survey, none of them conservation-listed or of other significance.

2.3.2 IBSA DATA SEARCH

The Department of Water and Environmental Regulation's (DWER's) *Index of Biodiversity Surveys for Assessments (IBSA)* Portal (DWER 2024) was searched for recent environmental surveys in the vicinity of the survey area.

The search, conducted on 5 November 2024 identified 28 environmental surveys that have been conducted within 10 km of the survey area. Eighteen of these listings did not have data accessible for review i.e. contained metadata only or were duplicates. The following documents had relevance to current survey:

- Emerge Associates (2022) *Reconnaissance Flora, Vegetation and Tree Assessment Part Mandurah Road Reserve between Fifty Road and Safety Bay Road*. Eight vegetation types were recorded from the 2.37 ha of native vegetation, some of which may be representative of the Tuart Woodlands and Banksia Woodlands TECs; no conservation-listed flora were identified; 42 potential Black Cockatoo habitat trees including 11 with potentially suitable hollows were recorded.
- PGV Environmental (2021) *Lot 4 King Road, Oldbury Flora Vegetation and Fauna Survey Assessment*. The site occupied 14.25 ha; half was previously part of a sand mine. Four vegetation types including a Banksia woodland were recorded; this vegetation type, when combined with adjacent similar vegetation, was assessed as being representative of the Banksia Woodlands TEC. No conservation-listed flora were recorded, however the survey was not conducted during spring. Three fauna habitat types were recorded including foraging habitat for Black Cockatoos, but no breeding habitat.
- Biologic (2021) *Kwinana Nickel Refinery Eucalyptus gomphocephala (Tuart) TEC Assessment*. No Tuart Woodlands TEC/PEC was recorded.
- GHD (2020) *Hollow Survey*. An assessment at the Kwinana Rail Yard of a tree identified as potentially suitable for Black Cockatoos by Strategen-JBS&G (2019) was determined to not be suitable.
- PGV Environmental (2019) *Lot 1488 Patterson Road, East Rockingham Environmental Assessment Report*; 4.05 ha of Degraded-Good condition *Acacia rostellifera-Xanthorrhoea preissii* shrubland. There were no significant flora, vegetation (communities) or fauna associated with the site.
- Strategen-JBS&G (2019) *Kwinana Island Vegetation Assessment*. An assessment at the Kwinana Rail Yard identified 21 flora species, two native vegetation types in Completely Degraded condition including one that, when taking contiguous vegetation into consideration, was considered to represent the Tuart Woodlands TEC/PEC. Eight trees of sufficient size to be potential Black Cockatoo nest trees were recorded; one had hollows that may be suitable for breeding.
- Biologic (2019) *Kwinana Nickel Refinery, Flora, Vegetation and Fauna Assessment*. The site occupied 38 ha and included current infrastructure. Fifty vascular flora species were recorded (none of which were conservation-listed) across five vegetation units all in Degraded-Completely Degraded condition, none of which were representative of any conservation-listed communities; seven vertebrate fauna species including Carnaby's Cockatoo (overflying) were recorded from the single habitat type which was considered to be poor quality.
- Western Botanical (2018) as above (**Section 2.3.1**)
- GHD (2018) as above (**Section 2.3.1**)

- GHD (2012) *Report for Rail Reserves in the Shire of Serpentine Jarrahdale Spring Flora and Vegetation Survey and Fauna and Habitat*; five TECs were identified from amongst the 13 vegetation types; 394 flora species including one TF and four PF; seven fauna habitat types; 49 fauna species including Baudin's Cockatoo (EPBC and BC Act – EN) and Forest Red-tailed Black Cockatoo (EPBC and BC Act – VU) and two Priority-listed fauna.

3 METHODS

3.1 SURVEY AIMS

The aims of the Detailed flora and vegetation and Basic terrestrial vertebrate fauna surveys were to:

- identify if there were any significant botanical attributes occurring within the survey area, including:
 - conservation-listed flora (TF or PF)
 - conservation-listed ecological communities (TECs or PECs)
- identify if the survey area provided habitat for conservation-listed fauna, in particular threatened Black Cockatoo species (breeding trees, roosting or foraging habitat).

3.2 GUIDING PRINCIPLES

The flora and vegetation survey was conducted as a Detailed survey according to the Flora and Vegetation Technical Guidance (EPA 2016a). The EPA considers that a Detailed survey requires:

- a comprehensive survey design, including giving consideration to the survey timing that should be conducted during the primary season of survey for the bioregion and disturbance events, and the potential requirement for supplementary surveys
- a minimum of three quadrats (in proportion to the extent of the vegetation type), located throughout each preliminary vegetation types sampled throughout its geographic range, with additional quadrats and rescoring during supplementary surveys to clarify vegetation type boundaries
- regional surveys if there is insufficient information available (identified during the desktop assessment) to provide local and regional context
- the survey may include a number of sampling techniques including quadrats, relevés, transects and traverses, as well as opportunistic observations
- the flora inventory should be comprised of data collected from quadrats and relevés, supplemented by opportunistic observations, systematic surveys and targeted inspections of various habitat areas
- it may be appropriate to increase survey effort in areas of unusual habitat
- sampling sites that are placed at representative locations throughout the survey area considering landform, geology, elevation, slope, aspect, surface or groundwater expression and soil type, as well as vegetation structure, composition and condition.

Targeted searches were also conducted in areas of habitat suitable for TF and PF identified during the desktop assessment and previous surveys as having potential to occur.

The fauna and fauna habitat survey was conducted as a Basic survey according to the Fauna Technical Guidance (EPA 2020). The EPA recommends a Basic terrestrial vertebrate fauna survey should:

- be conducted as a low intensity survey to gather broad fauna and habitat information
- verify the adequacy of the desktop assessment
- map, describe and photograph habitats
- record opportunistic fauna observations
- identify possible future survey site locations, access and logistics
- determine if a Detailed survey is required.

Targeted surveys were also conducted to gather information on significant fauna and their habitats.

3.3 FLORA AND VEGETATION FIELD SURVEY

3.3.1 FIELD SURVEY METHODS

The methods utilised during the field survey followed those outlined in the Flora and Vegetation Technical Guidance (EPA 2016a), conducted as a single-phase Detailed survey.

Conservation criteria used in this assessment are outlined in **Table 17**, **Table 18** and **Table 19** in **Appendix Two**.

Survey method details are outlined below. Cleared areas currently being grazed by horses and gardens associated with residences were not assessed.

3.3.1.1 Floristic Quadrats

Floristic quadrat ('quadrat') locations were selected using aerial photography, environmental values and field observations to represent the vegetation values existing within the survey area. The unmarked quadrats were 10 m x 10 m in dimension, as required according to the Flora and Vegetation Technical Guidance (EPA 2016a).

The following information was collected from within each quadrat:

- observer
- date
- quadrat/site number
- GPS location (GDA94) of the northwest corner
- digital photograph (spatially referenced with a reference number), taken from the northwest corner, looking diagonally across the quadrat
- broad soil type and colour
- topography
- list of flora species recorded with the average height and total cover within the quadrat for each species
- vegetation description (as per below)
- vegetation condition.

At least three quadrats per vegetation type were recorded for the Detailed survey where there was sufficient extent. Quadrat locations are displayed on **Map 4**.

Supplementary descriptive relevés (unmeasured areas) were recorded in areas of Degraded or Completely Degraded condition vegetation; only dominant species were recorded.

3.3.1.2 Targeted Searches

Threatened and Priority Flora identified during the desktop analysis and previous surveys as known or having potential to occur (i.e. those considered 'Likely' to occur) were targeted for searches in areas of potential habitat. Such searches were conducted during site traverses, including during the Black Cockatoo tree assessment as all vegetated portions of the survey area were visited.

Where observed, the locations of all targeted taxa collected were recorded using a handheld GPS with the following data recorded:

- observer, date and time
- local abundance/population size and/or population boundary, including outside the development envelopes where possible
- landform
- brief vegetation community description
- representative photos of each species and habitat
- collection of representative specimens.

3.3.1.3 Introduced Species

Introduced species (weeds) were recorded during the collection of the overall flora inventory.

3.3.1.4 Vegetation Description and Classification

Vegetation was described from each of the quadrats using the height and estimated cover of dominant and characteristic species of each stratum based on the National Vegetation Information System, recorded at Level V (NVIS Technical Working Group & DotEE 2017) (**Table 20** and **Table 21** in **Appendix Three**). Up to three species per stratum from each stratum (upper, mid and ground) were used to formulate vegetation descriptions for each quadrat and each vegetation type.

Vegetation type descriptions were created by combining quadrat descriptions and modifying, where necessary, based on the wider vegetation. Vegetation codes for these were formulated using the characteristic species of the highest stratum within the vegetation type that had >2% cover (i.e. not scattered) if present, with the first series of letter codes referring to the component species (upper case first letter referring to the genus, lower case one or two letters referring to the species, with the upper case letters at the end referring to the stratum structure e.g. **CcMOF** refers to *Corymbia calophylla* mid open forest.

3.3.1.5 Vegetation Condition Assessment

Vegetation condition was assessed broadly and continuously throughout the survey area and at each quadrat using the Vegetation Condition Scale for the Southwest Botanical Province (EPA 2016a) (**Table 22** in **Appendix Three**). As quadrats are located in the best condition parts of a vegetation type, the condition rating of the quadrat may not match that of the broader vegetation type due to the scale of mapping.

3.3.1.6 Field Survey Timing

The field survey was conducted during October which is within the optimal period for a primary survey within the bioregion according to the Flora and Vegetation Technical Guidance (EPA 2016a).

3.3.2 DATA MANAGEMENT AND ANALYSIS

3.3.2.1 Taxonomic Plant Identification

Any plants that could not be identified with certainty in the field, having potential to be conservation-listed, introduced species and having significance according to the Flora and Vegetation Technical Guidance (EPA 2016a) were collected during the field survey using Western Australian Herbarium collecting protocols.

The majority of post-survey plant collection identification was undertaken by Ecoscape taxonomists (primarily Dr Udani Sirisena) using relevant literature, taxonomic keys and reference specimens held at the WA Herbarium, including seeking assistance from specialist taxonomists where necessary.

3.3.2.2 Post-survey Likelihood Assessment

The likelihood of occurrence assessed during the desktop assessment was re-evaluated following the field survey when actual survey area characteristics (vegetation types, vegetation condition, visibility for individual species) were better understood. The revised likelihood assessment was based on survey results, survey effort and habitat identified within in the survey area.

3.3.2.3 Floristic Analysis

PATN© software (Blatant Fabrications Pty Ltd 2013) was used to undertake statistical analysis to generate floristic groups using the data collected from the quadrats and relevés, in order to better understand local significance of floristic units.

PATN is a multivariate analysis tool that generates estimates of association (resemblance, affinity, distance) between sets of objects described by a suite of variables (attributes) and classifies the objects into groups and condenses the information and displays the patterns in the data graphically. It offers a choice of data transformations prior to multivariate analysis.

Floristic groups, identified using a dendrogram output of the analysis, are used as a tool to inform vegetation type groups at various levels and scales.

Two separate analyses were undertaken:

- a survey area-based analysis to confirm if structural vegetation types as identified in the field were supported by the floristic composition ('floristics')
- a Floristic Community Type (FCT) analysis.

Survey Area Assessment

A number of floristic analyses using quadrat and relevé data were performed. All analyses (Bray and Curtis, Two-step, Kulczynski) performed on rows and columns provided the same result with similar ordination stress values that indicated a valid assessment.

FCT Assessment

Floristic analysis was conducted to compare the floristics of the recorded quadrats with the Gibson *et al.* and Keighery *et al.* (2012) data.

The combined analysis method used in this project was as close as possible to as used in Gibson *et al.* (1994), using the Gibson *et al.* and Keighery *et al.* (2012) data, and quadrats/relevés with sufficient data (i.e. a comprehensive species list) from the survey area. Limitations of data analysis include:

- the Czekanowski coefficient was not available within the PATN© software (Blatant Fabrications Pty Ltd 2013); instead, the Grower Metric transformation was utilised for rows and Kulczynski transformation for columns
- the DBCA data provided was only presence/absence thus not permitting square root transformation of weed data as used in Gibson *et al.*
- the DBCA data did not include conservation-listed species.

3.3.2.4 TEC Assessment Criteria

Vegetation potentially representative of TECs was assessed against the criteria outlined in the Approved Conservation Advice for the Banksia Woodlands TEC (TSSC 2016) and Tuart Woodlands TEC/PEC (DotEE 2019).

Reasons that vegetation was considered clearly not representative of the TEC in an indicatively mapped occurrence include the vegetation being a different type to that of the TEC, vegetation condition clearly not meeting the condition thresholds (i.e. Degraded-Completely Degraded condition for Banksia Woodlands TEC or proportion of native species for the Tuart Woodlands TEC/PEC), and extents too small for inclusion.

3.3.2.5 Adequacy of Sampling

In order to demonstrate adequacy of sampling, a species accumulation curve was generated by the software Species Diversity and Richness IV (Pisces Conservation Ltd 2010) using four random selections of sample order, using quadrat data only.

3.4 FAUNA FIELD SURVEY

The methods utilised during the field survey followed those outlined in the Fauna Technical Guidance (EPA 2020), conducted as a Basic survey.

Conservation criteria used in this assessment are included in **Table 17** and **Table 18** in **Appendix Two**.

Survey method details are outlined below.

3.4.1 FAUNA SURVEY METHODS

The Basic fauna survey incorporated a number of survey techniques as per the Terrestrial Fauna Technical Guidance (EPA 2020) including:

- habitat assessment
- opportunistic observations of birds and mammals while moving through the survey area and focussing on areas of suitable habitat including rocks, logs, spoil heaps and areas of dense litter

- external observations of tree trunks and hollows to observe evidence of fauna use.

Fauna species were identified opportunistically based on sightings, calls, remains, diggings and other signs. Potential habitats for conservation significant species were identified and evaluated (see **Section 3.4.1.2**) and their likelihood of occurrence re-assessed.

3.4.1.1 Bird Survey Methodology

Bird surveys were conducted as 20-minute point searches by an experienced ornithologist during peak periods of bird activity (early morning, as per Birdlife Australia standard methodology). Bird surveys (including opportunistic sampling during traverses within the survey area) were conducted in all habitat types and targeted conservation-listed species assessed as 'Likely' to occur during the desktop likelihood assessment (see **Section 2.2.7.2**). Birds were identified from their call signatures and from observations of live individuals.

3.4.1.2 Fauna Habitat Assessment

The fauna habitats present within the survey areas were identified and mapped. Fauna habitats were described as an area which is distinguishable from its surrounding area by its landform, vegetation and fauna assemblage occupying the area. In addition, its likelihood to harbour specialised fauna species which are not found in adjacent areas was taken into consideration.

The following information was used to identify and map all fauna habitats within the survey area:

- (if applicable) previous fauna habitat and/or vegetation type mapping
- land systems
- vegetation type and condition mapping
- aerial imagery
- landforms
- soil characteristic
- fauna assemblage information.

The composition and characteristics of each fauna habitat type was recorded, including noting suitability for various fauna suites or conservation-listed species. Habitat types were delineated in the field and digitised upon return from the field survey.

3.4.2 TARGETED SURVEY METHODS

3.4.2.1 Black Cockatoo Assessment Methods

'Black Cockatoos' refer to three threatened Western Australian species: *Zanda latirostris* (Carnaby's Cockatoo; EPBC- and BC Act EN), *Zanda baudinii* (Baudin's Cockatoo; EPBC- and BC Act EN) and *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo; EPBC- and BC Act VU). The survey area is within the mapped distribution of all three Black Cockatoos (DAWE 2022) and more than 100 km from any known Carnaby's Cockatoo breeding area as identified in EPA (2019).

Potential and active (actual) Black Cockatoo breeding trees were assessed as per Commonwealth guidance (DAWE 2022) and BCE (2025) methods (see below).

The suitability of the survey area for breeding (additional to the specific tree survey) and as foraging was also assessed and mapped (see 'foraging habitat survey methods' below).

Tree Survey Methods

Potential and actual Black Cockatoo habitat trees are:

- tree species as listed in the Commonwealth guidance (DAWE 2022)
- a minimum size of 500 mm diameter at breast height (DBH) for most species, or 300 mm DBH for Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*E. wandoo*, *E. capillosa* and/or *E. accedens*).

The following were recorded for each potential and actual habitat tree:

- location, recorded using a handheld GPS device with an accuracy of approximately 5 m
- species
- tree diameter (DBH) class, recorded in 250 mm intervals (e.g. 500-750 mm)
- identifying if tree hollows of suitable size and orientation are present, and recording evidence of use by cockatoos such as chewing at the hollow entrance – noting that this assessment was from ground level only and further assessment is required to confirm if the apparent hollows are actual, and if so, if the internal dimensions of the hollow are suitable
- habitat value according to the scoring system developed by Dr Mike Bamford (BCE 2025); this score reflects the existing value of the tree characteristics with respect to its potential to be used as a nesting tree (as per **Table 23 in Appendix Three**)
- photographs of each Class 3 and above trees, showing hollows if possible
- known nesting trees as per DBCA data.

Foraging Habitat Survey Methods

The suitability of the survey area for breeding (additional to the specific tree survey) and as foraging habitat was assessed and mapped as per the Commonwealth (DAWE 2022) scoring tool and Bamford (BCE 2023) foraging habitat methods.

The Commonwealth (DAWE 2022) scoring tool (**Table 24 in Appendix Three**) takes into consideration:

- the extent of the site (that must be at least 1 ha to be considered as suitable)
- preferred foraging species
- connectivity to other foraging habitat within 12 km
- proximity to known foraging and breeding habitat within 12 km
- presence of disease, such as *Phytophthora cinnamomi* or Marri Canker (*Quambalaria coyrecup*).

The Bamford (BCE 2023) scoring system (**Table 25 in Appendix Three**) takes into consideration:

- site condition (vegetation composition, condition and structure)
- site context (the site in relation to other native vegetation within a 15 km radius of the site)
- species density (stocking rate: frequency and abundance of Black Cockatoos at the site)
- modification, if needed, for vegetation with little or no foraging value and for pine plantations that provide valuable food sources.

3.4.2.2 Other Species of Conservation Significance

Other conservation-listed species, including migratory birds, with the potential to occur were targeted using active searches during the field survey.

Due to the short duration of the field survey, the likelihood of such species occurring was largely re-evaluated by identifying if suitable habitat was present in the survey area.

3.4.3 POST-SURVEY LIKELIHOOD ASSESSMENT

The likelihood of occurrence was re-evaluated following the field survey when actual survey area characteristics were better understood and the level of survey effort was considered. The post-survey likelihood assessment is incorporated into **Table 29** and discussed further in **Section 5.3.3**, including providing an indication of dependence of species on the habitat and resources available within the survey area. The revised likelihood assessment was based on survey results, survey effort and habitat identified within in the survey area.

4 FIELD SURVEY RESULTS

4.1 FLORA AND VEGETATION SURVEY

The flora and vegetation survey was conducted by Lyn Atkins (Principal Ecologist, Flora Collecting Permit FB6200003-2; Threatened Flora Collecting Permit TFL2223-0089) during 29-30 October 2024. Additional observations were made during a 19 February 2025 site visit by Coterra Environment's Claire Norman and Will Oversby.

4.1.1 FLORA

4.1.1.1 Flora Inventory

Four floristic quadrats and two descriptive relevés (recording only the dominant species in each strata) were recorded from within the survey area. House gardens were not included in the survey thus species occurring only within them are not included in the inventory.

Sixty-five vascular flora species were recorded from 55 genera and 25 families from the quadrats, relevés, opportunistic observations and searches for conservation-listed flora. Of these, 37 were introduced (56.9%).

The most commonly represented families were Fabaceae (13 taxa), Poaceae (12), Myrtaceae (seven) and Asteraceae (four). The most commonly represented genera were *Acacia*, *Banksia* and *Eucalyptus* with three taxa each.

The number of species per quadrat ranged from nine in quadrat KL2402 to 22 in quadrats KL2401 and KL2404, with an average species diversity per quadrat of 17.75. The most commonly recorded species was **Zantedeschia aethiopica* recorded from all four quadrats.

The combined flora inventory is presented in **Table 31** in **Appendix Six**. Quadrat data is presented in **Appendix Seven**.

4.1.1.2 Conservation-listed Flora

Threatened Flora

No Commonwealth EPBC Act or Western Australian BC Act-listed TF were recorded during the field survey. No taxa that was not identified with certainty resembled any currently described TF.

Priority Flora

No Western Australian-listed PF were recorded during the field survey. No taxa that was not identified with certainty resembled any currently described PF.

4.1.1.3 Other Significant Flora

No flora taxa having other significance according to the Flora and Vegetation Technical Guidance (EPA 2016a) were recorded during the field survey.

4.1.1.4 Flora of Taxonomic Interest

No flora of taxonomic interest were recorded during the field survey.

4.1.1.5 Introduced Flora

Thirty-seven introduced flora species (weeds) were recorded during the field survey, representing 56.9% of the overall flora inventory. Several weed species contributed significantly to the vegetation condition ratings including **Zantedeschia aethiopica* (Arum Lily) that covered up to 95% of the ground canopy in one quadrat (KL2402) and occurred in all four quadrats, and **Ehrharta calycina* (Perennial Veldt Grass) that was recorded from three quadrats.

Two recorded weed species are Declared Pest plants, although in the Exempt category and therefore do not have any management requirements. These are:

- **Asparagus asparagoides* (Bridal Creeper) (also a WoNS species)
- **Zantedeschia aethiopica* (Arum Lily).

Asparagus asparagoides* was observed to occur sporadically through much of the vegetated south-western portion of the survey area (Image 1**, midground), particularly in more degraded areas.

Zantedeschia aethiopica* occurred more commonly and at times occupied significant areas (up to 95%) of the ground stratum in both the vegetated south-western portion of the survey area (Image 1** left foreground and **Image 2**) and around isolated trees in the northern paddock, and was observed on several occasions to be growing as an epiphytic species in tree hollows, as high as 10 m above the ground, and tree trunk axils (**Image 3**).



Image 1: **Asparagus asparagoides* (Bridal Creeper)



Image 2: **Zantedeschia aethiopica* (Arum Lily)



Image 3: 'Epiphytic' **Zantedeschia aethiopica*

4.1.2 VEGETATION

4.1.2.1 Vegetation Types

Two vegetation types were recorded from within the survey area (**Table 6, Map 4**) based on a combination of structural vegetation type as identified in the field.

The vegetation types within the survey area were:

- **CcMOF**; *Corymbia calophylla* mid open forest from isolated patches in the eastern portion of the survey area
- **CcEgEmMOF**; *Corymbia calophylla*, *Eucalyptus gomphocephala* and *Eucalyptus marginata* subsp. *marginata* mid open forest, occupying the vegetated south-western portion of the survey area.

The majority of the survey area was not considered to have native vegetation as it was:

- devoid of all native species (i.e. completely cleared)
- paddock with sparse native trees but no other native species, including currently grazed (by horses) areas or abandoned (currently ungrazed and not cultivated) paddock
- mixes of native and introduced trees over bare ground or weed cover (including some likely previously grazed areas), no longer resembling native vegetation
- surrounding houses (residential garden).

Table 6: Vegetation types

Mapping unit	Vegetation type	Floristic quadrats	Representative photograph	Other characteristic species	Area (ha) and extent (%)
CcMOF	<i>Corymbia calophylla</i> mid open forest over *<i>Ehrharta calycina</i>, *<i>Bromus diandrus</i> and *<i>Cenchrus clandestinus</i> mid closed tussock grassland/grassland NVIS: U+ ^<i>Corymbia calophylla</i>\^tree\7d; G ^<i>Ehrharta calycina</i>,^<i>Bromus diandrus</i>,<i>Cenchrus clandestinus</i>\^tussock grass,other grass\2d	KL24R1 KL24R2		*<i>Euphorbia terracina</i> *<i>Tropaeolum majus</i> *<i>Trifolium campestre</i>	0.58 ha 2.61%
CcEgEmMOF	<i>Corymbia calophylla</i>, <i>Eucalyptus gomphocephala</i> and <i>Eucalyptus marginata</i> subsp. <i>marginata</i> mid open forest over *<i>Ehrharta calycina</i>, *<i>Zantedeschia aethiopica</i> and *<i>Bromus diandrus</i> mid closed tussock grassland/forbland/grassland NVIS: U+ ^<i>Corymbia calophylla</i>,^<i>Eucalyptus gomphocephala</i>,^<i>Eucalyptus marginata</i> subsp. <i>marginata</i>\^tree\7c; G ^^<i>Ehrharta calycina</i>,<i>Zantedeschia aethiopica</i>,<i>Bromus diandrus</i>\^tussock grass,forb,other grass\2d	KL2401 KL2402 KL2403 KL2404		<i>Acacia lasiocarpa</i> *<i>Avena barbata</i> *<i>Briza maxima</i> <i>Caesia micrantha</i> *<i>Euphorbia terracina</i> <i>Hardenbergia comptoniana</i> *<i>Hypochaeris glabra</i> *<i>Lysimachia arvensis</i> <i>Macrozamia riedlei</i> *<i>Pelargonium capitatum</i> *<i>Sonchus oleraceus</i>	3.88 ha 17.54%
Not native vegetation (cleared, current or former paddock, treed but not all native species, residential garden, tracks)					17.66 ha 79.8%
TOTAL EXTENT					22.12 ha

4.1.3 VEGETATION SIGNIFICANCE

4.1.3.1 TECs and PECs

Database searches (**Section 2.2.4**, shown on the **Map 2** inset) identified that the southwestern portion of the survey area (i.e. the western portion of Lot 293) has been mapped as being representative of two TECs: the Banksia Woodlands TEC and Tuart Woodlands TEC/PEC. The criteria used to define these TECs are outlined in **Appendix Four**. This portion of the survey area, vegetation type **CcEgEmMOF** occupying 3.88 ha has been assessed against the relative criteria for each of these TECs.

No other portions of the survey area meet the requirements to be representative of these (or any other) conservation-listed ecological community except (for the Tuart Woodlands TEC only) adjacent areas where Tuart canopies are within 30 m of other buffered Tuart canopies (i.e. <60 m between tree canopies).

Banksia Woodlands TEC

The southwestern portion of the survey area was assessed against the criteria outlined in the Approved Conservation Advice (TSSC 2016) for the Banksia Woodlands TEC.

The vegetation within this portion of the survey area:

- does not meet the basic structure and composition of a Banksia woodland (i.e. Banksias are not the characteristic dominant or co-dominant upper stratum species, noting that *Banksia attenuata* is the only definitive species occurring)
- the overall density (cover) of *Banksia attenuata* is below the required threshold of 2% canopy cover
- the vegetation condition does not meet the minimum requirement of being Good (see **Map 5**) according to the Approved Conservation Advice (*ibid.*). The vegetation condition scale used in this Advice is that of Keighery (1994) and is reproduced (verbatim) in **Table 22** in **Appendix Three** showing that it is, in all respects except precise wording, the same as that used for vegetation condition assessment as required according to the Flora and Vegetation Technical Guidance (EPA 2016a).

Therefore, the Banksia Woodlands TEC is not present within this portion or any part of the survey area.

Tuart Woodlands TEC/PEC

The southwestern portion of the survey area was assessed against the criteria outlined in the Approved Conservation Advice (DotEE 2019) for the Tuart Woodlands TEC/PEC.

Of note, Tuart (*Eucalyptus gomphocephala*) is not the dominant species in vegetation type **CcEgEmMOF** with Marri (*Corymbia calophylla*) most often dominant and Tuart sub- or, at most, co-dominant. Jarrah (*Eucalyptus marginata* subsp. *marginata*) and Pricklybark (*Eucalyptus tottiana*) also occur, with the former dominant in two quadrats but not overall in the vegetation.

Therefore, the broad description of being a Tuart Woodland to meet the most basic aspect of the diagnostic criteria is compromised, although the Approved Conservation Advice does not require Tuart to be dominant (*ibid.* Section 2.1 'The ecological community occurs as woodlands or forests or other structural forms where the primary defining feature is the **presence** of *Eucalyptus gomphocephala* (Tuart) trees in the uppermost canopy layer.').

As part of the survey area has been identified by DBCA as being representative of the Tuart Woodlands TEC/PEC and under the precautionary principle, the vegetation has been assessed against the criteria for inclusion (DotEE 2019); **Table 7**.

Locations of mature Tuart trees (i.e. those with a DBH 150 mm or more) are listed in **Table 32** in **Appendix Six**. Large trees (i.e. >500 mm DBH) were recorded as part of the Black Cockatoo habitat survey (**Section 4.2.3.1**), with smaller trees recorded separately. Non-consecutive tree numbers (in **Table 32**) are due to species other than Tuart being recorded for the Black Cockatoo habitat survey.

A total of 200 Tuart trees are located within the relevant densely vegetated portion of the survey area in vegetation type **CcEgEmMOF**. A further three live trees (plus one dead tree) extended the TEC to the north.

Three trees towards the south near Kerosene Lane, including one on the road reserve outside the survey area, extended the TEC extent and merged into the adjacent mapped extent to the south that occupies 36.83 ha (Emerge Associates 2021b).

Table 7: Diagnostic criteria (from Section 3.2.1 in Approved Conservation Advice (DotEE 2019))

Key Diagnostic Characteristics	Survey area
In the Swan Coastal Plain bioregion	Yes
Primarily on Spearwood and Quindalup dunes, but also on Bassendean dunes and Pinjarra Plain	On Spearwood dunes
Presence of at least two living <i>Eucalyptus gomphocephala</i> (Tuart) trees with a gap of <60 m between canopies of adjacent trees	Yes – in part of survey area
Mostly woodland but may be forest, open forest, woodland, open woodland or mallee-form	Open forest
Other species may be present in canopy or sub-canopy	Other listed 'commonly occurring species' present: <i>Banksia grandis</i> (uncommon), <i>Banksia attenuata</i> (uncommon), <i>Eucalyptus marginata</i> (occasionally co-dominant). Other listed 'less common species' present: <i>Corymbia calophylla</i> (dominant to co-dominant)
Understorey of native plants is typically present (listed in Section 2.3.3 and Appendix E of Approved Conservation Advice)	Listed species occurring: <i>Acacia rostellifera</i> (occasional patches), <i>Banksia sessilis</i> (uncommon, scattered), <i>Gompholobium tomentosum</i> (scattered, only near far southern edge), <i>Hardenbergia comptoniana</i> (common), <i>Kennedia prostrata</i> (uncommon), <i>Acanthocarpus preissii</i> (only near far southern edge), <i>Dianella revoluta</i> (very uncommon), <i>Tricoryne elatior</i> (common near southern edge), <i>Thysanotus arenarius</i> (sparse), <i>Daucus glochidiatus</i> (only near far southern edge), <i>Lobelia tenuior</i> (sparse). Appendix E only: <i>Ptilotus polystachyus</i> (very uncommon), <i>Jacksonia sternbergiana</i> (scattered), <i>Conostylis aculeata</i> (scattered, only near far southern edge), <i>Caesia micrantha</i> (dominant native species in ground stratum in some parts near far southern edge), <i>Eucalyptus marginata</i> (scattered sub-dominant tree), <i>Banksia attenuata</i> (scattered), <i>Banksia grandis</i> (scattered). Only <i>Hardenbergia comptoniana</i> and <i>Acacia rostellifera</i> occurred in Completely Degraded condition vegetation.
Native fauna species most commonly present (listed in Section 2.4 of Approved Conservation Advice) - not including non-local species - only species recorded in relevant portion of survey area.	Mammals: Quenda (<i>Isodon fusciventer</i>), Echidna (<i>Tachyglossus aculeatus</i>) Reptiles: Buchanan's Snake-eyed Skink (<i>Cryptoblepharus buechananii</i>) Birds: Weebill (<i>Smicrornis brevirostris</i>), Striated Pardalote (<i>Pardalotus striatus</i>), Western Gerygone (<i>Gerygone fusca</i>), Yellow-rumped Thornbill (<i>Acanthiza chrysorrhoa</i>), Rufous Whistler (<i>Pachycephala rufiventris</i>), Carnaby's Cockatoo (<i>Zanda latirostris</i>), Australian Raven (<i>Corvus coronoides</i>), Silvereye (<i>Zosterops lateralis</i>).

As all patches greater than 5 ha are considered to be Tuart TEC (provided they meet key diagnostic criteria and the definition of a patch), it is considered that 6.48 ha of the survey area is representative of the Tuart Woodlands TEC/PEC. A further 1.53 ha of the TEC, as calculated from the tree canopy buffers as below, occurs outside the survey area.

Extents of the Tuart Woodlands TEC/PEC are delineated by including 30 m from the outer canopy edge of mature Tuarts (DotEE 2019). Where canopy cannot be easily distinguished via aerial photography (i.e. in a mixed-species woodland), and as only the trunk location was recorded, the canopy is estimated to be approximately 5 m wide, therefore 35 m from the outermost tree within the patch's trunk locations are used to delineate the community's extent. Where canopy extents can be identified (i.e. paddock trees), the actual canopy edge was used.

The portion of the survey area which has been determined to represent the Tuart Woodlands TEC/PEC is immediately adjacent to, and therefore considered to be contiguous with an area occupying 36.83 ha that Emerge Associates (2021b) has assessed as being representative of the Tuart Woodlands TEC/PEC. Additional similar vegetation, although in Completely Degraded condition, also extends contiguously in a narrow strip to the west of the survey area, further increasing the extent of the TEC.

4.1.3.2 Other Significant Vegetation

No vegetation having other significance according to the Flora and Vegetation Technical Guidance (EPA 2016a) was recorded during the field survey.

4.1.4 STATISTICAL ANALYSIS

4.1.4.1 Floristic Analysis

Survey Area Floristics

Based on structural characteristics, only two vegetation types were identified from the survey area. Floristic analysis (**Figure 3**) did not entirely support the separation, however, it was retained due to the species composition of the upper stratum. Quadrat KL2402 is the least species rich and has the equal highest weed cover of the quadrats in vegetation type **CcEgEmMOF**, which are characteristics also shared with vegetation type **CcMOF**.

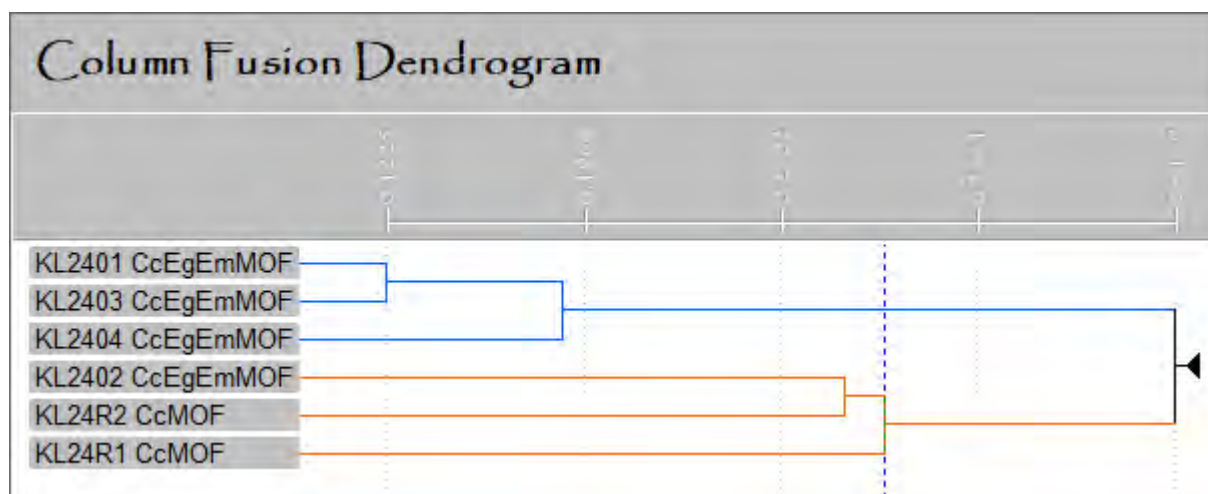


Figure 3: Survey area floristic analysis

Floristic Community Type Assessment

FCT analysis, undertaken by incorporating the site quadrat data with the Gibson *et al.* and Keighery *et al.* (2012) data indicated that:

- three of the four quadrats were aligned with FCT 24 *Northern Spearwood shrublands & woodlands* which is a Western Australian PEC that, when characterised by *Eucalyptus gomphocephala* (as was the case) may be included in the EPBC-listed Tuart Woodlands TEC/PEC
- one of the quadrats (KL2402) was broadly aligned with FCT 19b *Woodlands over sedgeland in Holocene dune swales* that, when a *Eucalyptus gomphocephala* overstorey is present, may be included in the EPBC-listed Tuart Woodlands TEC/PEC (DotEE 2019). Other FCTs that may also be included in the Tuart Woodlands TEC/PEC were also aligned with this quadrat (FCTs 30b and 24). As FCT 19b is a wetland type community type that has a ground stratum of sedges, the similarity of this quadrat to this FCT is likely to be invalid as no wetland is present within the survey area and the quadrat does not have any sedge species. Therefore, the other FCTs within this floristic group are more likely to be correct.

The relevant parts of the resulting dendrogram are reproduced in **Appendix Eight**. The full dendrogram can be provided on request.

4.1.4.2 Adequacy of Survey

Adequacy of survey can be demonstrated using a species accumulation curve; if the curve has reached (or almost reached) an asymptote it is considered that most species are likely to have been recorded from the survey area.

A species accumulation curve was generated using quadrat data (**Figure 4**). Opportunistic observations, which increase the number of species recorded, are not included in the analysis.

The species accumulation curve suggests additional survey would have resulted in additional species being recorded. However, the Bootstrap estimate of species richness is 49.32 which, when taking opportunistic records into account, is well under the total species richness identified (63) thus indicating that the survey effort was adequate to describe the floristic composition of the survey area.

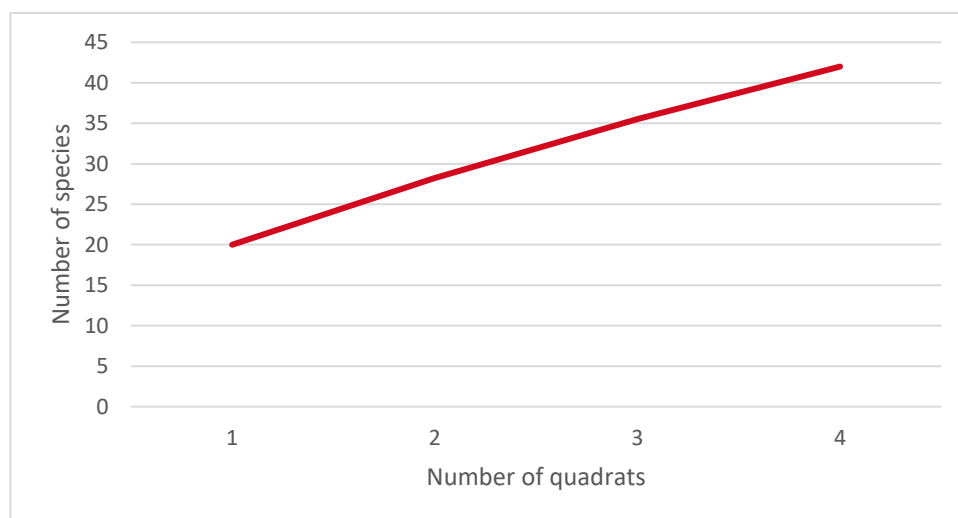


Figure 4: Species accumulation curve

4.1.5 VEGETATION CONDITION

The vegetation condition is indicated in **Table 8** and shown on **Map 5**. The northern portion of the survey area has been cleared and is an abandoned paddock with only few emergent trees, and not considered as extant native vegetation due to the degree of disturbance resulting in an almost complete lack of native species including complete removal of mid and ground strata and almost complete removal of upper stratum trees although a few have been retained (at far lower density than where naturally-occurring, based on adjacent areas), presumably as shade trees for livestock. Therefore, the paddock is not considered to represent extant native vegetation.

The eastern and part of the southern portion of the survey area is largely occupied by houses, a transport company yard, grazed horse paddock (similar to above) and abandoned but cleared land, none of which is considered as extant native vegetation. Cleared and Not Native Vegetation occupy 79.84% of the survey area.

Parkland cleared areas are considered as Completely Degraded condition native vegetation; these retain their upper stratum at natural or near-natural densities but are largely devoid of native species in the mid or ground strata.

Vegetation condition ranged from Degraded to Completely Degraded, with the majority in Degraded condition.

Table 8: Vegetation condition

Vegetation condition	Extent (ha)	Proportion	Proportion of vegetated parts
Pristine	-	-	
Excellent	-	-	
Very Good	-	-	
Good	-	-	
Degraded	2.14	9.70%	48.10%
Completely Degraded	2.31	10.46%	51.90%
Not vegetated, not native vegetation	17.66	79.84%	n/a

The land use, fire and clearing history of the survey area within remnant native bushland is unknown, thus causes of degradation cannot be determined. However, the previous disturbances have led to the site being

heavily weed infested (up to 99% of the ground stratum being introduced species in the remnant native bushland) and having significantly reduced species composition in comparison to what would be expected in less-disturbed areas, thus was assessed as being either Degraded (where there were some native species in the mid and ground strata, excluding *Hardenbergia comptoniana* which was widespread regardless of disturbance) or Completely Degraded (where there were few to no native species present other than trees at natural or near-natural density).

4.1.6 BOTANICAL SURVEY LIMITATIONS

Survey design and type: Single phase, quadrat-based flora and vegetation survey with extensive traverses searching for conservation-listed flora. Results from nearby surveys were considered as part of survey design and the desktop assessment.

Type of vegetation classification system: Vegetation classified at NVIS Level V (NVIS Technical Working Group & DotEE 2017) using largely structural vegetation types defined using dominant and characteristic species and vegetation structure as recorded during the field surveys.

A full summary of botanical limitations is presented in **Table 9**.

Table 9: Botanical limitations

Possible limitations	Constraints (yes/no): Significant, moderate or negligible	Comment
Availability of contextual information at a regional and local scale	No constraints	There is a large amount of information including botanical survey reports from the surrounding area to provide contextual information.
Competence/experience of the team conducting the survey, including experience in the bioregion surveyed	No constraints	The lead ecologist/botanist conducting the field survey has 40 years' experience conducting botanical surveys in the bioregion.
Proportion of the flora recorded and/or collected, and any identification issues	No constraints	Sixty-three vascular flora taxa were recorded during the field survey all of which could be identified with certainty to species level.
Was the appropriate area fully surveyed (effort and extent)	No constraints	Four quadrats were recorded in the area considered representative of native vegetation. A further two descriptive relevés were recorded from a highly disturbed area; while additional species would have been recorded if a full assessment was made, none would have been native species.
Access restrictions within the survey area	No constraints	All areas were fully accessible and if not entered could be viewed and were determined to not have native vegetation.
Survey timing, rainfall, season of survey	No constraints	The field survey was conducted during October which is optimal for survey in the Swan Coastal Plain bioregion. The rainfall in the 6 months prior to the field survey was slightly above the average for this period (Section 2.1.1), also indicated by the rainfall deciles (Figure 4). This represents no constraints to plant identifications.
Disturbance that may have affected the results of the survey e.g. fire, flood, clearing	No constraints	There were no recent disturbances that affected the field survey results.

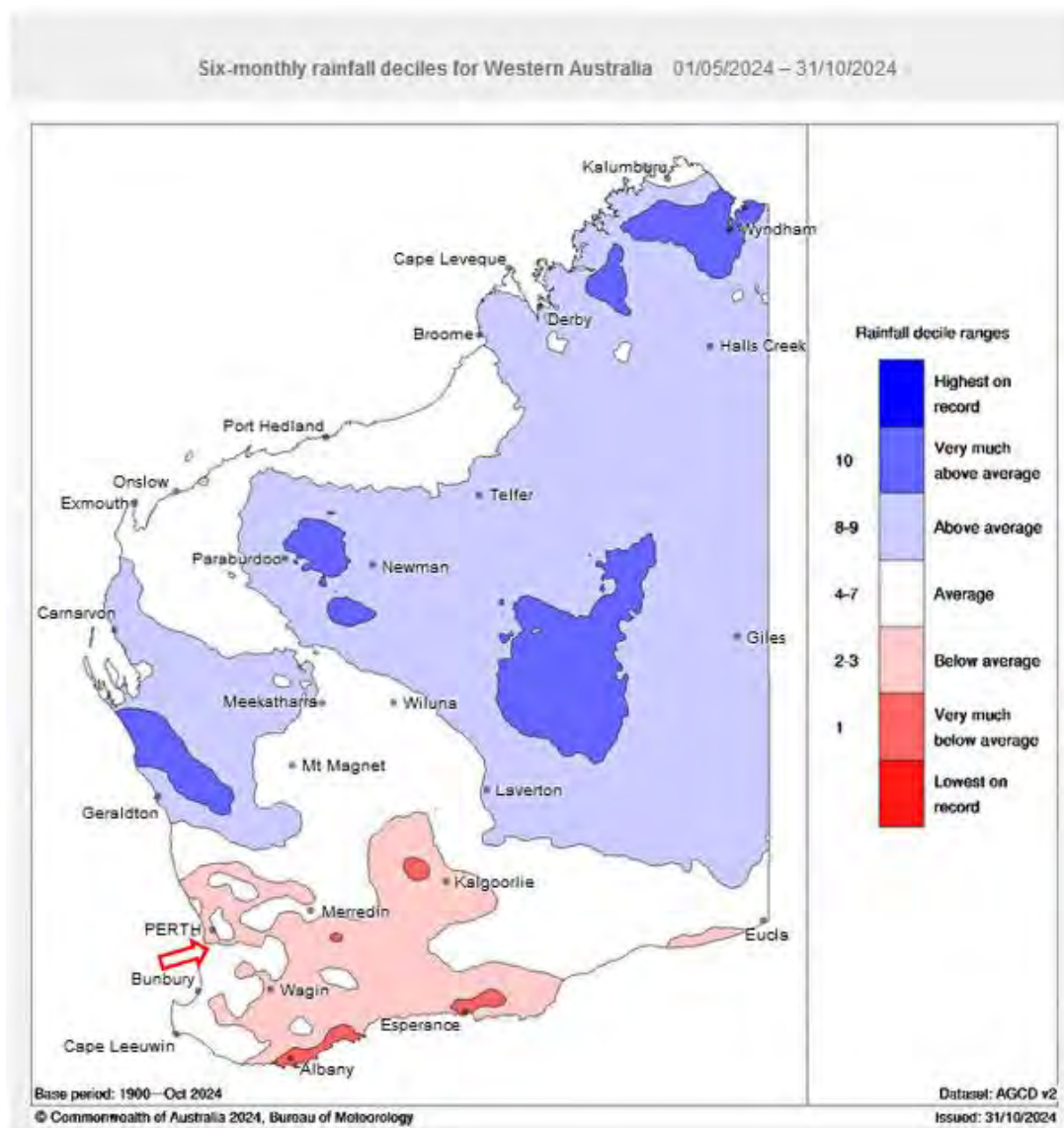


Figure 5: Rainfall deciles for the 6 months prior to the field survey (BoM 2024b)

The arrow in **Figure 5** indicates the approximate location of the survey area.

4.2 VERTEBRATE FAUNA SURVEY

The fauna survey was conducted by Lyn Atkins (Principal Ecologist) during 29-30 October 2024. Additional (supplementary) observations were made during a 19 February 2025 site visit by Coterra Environment's Claire Norman and Will Oversby, and incorporated into the report.

The survey was conducted in accordance with the requirements for a Basic survey as outlined in the Fauna Technical Guidance (EPA 2020).

The entire survey area was traversed on foot and all habitats were assessed for quality and capability of supporting both locally common and significant fauna species.

4.2.1 FAUNA HABITAT

Two fauna habitat types were recorded within the survey area (**Table 10**):

- Eucalypt Woodland
- Isolated trees over Grassland.

The quality of each habitat type was based on the field surveyor's experience and takes into consideration the level of disturbance to habitats from weeds, the amount of native vegetation, vegetation cover (density) and the context of the habitat with the surrounding landscape. One habitat assessment point was recorded (**Table 34 in Appendix Nine**), with habitat assessments being conducted continuously during site traverses. The survey track log demonstrating site coverage is indicated on **Map 5**.

Table 10: Fauna habitat types

Habitat type	Description	Photographs
Eucalypt Woodland	Eucalypt woodland Eucalypt woodland (Marri, Tuart, Jarrah) over dense weed cover that is either grassy (upper image) or dominated by Arum lilies (lower image). The groundcover provides shelter for small animals during winter, but less so during summer when the dried plant material collapses to close to the ground surface. There is little in terms of diverse food resources due to low plant species richness and lack of structural variation in the vegetation. There was little fallen timber (few logs, large branches). The soil is sandy and dry (despite the Arum lily suggesting dampness), with numerous small-sized (~2-5 cm) holes and divots suggesting suitability for reptiles, rodents and Quenda (diggings; recorded). Tall trees provide resources for roosting and nesting birds including hollow-nesting species and raptors. Occasional, scattered Banksias provide seasonal foraging for nectivorous birds and small and arboreal mammals (i.e. Brushtail Possums and, if present, Pygmy Possums as well as introduced rodents), and Carnaby's Cockatoo. As foraging habitat, the area is suited to generalist bird species including granivores (grass seeds, Eucalypt seeds – including for Black Cockatoos) and insectivores (leaf gleaners), Quenda and other small mammals, and reptiles. Extent: 4.80 ha; 21.70%	 

Habitat type	Description	Photographs
Isolated Trees over Grassland	Grassland with isolated trees The Isolated Trees over Grassland habitat consists of open grassland, either as abandoned paddock (image) or previously cleared areas with grass weeds, or currently grazed (by horses) paddock. The understorey provides food resources and shelter for small mammals, most likely introduced rodents, and reptiles and seasonally for granivore birds. Scattered trees (Marri, Tuart, Jarrah, Pricklybark, Sheoak) provide roosting and nesting resources for birds including hollow-nesting species and raptors, and food resources for granivores including parrots and cockatoos (including Black Cockatoos) and leaf gleaners (insectivores). Extent: 15.22 ha; 68.81%	
Not habitat	Houses, gardens etc are not considered as a natural habitat type. They do, of course, provide resources for native species, however these resources are not reflective of the natural environment and may be altered at any time. Extent: 2.10 ha; 9.49%	

4.2.2 FAUNA ASSEMBLAGE

The fauna inventory was gathered during site traverses (opportunistic observations) and from two 20-minute point searches (bird surveys) undertaken early on both mornings of the survey.

Thirty-two vertebrate fauna species were recorded during the survey (**Table 33** in **Appendix Nine**), consisting of:

- two mammals (none introduced although feral cats, foxes and rodents would occur but were not recorded during the 2 days of survey)
- 29 birds (two introduced)
- one reptile.

Of these, three are conservation-listed:

- Carnaby's Cockatoo (*Zanda latirostris*); EPBC and BC-listed EN – a single individual heard calling while overflying the survey area
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*); EPBC and BC-listed VU – foraging evidence recorded in northern (paddock) portion (observed during October and February) and observed on-site for a few hours during February 2025
- Quenda (*Isodon fusciventer*); DBCA status P4 – observed in dense Arum Lily undergrowth in Woodland habitat but diggings common throughout the Eucalypt Woodland.

There were also recorded an unexpectedly large range of raptor species observed, although none are conservation-listed:

- Australian Kestrel (*Falco cenchroides*)
- Brown Goshawk (*Accipiter fasciatus*)
- Whistling Kite (*Haliastur sphenurus*)
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*); EPBC-listed MA.

The White-bellied Sea-Eagle is of significance as a Marine species but is not otherwise conservation-listed. It occurs mainly along the coastline, extending inland along major waterways, with breeding confined to only a

small portion of its range (DCCEEW 2024b). Three individuals were observed during the first day of field survey, generally soaring above the survey area but they were also observed chasing Corellas from the known nest that is located within the survey area (**Image 4, Map 6**). This nest, in a large Tuart, has been used since at least 2019 (Singor 2024) but breeding had not commenced by the time of survey, although appeared imminent as judged by the protective behaviour of the birds.

Another large nest suited to raptors of similar size was also observed to the north, in a dead tree likely to have once been a Tuart, within the paddock portion of the survey area (**Image 5, Map 6**). No raptor activity was observed near this nest which may be either a less-developed White-bellied Sea-Eagle nest as pairs of this species are known to display such activities (DCCEEW 2024b), a nest of a different pair, an abandoned nest, or of a different raptor species.



Image 4: Sea-eagle nest



Image 5: Raptor nest

4.2.3 SIGNIFICANT FAUNA AND ASSOCIATED HABITAT

The significant fauna species observed during the field survey are discussed below with respect to each species' habitat requirements, taking into consideration the findings of the field survey and survey effort.

Three conservation-listed fauna species were recorded during the survey: Carnaby's Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), and Quenda (*Isodon fusciventer*).

4.2.3.1 Black Cockatoo Habitat Assessment

The survey area is within the mapped distribution of Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo (DAWE 2022).

Carnaby's Cockatoo (observed; heard overflying the survey area) and Forest Red-tailed Black Cockatoo (foraging evidence) were recorded during the field survey.

Breeding Habitat

Black Cockatoo habitat trees were assessed according to the criteria outlined in Commonwealth guidelines (DAWE 2022), with additional information recorded using the Bamford (BCE 2025) grading classifications to identify the potential suitability of trees to be used for nesting based on the presence of, size and orientation of hollows (as per **Table 23** in **Appendix Three**) and further notes determining the significance of Class 3 and above trees recorded (i.e. those with hollows).

Photographs of Class 3 and above trees are included in **Appendix Ten**; locations are shown on **Map 6**.

A total of 239 trees of suitable diameter and species to be Black Cockatoo habitat trees were recorded. The majority were Marri (*Corymbia calophylla*, 110; 46.0%), with 99 Tuart (*Eucalyptus gomphocephala*; 41.4%), 21 Jarrah (*Eucalyptus marginata* subsp. *marginata*; 8.8%), five Flooded Gum (*Eucalyptus rudis*; 2.1%) and four dead trees (1.7%). Details of the habitat trees are included in **Table 35** in **Appendix Nine**; species and diameter classes are illustrated in **Figure 6**.

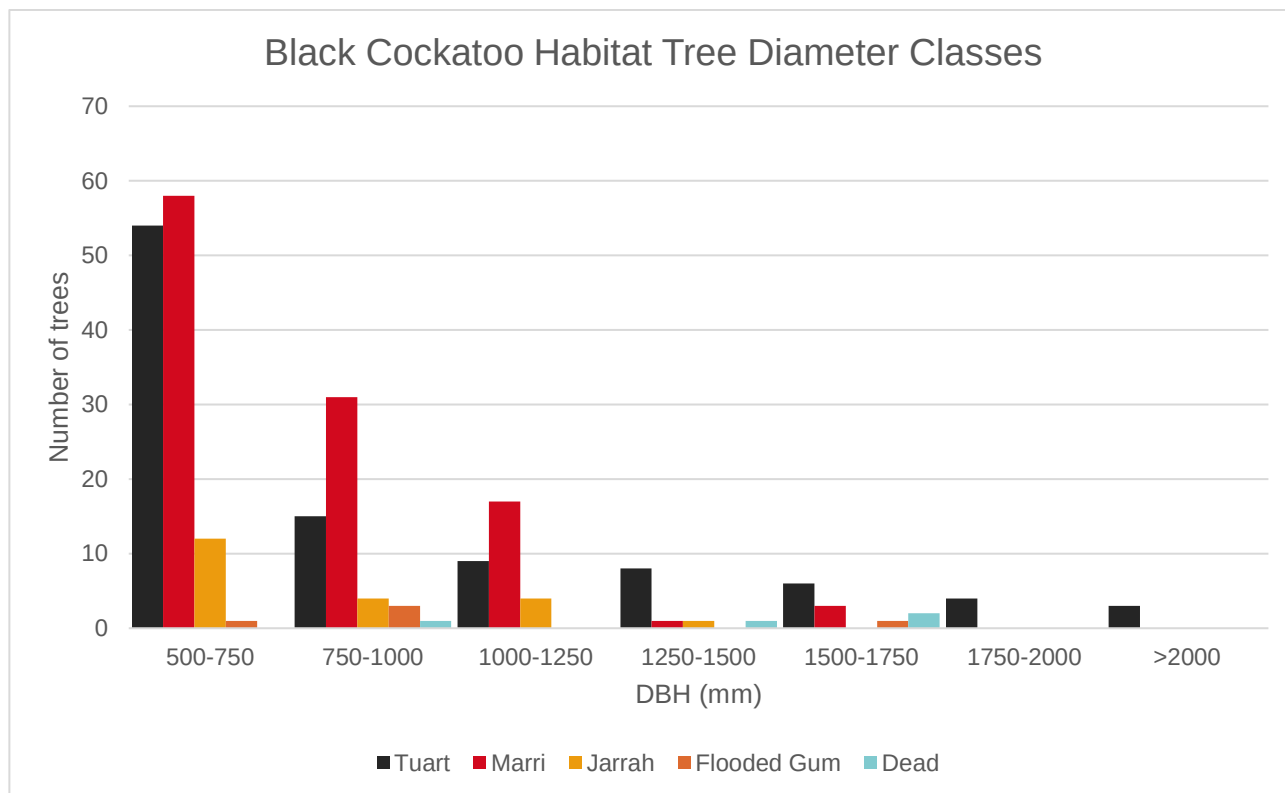


Figure 6: Black Cockatoo habitat trees; species and diameter classes

The potential for Black Cockatoo habitat trees to be used for breeding was assessed using the Bamford (BCE 2025) grading classification scale (as per **Table 23** in **Appendix Three**), illustrated in **Figure 7**. Trees hollows were assessed from ground level only and may not have had internal chambers or chambers of suitable size.

The majority of trees of suitable size (DBH) and species to be considered as potential Black Cockatoo habitat trees were Class 5 that did not have large hollows or broken branches of sufficient size to form hollows (216; 90.4%). Class 4 trees, being those with large hollows or broken branches that may have been hollow but not of the vertical or near-vertical alignment preferred by Black Cockatoos, comprised 1.7% of the trees (four trees).

Class 3 trees with potentially suitable hollows i.e. at least 10 cm diameter opening and (if present) internal diameter of the hollow, with a vertical or near-vertical alignment, but not showing evidence of use for Black Cockatoo breeding comprised 7.9% of trees (19). Most (11 of the 19 trees; 57.9%) were Tuart. Further investigation would be required to determine if the hollows were actual (i.e. hollow and with a structurally sound internal chamber of sufficient size) and suitable for use.

No trees ranked as Class 2 (having suitable hollows with chew marks indicating use) or Class 1 (having an active nest) were recorded.

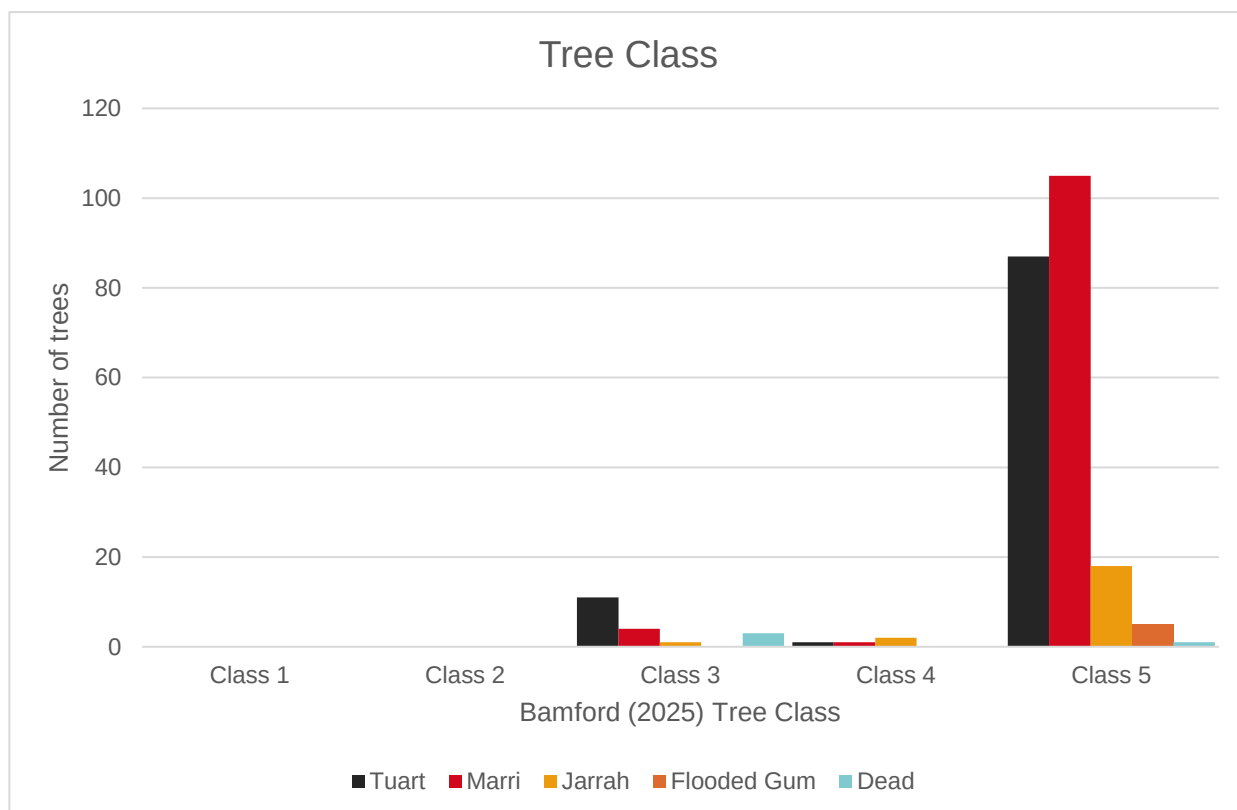


Figure 7: Black Cockatoo potential habitat class (according to Bamford (BCE 2025)) by tree species

The class 3 trees were further classified by rating their significance as a potential habitat tree (as per **Table 23** in **Appendix Three**). One, a Tuart (tree # 250) ranked as Very High Value (rank 1). Rank 1 trees are large and with obvious large vertical hollows more than 5 m above ground level, with future potential to create more hollows; they are considered ideal for Black Cockatoo species. However, in this instance although being physically ideal for Black Cockatoos, this tree also has a White-bellied Sea-Eagle nest (**Image 4**) which would likely preclude its use for breeding by Black Cockatoos, noting that the Sea-Eagles were observed defending the nest although they were not currently using it for breeding.

Thirteen trees were assessed as High Value (rank 2); these trees are large-medium sized with a suitable vertical or near vertical hollow and with the potential to create future hollows. Nine of the rank 2 trees were Tuarts, two were Marris and one each were Jarrah and a dead tree. The remaining Class 3 trees were ranked as Moderate-Low value for Black Cockatoos, although they have hollows at least 10 cm diameter at least 3 m above ground level. They were assessed as having limited potential for future hollows and comprised a single Marri and two dead trees.

The rank 1 tree is indicated on **Map 6**, and is identified as the White-bellied Sea-Eagle nest tree.

Roosting Habitat

According to the Commonwealth guidelines (DAWE 2022), Black Cockatoo night roosting habitat is generally in or near riparian areas and includes tall trees, with generally the tallest used for roosting.

The survey area includes tall trees that appear suitable for roosting as they are emergent above the usual tree canopy and are of moderate density to provide some shelter but also allow a view of surrounding areas. Fresh water is available from within the survey area from a small artificial water source (plastic-lined dam) but it is unknown if the observed water was permanent. There are, however, numerous artificial freshwater sources located approximately 1 km to the east (Alcoa Wellard wetlands) that are likely to be permanent although the water quality is unknown.

Therefore, it is possible that the survey area may be used for roosting.

Foraging Habitat (DAWE 2022 guidelines)

The entire survey area would be considered as suitable foraging habitat (but particularly the Eucalypt Woodland habitat type) due to the presence of trees used for foraging (Marri, Tuart and Jarrah in particular), with the habitat quality scores as below tabulated using the Commonwealth (DAWE 2022) guidelines' example.

Foraging habitat quality was assessed and scored as detailed in **Table 11-Table 13**. For all species, final scores of 5-10 indicate 'high quality native foraging habitat' and 0-4 indicate 'lower quality native foraging habitat'.

Table 11: Foraging habitat scoring tool – Baudin's Cockatoo

Habitat Summary for Baudin's Cockatoo Foraging Habitat		Score
Starting Score:		
	10 if the site is >1 ha in extent, is within the usual range of the species, and is: • native Eucalypt woodland and/or forest • proteaceous woodland and heath • includes Marri • includes the above if along roadsides, parkland cleared areas and planted vegetation.	+10
Context adjustor (subtractions):		
	No foraging evidence	-2
	More than 12 km from known breeding habitat	-2
FINAL SCORE		6

The final score is 6 (out of a maximum score of 10). According to the guidelines this indicates high quality foraging habitat for Baudin's Cockatoo. Both the Eucalypt woodland and Isolated Trees over Grassland habitat types, the latter having scattered foraging trees, are considered as Baudin's Cockatoo foraging habitat (20.02 ha; 90.53%).

However, no evidence of foraging by Baudin's Cockatoo was observed in the survey area.

Table 12: Foraging habitat scoring tool – Carnaby's Cockatoo

Habitat Summary for Carnaby's Cockatoo Foraging Habitat		Score
Starting Score:		
	10 if the site is >1 ha in extent, is within the usual range of the species, and is: • native shrubland, kwongan heathland or woodland dominated by proteaceous species • native woodland or forest containing foraging species, including roadsides, parkland cleared areas and planted native vegetation.	+10
Context adjustor (subtractions):		
	No foraging evidence	-2
	More than 12 km from known breeding habitat	-2
FINAL SCORE		6

The final score is 6 (out of a maximum score of 10). According to the guidelines this indicates high quality foraging habitat for Carnaby's Cockatoo. Both the Eucalypt woodland and Isolated Trees over Grassland habitat types, the latter having scattered foraging trees, are considered as Carnaby's Cockatoo foraging habitat (20.02 ha; 90.53%).

However, no evidence of foraging by Carnaby's Cockatoo was observed in the survey area.

Table 13: Foraging habitat scoring tool – Forest Red-tailed Black Cockatoo

Habitat Summary for Forest Red-tailed Black Cockatoo Foraging Habitat		Score
Starting Score:		
	10 if the site is >1 ha in extent, is within the usual range of the taxon, and is: • Jarrah or Marri woodland and/or forest • on the edge of Karri forest • Wandoo and Blackbutt occur on the site • includes the above if along roadsides and parkland cleared areas.	+10
Context adjustor (subtractions):		
	More than 12 km from known breeding habitat	-2
FINAL SCORE		8

The final score is 8 (out of a maximum score of 10). According to the guidelines this indicates high quality foraging habitat for Forest Red-tailed Black Cockatoo. Both the Eucalypt woodland and Isolated Trees over Grassland habitat types, the latter having scattered foraging trees, are considered as Forest Red-tailed Black Cockatoo foraging habitat (20.02 ha; 90.53%).

Foraging evidence was observed in the paddock (northern) portion of the survey area under an isolated Marri tree during the 2024 survey (**Image 6**) and in the Woodland habitat during February 2025, when the birds were also observed.



Image 6: Forest Red-tailed Black Cockatoo foraging evidence

Foraging Habitat (BCE 2023 scoring)

Evaluation of foraging habitat according to the Bamford (BCE 2023) scoring system (Table 25 in Appendix Three) identified foraging values as shown in Table 14.

Table 14: Black Cockatoo foraging value (BCE 2023)

Score	Baudin's Cockatoo		Carnaby's Cockatoo		Forest Red-tailed Black Cockatoo	
	Eucalypt woodland	Isolated Trees over Grassland	Eucalypt woodland	Isolated Trees over Grassland	Eucalypt woodland	Isolated Trees over Grassland
Site condition	4: Moderate foraging value. Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover	2: Low foraging value. Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover	4: Moderate foraging value. Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover	1: Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these is < 2%.	4: Moderate foraging value. Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths	1: Low foraging value. Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover
Site context	0: local breeding <0.1% of area within 15 km		0: local breeding <0.1% of area within 15 km		0: local breeding <0.1% of area within 15 km	
Species density/stocking rate	0: species is irregularly or very infrequently reported and little or no foraging evidence is present.)		1: species is regularly reported/recorded and/or abundant foraging evidence		1: species is regularly reported/recorded and/or abundant foraging evidence	
TOTAL SCORE	4 = Moderate value	1 = Low value (modified)	5 = Moderate-high value	1 = Low value (modified)	5 = Moderate-high value	1 = Low- value (modified)

The Eucalypt woodland portion of the survey area (4.8 ha; 21.69%) has been assessed as being of variable value to the three species (Table 14), being moderate-high value foraging for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo, and moderate value for Baudin's Cockatoo.

The Isolated Trees over Grassland habitat type (15.22 ha; 68.84%) scores lower as there are few, sparsely spaced foraging species, being low value for all species.

Aside from the Eucalypts (Marri and Jarrah; foraging for all species and Tuart; foraging for Carnaby's Cockatoo), according to the list of foraging plants for Black Cockatoo species (Bamford 2020), the following foraging species occur:

- Baudin's Cockatoo:
 - *Allocasuarina fraseriana* (sparse)
 - *Banksia sessilis* (Parrot Bush – occasional plant)
- Carnaby's Cockatoo:
 - *Agonis flexuosa* (Peppermint – occasional in paddock portion)
 - *Banksia attenuata* (Slender Banksia – sparsely occurring including adjacent to the gate at Lot 293 Kerosene Lane)
 - *Banksia grandis* (Bull Banksia – sparsely occurring)
 - *Banksia sessilis* (Parrot Bush – occasional plant)
 - *Corymbia ficifolia* (Red-flowering Gum – occasional, planted in paddock portion)
 - *Lupinus* sp. (Lupin – scattered in paddock portion)
- Forest Red-tailed Black Cockatoo:
 - *Allocasuarina fraseriana* (sparse)
 - *Lupinus* sp. (Lupin – scattered in paddock portion).

None of those listed above (aside from the Eucalypts) occur more than occasionally and do not offer significant amounts of foraging resources.

4.2.3.2 Quenda

Quenda are widely distributed in the southwest of Western Australia from Guilderton (north of Perth) to east of Esperance. They have a patchy distribution through the Jarrah and Karri forest, the Swan Coastal Plain, and inland as far as Hyden and have been recorded in swampy vegetation with dense cover up to 1 m high. Quenda often feed in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Quenda will thrive in more open habitat subject to introduced predator control (Department of Environment and Conservation 2012).

The survey area does not have any naturally-occurring standing water and, despite significant portions of the survey area being covered by dense Arum Lily that usually indicates damp areas, the soil surface was barely damp under the foliage. Further, the Arum Lily did not occur in the lowest-lying parts suggesting its presence may not be related to soil moisture.

Quenda diggings were commonly observed throughout the vegetated southwestern portion of the survey area in the Eucalypt Woodland habitat but were not observed elsewhere. Quenda was sighted in dense Arum Lily during the survey (see lower photograph of Eucalypt Woodland habitat in **Table 10**).

4.2.4 FAUNA SURVEY LIMITATIONS

The fauna assessment was undertaken as a Basic fauna survey according to the Fauna Technical Guidance (EPA 2020). Basic surveys concentrate on identifying habitat types and their suitability for conservation-listed species.

Table 15: Fauna survey limitations

Possible limitations	Constraints (yes/no): Significant, moderate or negligible	Comment
Availability of data and information	No constraints	There is a large amount of information including fauna survey reports from the surrounding area to provide contextual information.
Competency/experience of the survey team, including bioregion experience	No constraints	The ecologist conducting the survey has been conducting similar surveys in the southwest of Western Australia for approximately 20 years.
Scope of survey e.g. excluded fauna groups	No constraints	The survey was undertaken for terrestrial vertebrate fauna species.
Timing, weather, season	No constraints	The survey was conducted during late October when the weather was warm and fine. Seasonal rainfall was average or above during the 6 months prior to the field survey (Figure 5).
Disturbances that may have affected results	No constraints	There were no recent disturbances that may have affected the results of the survey.
Proportion of fauna identified, recorded, or collected	No constraints	No fauna specimens were collected as per the requirements of a Basic fauna survey. All observed fauna were accurately identified.
Adequacy of survey intensity and proportion of survey achieved	No constraints	The survey intensity was sufficient to describe the fauna and habitat present to the level required for a Basic fauna survey.
Access	No constraints	All areas were fully accessible and if not entered could be viewed and were determined to not have native vegetation.
Data and analysis issues including sampling biases	No constraints	Data analysis is not required for a Basic fauna survey.

5 DISCUSSION

5.1 FLORA SIGNIFICANCE

A total of 65 vascular flora species were recorded from four floristic quadrats, two descriptive relevés in Completely Degraded vegetation (characteristic species only recorded; all other species were introduced) and opportunistic observations, including during searches for conservation-listed flora. More than half of the total flora inventory (37 species; 56.9%) were introduced species reflecting the level of disturbance in the survey area.

5.1.1 FLORA SIGNIFICANCE

5.1.1.1 Conservation-listed Flora

Threatened Flora

No Threatened Flora species listed for protection under the Commonwealth EPBC Act or Western Australian BC Act were recorded. None of the unidentified taxa resemble any currently described TF.

Priority Flora

No Priority-listed Flora species were recorded. None of the unidentified taxa resemble any currently described PF taxa.

5.1.1.2 Post-survey Likelihood Assessment

The likelihood of conservation significant flora occurring in the survey area was revised following the field survey. This revised likelihood, that took into account vegetation condition, grazing and other disturbances, actual habitat availability and search effort, is included in **Table 28** in **Appendix Five**.

No conservation-listed flora had previously been recorded from within close proximity (<500 m) of the survey area.

Four taxa were identified at desktop assessment stage as being Likely to occur; discussed below.

***Acacia* sp. Binningup (G. Cockerton et al. WB 37784) (P1)**

According to *FloraBase* species data (WAH 1998-2024, 2024), this species is an erect suckering shrub to 2.5 m high with bright green foliage, flowering in September and perhaps October, growing in association with *Banksia*, *Agonis* or *Tuart* on sandy soil, including in degraded situations (e.g. road verges). Review of specimen information indicates that there are 11 vouchered records of this taxon (WAH 2024); except for two, they are from Binningup (approximately 95 km south of the survey area) with only one from within 10 km of the survey area (3.9 km to the west).

No shrubs resembling a bright green suckering *Acacia* sp. were observed although potentially broadly suitable habitat may have occurred. Therefore, as a result of the survey effort and lack of local records of this taxon, its likelihood of occurrence has been re-evaluated as 'Very unlikely to occur'.

***Pimelea calcicola* (P3)**

According to *FloraBase* (WAH 1998-2024, 2024) *Pimelea calcicola* is an erect to spreading shrub 0.2-1.0 m high with white to pale pink flowers between September and November, growing in sandy soil on coastal limestone ridges with *Melaleuca* shrubs, *Banksia* shrubs or trees (woodland) or *Tuart* woodland. The WAH (2024) holds 32 records of this taxon, from locations between Yanchep and Yalgorup. The nearest record is from 3.9 km northwest of the survey area.

No similar species were observed, nor was the recorded habitat of limestone ridges present within the survey area. Due to the poor (Degraded-Completely Degraded) condition of the survey area and that this taxon's preferred habitat does not occur, its likelihood of occurrence has been re-evaluated as 'Very unlikely to occur'.

***Dodonaea hackettiana* (P4)**

Dodonaea hackettiana (WAH 1998-2024, 2024) is an erect shrub or tree 1-5 m high growing in sand and outcropping limestone. It occurs in a range of vegetation types including Tuart, Jarrah, Flooded Gum and Banksia woodlands, coastal shrublands and heaths, and disturbed areas, occurring in dry and damp situations. Thirty-one specimens are housed in the WAH (2024) from locations south of the Swan River (Perth) to the southernmost record located 1.5 km northeast of the survey area, and also west of Moore River National Park.

Dodonaea hackettiana is well known to the surveyor and would have been immediately recognisable had it been present. As a result of the survey effort, it being a readily identifiable and usually large plant, and that the survey area is south of the usual distribution of this species, its likelihood of occurrence has been re-evaluated as 'Very unlikely to occur'.

***Eucalyptus foecunda* subsp. *foecunda* (P4)**

This taxon is a rough-barked mallee with narrow, glossy green leaves with rough bark, growing in yellowish or white sands over limestone (Nicolle & French 2021). WAH specimens (WAH 2024) indicate it occurs with other mallee species, Tuart, coastal heath or shrublands, mostly high in the landscape. There are 79 vouchered specimens of this taxon in the WAH (2024), from Jurien south to Lake Preston, with an outlier (and potentially inaccurate location) near Perup. The nearest record is 3 km to the northwest of the survey area.

No mallees were recorded from within the survey area. As a result of the survey effort and it being a readily identifiable type of plant, its likelihood of occurrence has been re-evaluated as 'Very unlikely to occur'.

5.1.1.3 Other Significant Flora

No species having any other significance according to the Flora and Vegetation Technical Guidance (EPA 2016a) was recorded, nor any flora of taxonomic interest.

5.1.1.4 Introduced Flora

Thirty-six introduced flora species (weeds) were recorded during the field survey, representing 57.1% of the overall flora inventory. Several contributed significantly to the vegetation condition ratings including **Zantedeschia aethiopica* (Arum Lily) and **Ehrharta calycina* (Perennial Veldt Grass). Several introduced grass species including **Bromus diandrus* (Great Brome) and **Briza maxima* (Blowfly Grass) were also major contributors to the weediness of the survey area.

Zantedeschia aethiopica* is a Declared Pest plant, however, there are no management requirements relevant to its presence. At times it formed a dense ground-cover (although up to 1 m high) in more degraded parts of the bushland (south-western portion of the survey area in vegetation type **CcEgEmMOF) and under isolated trees in the northern paddock portion of the survey area.

Similarly, **Asparagus asparagoides* (Bridal Creeper) is also a Declared Pest WoNS species without any management requirement, however, this species did not contribute significantly to vegetation condition ratings as it occurred as scattered occurrences only.

5.1.1.5 Local and Regional Significance of Flora

None of the recorded flora species have restricted habitats or small populations; all species recorded are common and widespread within the bioregion and beyond. Therefore, the flora does not have any specific local or regional significance.

5.2 VEGETATION SIGNIFICANCE

Two vegetation types were recorded from the survey area:

- **CcMOF**; *Corymbia calophylla* mid open forest from isolated patches in the eastern portion of the survey area
- **CcEgEmMOF**; *Corymbia calophylla*, *Eucalyptus gomphocephala* and *Eucalyptus marginata* subsp. *marginata* mid open forest, occupying the vegetated south-western portion of the survey area.

Vegetation type **CcMOF** was recorded from highly disturbed, Completely Degraded condition areas close to residences in the eastern portion of the survey area. Aside from the characteristic upper stratum species (*Corymbia calophylla*) all other species present were introduced.

Vegetation type **CcEgEmMOF** occupied 3.88 ha in the south-western portion of the survey area. No land use history information is available to explain the Degraded-Completely Degraded condition of the vegetation although it is highly likely to have been grazed given that it adjacent to cleared paddocks. This portion of the survey area is, at least in part, considered to be representative of the Tuart Woodlands TEC/PEC.

5.2.1 ASSESSMENT AGAINST TEC CRITERIA

The survey area intersects one indicatively mapped but largely overlapping occurrence of two EPBC-listed TECs: the Banksia Woodlands and Tuart Woodlands TEC/PECs.

Additionally, the survey area intersects part of the buffer of another representative of the Banksia Woodlands TEC, however, the occurrence (excluding buffer) is entirely outside the survey area and there is no potentially suitable vegetation that would indicate that its extent should be expanded.

5.2.1.1 Banksia Woodlands TEC

The survey area did not have vegetation dominated or characterised by Banksia trees, although some *Banksia* species did occur sparsely, but at less than the required canopy cover of 2% that defines the community. Additionally, no vegetation met the minimum condition requirement of 'Good'.

Therefore, the descriptive (being a 'Banksia woodland') and the condition requirements of the TEC according to the Approved Conservation Advice (TSSC 2016) have not been met and the Banksia Woodlands TEC does not occur.

5.2.1.2 Tuart Woodlands TEC/PEC

The FCT analysis indicates that vegetation type **CcEgEmMOF** is largely floristically associated with FCTs that are representative of the Tuart Woodlands TEC/PEC (**Section 4.1.4.1**).

It is also of note that, although the survey area's vegetation was characterised by *Corymbia calophylla* (being the dominant upper stratum species), the Approved Conservation Advice for the Tuart Woodlands TEC/PEC (DotEE 2019) indicates that the **presence** of Tuarts (*Eucalyptus gomphocephala*) define the community.

The Tuart Woodlands TEC/PEC has been assessed as occupying 6.48 ha within vegetation type **CcEgEmMOF** and adjacent areas where Tuart tree canopies are <60 m apart and (including this buffer) are contiguous with the larger TEC area. An additional 1.53 ha of the TEC buffer occurs outside of the survey area, and joins the Tuart Woodlands TEC/PEC identified by Merge Associates (2021b) as occupying 36.83 ha to the south of Kerosene Lane (noting that there is some overlap within these extents).

5.2.2 PRIORITY ECOLOGICAL COMMUNITIES

No vegetation similar to any currently described PEC (DBCA 2023a; except where it is also an EPBC-listed TEC, as is the case with the Tuart TEC) occurs within the survey area.

5.2.3 LOCAL AND REGIONAL SIGNIFICANCE OF VEGETATION

The significance of the survey area's vegetation lies in its representation as an EPBC-listed TEC (the Tuart Woodlands TEC/PEC, in part of vegetation type **CcEgEmMOF**) and its role as foraging habitat for conservation-listed fauna, principally the EPBC-listed vulnerable Forest Red-tailed Black Cockatoo although the endangered Carnaby's Cockatoo may also forage within the survey area on occasion. The foraging vegetation occurs over the entire survey area (in the form of Eucalypt trees).

5.2.4 VEGETATION CONDITION

The survey area was largely not native vegetation (17.66 ha; 79.84%). The vegetated portions were in either Degraded (2.14 ha; 9.70%) or Completely Degraded (2.31 ha; 10.46%) condition.

5.3 FAUNA SIGNIFICANCE

5.3.1 FAUNA HABITAT TYPES

Two fauna habitat types were recorded during the field survey (**Section 4.2.1**):

- Eucalypt Woodland (4.8 ha)
- Isolated Trees over Grassland (15.22 ha).

The Eucalypt Woodland has the greatest diversity of shelter and food resources (compared with the Isolated Trees over Grassland habitat) including for most of the 29 bird species recorded and for Quenda. However, the Eucalypt Woodland habitat was lacking structural diversity and was largely devoid (or with low densities) of mid-storey cover (i.e. there were few shrubs) and therefore a lack of sites for birds that nest and forage in shrubs, and a lack of diversity and seasonality of food sources.

Of significance, however, is that the survey area houses a long-term nest of White-bellied Sea-Eagles which more usually breed close to the ocean or larger waterbodies. This species is not conservation-listed but has special protection as a marine species.

5.3.1.1 Habitat Suitable for Conservation-listed Fauna

Threatened Black Cockatoo species were specifically targeted for survey with Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo being recorded during the field survey. The suitability of the survey area as habitat for these is discussed below in **Section 5.3.2.1**, along with other recorded conservation-listed fauna species (i.e. Quenda).

5.3.2 FAUNA ASSEMBLAGE

Thirty-two vertebrate fauna species were recorded during the field survey (**Section 4.2.2**).

Most (29) were birds, with the majority (except parrots, cockatoos and pigeons) being wholly or partly insectivorous (i.e. honeyeaters) or predators (carnivores), including raptors and kingfishers. This likely reflects the lack of diversity of seed-producing plants present.

Only two mammals were recorded: Quenda (sighted, diggings) and Echidna (diggings), with the former being resident and the latter likely being transient. Whilst not recorded, other mammals were more than likely present including Common Brushtail Possums that would occupy tree hollows, some of which may have been suited to Black Cockatoo species. Feral mammals including rodents, cats and foxes undoubtedly would also have been present, with the rodents being prey for raptors and kingfishers (including Kookaburras), and also owls and frogmouths that were not recorded due to the survey being daytime only.

Only one reptile was observed. Whilst others would be present including a variety of skinks, geckos, varanids (goannas) and snakes, the high proportion of predator bird species may be suppressing their populations and perhaps restricting the species diversity due to predation. Alternatively, but less likely, the high number of predator birds may be an indicator of a healthy reptile population.

5.3.2.1 Recorded Conservation-listed Species

***Zanda latirostris* (Carnaby's Cockatoo); EPBC and BC-listed EN**

A single individual overflew the survey area during the field survey. There was no evidence of Carnaby's Cockatoo foraging, breeding or roosting suggesting that any visits to the survey area are likely to be transient, if at all (other than overflying).

Nineteen trees were assessed as potentially having hollows suitable for Black Cockatoo breeding (class 3 according to the Bamford (BCE 2025) scale) noting that the trees were assessed from ground level only and actual suitability of hollows is unproven), but there were no trees with evidence that they have been (class 2) or currently are (class 1) breeding trees. There is no historical or current evidence of the survey area being used for Carnaby's Cockatoo breeding with the nearest confirmed breeding area being approximately 24 km to the south-east (DBCA 2018a).

The foraging value of the survey area is considered high according to the DAWE (2022) scale and moderate-high in the Eucalypt woodland according to the Bamford (BCE 2023) foraging scales. Marri and Jarrah, and only sparse or occasional *Banksia* species are the only foraging species (Bamford 2020) in the Eucalypt Woodland. Scattered Eucalypts and Peppermint, and Lupins (seasonally) are the only foraging species present in the Isolated Trees over Grassland habitat (*ibid.*), and it is considered to represent low value foraging (BCE 2023). There is no reason to consider the survey area to have any higher foraging value than any other nearby areas.

The survey area does have trees suitable for night roosting, however, there is no evidence that it is used for this activity. A known roost site is located approximately 1.2 km west of the survey area (DBCA 2018c), in what (from aerial imagery) appears to be a Eucalypt plantation.

The presence of White-bellied Sea-Eagles nesting onsite and (as observed) defending their nesting territory, even while not breeding, has potential to dissuade other large species from spending time in the vicinity, unless there are significant resources present that are not available in other areas. Although the White-bellied Sea-Eagles are unlikely to be permanent, long-term occupants, their current presence and the lack of significant resources within the survey area suggest that Carnaby's Cockatoo are unlikely to utilise the survey area for breeding, foraging or roosting and would be occasional, transient visitors at most, and not dependent on the resources of the survey area.

***Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo); EPBC and BC-listed VU**

Foraging evidence of Forest Red-tailed Black Cockatoo was observed both habitat types.

Nineteen trees were assessed as potentially having hollows suitable for Black Cockatoo breeding (class 3 according to the Bamford (BCE 2025) scale), but there were no trees with evidence that they have been (class 2) or currently are (class 1) breeding trees. Breeding locations of Forest Red-tailed Black Cockatoo are less well documented than those of Carnaby's Cockatoo so there is no data to indicate if breeding is known or likely to occur in the local area.

The foraging value of the survey area is considered high according to the DAWE (2022) foraging scale and, in the Eucalypt woodland, moderate-high value according to the Bamford (BCE 2023) foraging scale. Marri, Jarrah and Tuart, and only sparse or occasional *Banksia* species and sparse *Allocasuarina fraseriana* are the foraging species present in the Eucalypt Woodland (Bamford 2020). Lupins (seasonally), along with scattered Eucalypt trees, are the only foraging species present in the Isolated Trees over Grassland habitat, which has a foraging score of 1 and is considered as being low foraging value (BCE 2023). There is no reason to consider the survey area to have any higher foraging value than any other nearby areas.

The survey area does have trees suitable for night roosting, however, there is no evidence that it is used for this activity. The presence of White-bellied Sea-Eagles nesting onsite and (as observed) defending their nesting territory, even while not breeding, has potential to dissuade other large species from spending time in the vicinity, unless there are significant resources present that are not available in other areas. Although the White-bellied Sea-Eagles are unlikely to be permanent, long-term occupants, their current presence and the lack of significant resources within the survey area suggest that Forest Red-tailed Black Cockatoo are unlikely to utilise the survey area for breeding or roosting and would be occasional, transient foraging visitors at most, and not dependent on the resources of the survey area.

***Isoodon fusciventer* (Quenda); DBCA status P4**

Quenda are widely distributed in the southwest of Western Australia from Guilderton (north of Perth) to east of Esperance (Department of Environment and Conservation 2012). They are omnivorous, eating invertebrates and plant material, including fungi, tubers and bulbs, which they find while digging (DBCA 2017).

Quenda diggings were commonly observed throughout the vegetated southwestern portion of the survey area in the Eucalypt Woodland habitat but were not observed elsewhere; a quenda was sighted in this habitat type. The wide-spread occurrence of diggings suggests that Quenda occur commonly in this portion of the survey area.

5.3.3 POST-SURVEY LIKELIHOOD ASSESSMENT

The post-survey likelihood assessment is incorporated into **Table 29** in **Appendix Five**.

Conservation-listed fauna species identified during the desktop assessment as having a High or Medium likelihood of occurring that were not recorded during the field survey are discussed below with respect to each species' habitat requirements, taking into consideration the findings of the field survey and survey effort.

No species other than those recorded from the survey area were considered as having a high likelihood of occurring i.e. there were 'likely to occur'.

Of note, Baudin's Cockatoo was considered as 'unlikely to occur' due to the lack of recent records despite the survey area being in the species' expected distribution according to DAWE (2022).

5.3.3.1 Medium Likelihood Species ('May occur')

At desktop assessment stage, the following species were considered to have a medium likelihood of occurring within the survey area.

***Ctenotus gemmula* (Swan Coastal Plain subpopulation) (Jewelled Southwest Ctenotus)– DBCA P3 status**

The Jewelled Southwest Ctenotus is a semi-fossorial (burrowing) skink that occurs on the Swan Coastal Plain in pale sands (Wilson & Swan 2017). He (2024) indicates that it occurs in *Banksia* and mallee woodlands and heathlands, and that its distribution is patchy and population is apparently in decline despite suitable habitat occurring widely.

Given that this species has a declining population and has only been recorded once from within 10 km of the survey area, and taking into consideration that its preferred habitat only occurs broadly (i.e. substrate but not vegetation) and degree of disturbance within the survey area, the Jewelled Southwest Ctenotus has been re-evaluated as being 'unlikely to occur'.

***Falco peregrinus* (Peregrine Falcon) –DBCA OS status**

The Peregrine Falcon is a medium sized bird of prey known to inhabit most environments across Australia where suitable nest sites are present (Menkhorst et al. 2017). Nesting individuals prefer steep cliff faces, however, will also nest in gorges, tree-lined watercourses, wetlands, plains, open woodlands, pylons, spires and buildings (Pizzey & Knight 2012). Nesting may also occur in tall trees along drainage lines, including the use of abandoned nests of other large bird species (Olsen & Olsen 1989). Peregrine Falcon preys largely on birds (e.g. parrots, pigeons, waterfowl, starlings and small seabirds) (Menkhorst et al. 2017) and occasionally small reptiles and mammals (Olsen et al. 2008). It is not common throughout its distribution (Australian Museum 2019).

There are three DBCA records of this species from nearby so there is potential for it to occur on occasion, either overflying the survey area or, given that there are large trees that could be suitable for nesting – and including potentially abandoned raptor nests – there is the potential for it to nest within the survey area.

Given that it has been recorded on occasion nearby and that it has a naturally sparse population density, the likelihood of Peregrine Falcon occurring within the survey area remains as medium, i.e. it 'may occur'. However, given that the majority of the survey area has been cleared and potential prey numbers (i.e. the lack of fauna species recorded) are low, it would not be dependent upon the survey area for food. If it occurs it is likely to be overflying or, if nesting, it would be hunting for prey outside of the survey area.

***Lerista lineata* (Perth Slider) –DBCA P3 status**

The Perth Slider is a small, slender fossorial (burrowing) skink occurring in pale sands on coastal plains with *Banksia* and/or eucalyptus, on coastal and low fixed dunes with heathlands and shrublands, and require a well-developed patchy litter ground cover. In the Perth area, this species occurs within 20-25 km of the coast, but the population has been in decline and it appears to have been affected by habitat fragmentation as well as changes to fire regimes, weed infestation and predation by feral species (Maryam et al. 2015).

As the survey area does not have a significant leaf litter layer and is fragmented and disturbed, and when taking into consideration that most nearby records are from Nature Reserves and other conservation lands, the likelihood of the Perth Slider occurring in the survey area has been re-evaluated as 'unlikely to occur'.

***Neelaps calonotos* (Black-striped Snake) – DBCA P3 status**

This species is now restricted to the sandy coastal strip near Perth between Mandurah and Cataby and is found in coastal dunes and sandplains vegetated with heaths and Eucalypt/Banksia woodlands (Wilson & Swan 2017). It feeds primarily on *Lerista praepedita* (Blunt tailed West Coast Slider), which is a small burrowing skink (*ibid.*). The Black-striped Snake has been significantly impacted by habitat loss from urban development within its restricted distribution (Wilson & Swan 2017), and favours long-unburnt areas with leaf litter (Huang 2009).

The survey area has broadly suitable substrate and potentially suitable vegetation, however, does not have a significant leaf litter layer to support the species. Therefore, it has been re-evaluated as 'unlikely to occur' within the survey area.

***Phascogale tapoatafa* (South-western Brush-tailed Phascogale) –DBCA CD status**

This Phascogale is a nocturnal arboreal marsupial that lives in tree hollows and preys mainly on large invertebrates like spiders and large insects, although it also consumes nectar, and rarely hunts on the ground although when it does it can prey on small mammals or birds (including chickens) (Van Dyck & Strahan 2008).

Information regarding this species ecology is largely unavailable, however, the records in the DBCA database indicate it occurs locally in scattered locations. Therefore, it retains its medium likelihood of occurring i.e. it 'may occur' as the Woodland habitat has suitable hollows.

6 CONCLUSIONS

The significant features of the survey area that have the potential to affect environmental approvals are:

- there were no areas of native vegetation assessed as being in Good or better condition, with 79.84% of the survey area not being native vegetation (largely cleared paddock with sparse trees, and residential gardens). The remaining areas of native vegetation were in Degraded (2.14 ha; 9.70%) or Completely Degraded (2.31 ha; 10.46%) condition.
- 6.48 ha of Tuart Woodlands TEC/PEC, with an additional 1.53 ha included in the TEC patch but not within the survey area (i.e. the TEC buffer extends beyond the survey area)
- conservation-listed fauna species were recorded:
 - EPBC-listed Carnaby's Cockatoo (overflying the survey area) and Forest Red-tailed Black Cockatoo (observed, foraging evidence)
 - Quenda (DBCA P4)
- White-bellied Sea-Eagles (listed marine species) were observed and are known to nest in the survey area
- two fauna habitat types were recorded:
 - Eucalypt woodland that is considered as moderate-high value foraging habitat for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo, and was also habitat for Quenda
 - Isolated Trees over Grassland (parkland cleared paddock) that is considered as low value foraging for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. It has little other value as a habitat, excluding that some trees potentially suitable for Black Cockatoo breeding were present.
- 19 potential Black Cockatoo breeding habitat trees (Class 3, having potentially suitable hollows although this was not verified as they were assessed from ground level) were recorded. There was no evidence of current or previous Black Cockatoo breeding recorded.

Both the Tuart Woodlands TEC/PEC and Black Cockatoos are Matters of National Environmental Significance.

REFERENCES

- Atlas of Living Australia 2024, *Explore your area*. Available from: <https://biocache.ala.org.au/explore/your-area#>.
- Australian Museum 2019, *Peregrine Falcon*. Available from: <https://australian.museum/learn/animals/birds/peregrine-falcon/>.
- Bamford Consulting Ecologists 2023, *Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos*. Revised 6th February 2023.
- Bamford Consulting Ecologists 2025, *Appendix 1: Approach to the valuation of nesting habitat for black-cockatoos (revised 9th April 2025)*.
- Bamford, M 2020, 'Plants known to be used for foraging, roosting and nesting by Black-Cockatoos in south-western Western Australia', *Unpublished data*.
- Beard, JS 1990, *Plant Life of Western Australia*, Kangaroo Press, Kenthurst, NSW.
- Biologic 2019, *Kwinana Nickel Refinery, Flora, Vegetation and Fauna Assessment*, Prepared for BHP Nickel West.
- Biologic 2021, *Kwinana Nickel Refinery Eucalyptus gomphocephala (Tuart) TEC Assessment*, Prepared for Nickel West.
- Birdlife Australia 2024, *Birddata: explore*. Available from: https://birddata.birdlife.org.au/explore#map=-22.5083100_136.0786120_4. [15 November 2024].
- Blatant Fabrications Pty Ltd 2013, *PATN Version 4.00*.
- Bureau of Meteorology 2024a, *Climate Data Services*. Available from: <http://www.bom.gov.au/climate/data-services/>.
- Bureau of Meteorology 2024b, *Recent and historical rainfall maps: rainfall deciles*. Available from: <http://www.bom.gov.au/climate/maps/rainfall/?variable=rainfall&map=decile&period=month®ion=wa&year=2023&month=05&day=31>. [2 February 2024].
- Department of Agriculture Water and the Environment 2020, *Australia's bioregions (IBRA)*. Available from: <http://www.environment.gov.au/land/nrs/science/ibra>.
- Department of Agriculture Water and the Environment 2022, *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo*.
- Department of Biodiversity Conservation and Attractions 2017, *Fauna Notes - Living with Quenda*. Available from: <https://www.dbca.wa.gov.au/media/2147/download>.
- Department of Biodiversity Conservation and Attractions 2018a, *Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)*.
- Department of Biodiversity Conservation and Attractions 2018b, *Carnabys Cockatoo Unconfirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-055)*. Available from: <https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-unconfirmed-breeding-areas>.
- Department of Biodiversity Conservation and Attractions 2018c, *Carnabys Cockatoo Confirmed Roost Sites (DBCA-050)*.
- Department of Biodiversity Conservation and Attractions 2018d, *Carnabys Cockatoo Areas requiring investigation as feeding habitat in the Jarrah Forest IBRA Region (DBCA-056)*. Available from: <https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-unconfirmed-feed-areas-jf>.
- Department of Biodiversity Conservation and Attractions 2019, *DBCA Statewide Vegetation Statistics*. Available from: <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>.
- Department of Biodiversity Conservation and Attractions 2023a, *Priority ecological communities list (updated 19-06-2023)*. Available from: <https://www.dbca.wa.gov.au/media/1730/download>.
- Department of Biodiversity Conservation and Attractions 2023b, *Conservation Category Definitions for Western Australian Fauna and Flora*. Available from: <https://www.dbca.wa.gov.au/media/792/download>.
- Department of Biodiversity Conservation and Attractions 2023c, *Threatened ecological community list 2023 (updated 28-11-2023)*. Available from: <https://www.dbca.wa.gov.au/media/3286/download>.
- Department of Biodiversity Conservation and Attractions 2023d, *Conservation Category Definitions for Western Australian Ecological Communities*. Available from: <https://www.dbca.wa.gov.au/media/3148/download>.

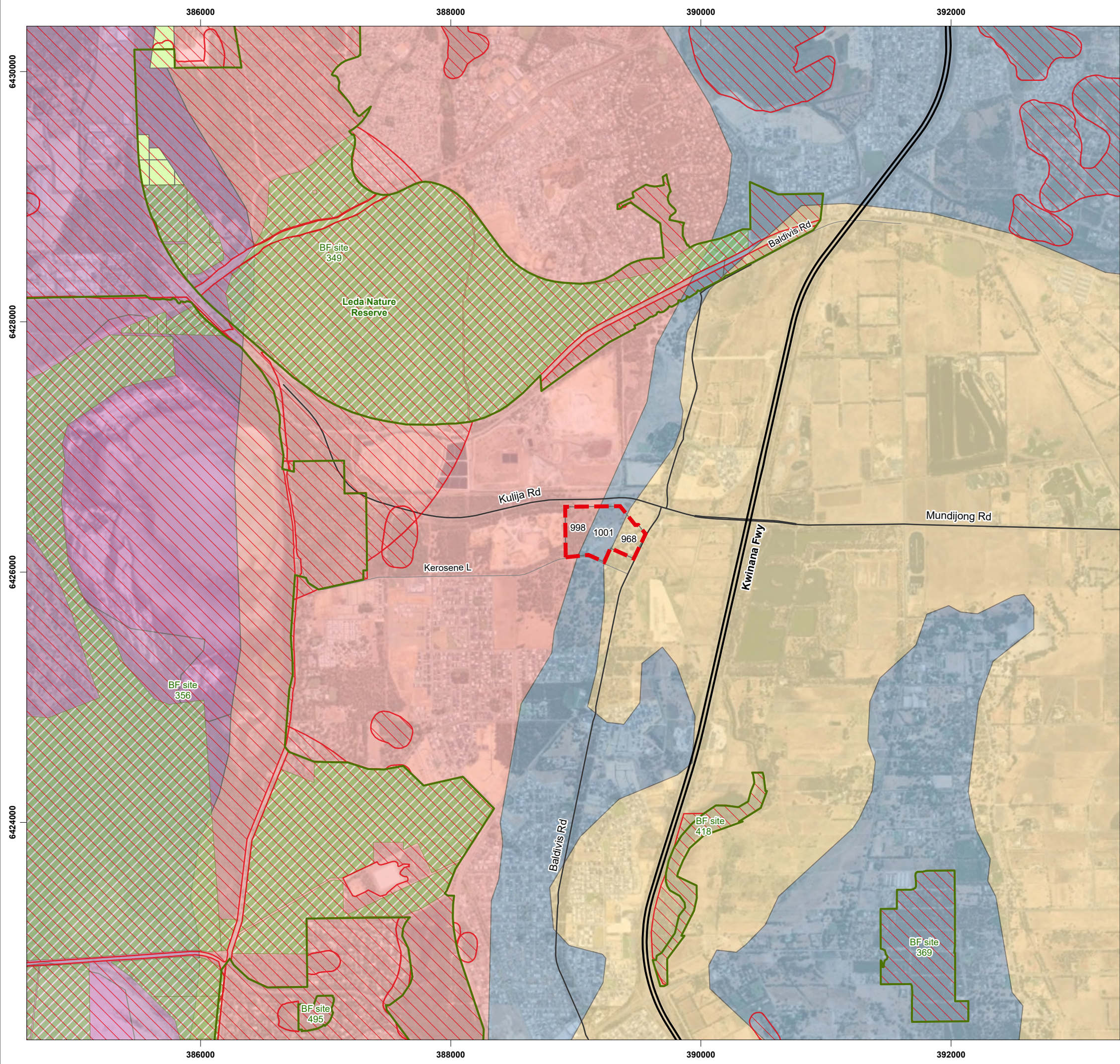
- Department of Climate Change Energy the Environment and Water 2023, *SPRAT EPBC Migratory List in Species Profile and Threats Database*. Available from: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowmigratory.pl>.
- Department of Climate Change Energy the Environment and Water 2024a, *Protected Matters Search Tool (PMST)*. Available from: <https://pmst.awe.gov.au/#!/map?lng=131.50634765625003&lat=-28.671310915880834&zoom=5&baseLayers=Imagery,ImageryLabels>.
- Department of Climate Change Energy the Environment and Water 2024b, *Species Profiles and Threats Database: Haliaeetus leucogaster - White-bellied Sea-Eagle*. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=943. [8 November 2024].
- Department of Environment and Conservation 2012, *Fauna profiles: Quenda Isoodon obesulus (Shaw, 1797)*. Available from: www.dpaw.wa.gov.au/images/documents/conservation-management/pests-diseases/quenda_2012.pdf.
- Department of Primary Industries and Regional Development 2019, *Pre-European Vegetation (DPIRD-006)*. Available from: <https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006>.
- Department of Primary Industries and Regional Development 2020, *Soil Landscape Mapping - Rangelands (DPIRD-063)*. Available from: <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-rangelands>.
- Department of Sustainability Environment Water Population and Communities 2011a, *Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Available from: <http://www.environment.gov.au/system/files/resources/b1c6b237-12d9-4071-a26e-ee816caa2b39/files/survey-guidelines-mammals.pdf>.
- Department of Sustainability Environment Water Population and Communities 2011b, *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Available from: <http://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelines-reptiles.pdf>.
- Department of the Environment and Energy 2019, *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community*. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf>.
- Department of the Environment Water Heritage and the Arts; Commonwealth of Australia 2009, *Matters of National Environmental Significance. Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*.
- Department of the Environment Water Heritage and the Arts; Commonwealth of Australia 2010a, *Survey Guidelines for Australia's Threatened Bats: Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Available from: <http://www.environment.gov.au/epbc/publications/threatened-bats.html>.
- Department of the Environment Water Heritage and the Arts; Commonwealth of Australia 2010b, *Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Available from: <http://www.environment.gov.au/epbc/publications/threatened-birds.html>.
- Department of Water and Environmental Regulation 2018a, *Hydrographic Catchments - Basins (DWER-027)*. .
- Department of Water and Environmental Regulation 2018b, *Hydrographic Catchments - Subcatchments (DWER-030)*. Available from: <https://catalogue.data.wa.gov.au/dataset/hydrographic-catchments-subcatchments/resource/950851c3-476c-4eb9-8665-392c1f7f89a1>.
- Department of Water and Environmental Regulation 2021, *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*. Available from: <https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>.
- Department of Water and Environmental Regulation 2024, *Index of Biodiversity Surveys for Assessments (IBSA)*. Available from: <https://biocollect.ala.org.au/ibsa#max%3D20%26sort%3DdateCreatedSort>.

- Van Dyck, S & Strahan, R 2008, *The Mammals of Australia (Third Edition)*, Reed New Holland, Sydney.
- Eamus, D 2009, *Identifying groundwater dependent ecosystems: a guide for land and water managers*, Land & Water Australia.
- Eamus, D, Froend, R, Loomes, R, Hose, G & Murray, B 2006, 'A functional methodology for determining the groundwater regime needed to maintain the health of groundwater-dependent vegetation', *Australian Journal of Botany*, vol. 54, pp.97–114.
- Emerge Associates 2021a, *Basic Fauna and Targeted Black Cockatoo Assessment, Lots 55, 56, 294, and 772 Kerosene Lane and Lot 295 Baldivis Road, Baldivis*, Prepared for Carcione Nominees Pty Ltd. Available from: http://epbcnotices.environment.gov.au/_entity/annotation/246816fd-a6f8-eb11-80c6-00505684c137/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1730774349237. [5 November 2024].
- Emerge Associates 2021b, *Detailed Flora and Vegetation Assessment, Lots 55, 56, 294, and 772 Kerosene Lane and Lot 295 Baldivis Road, Baldivis*, Prepared for Carcione Nominees Pty Ltd. Available from: http://epbcnotices.environment.gov.au/_entity/annotation/f77ed3e0-a6f8-eb11-80c6-00505684c137/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1730774349237. [5 November 2024].
- Emerge Associates 2022, *Reconnaissance Flora, Vegetation and Tree Assessment Part Mandurah Road Reserve between Fifty Road and Safety Bay Road*, Prepared for City of Rockingham.
- ENV Australia 2011, *Bollard Bulrush East Fauna Assessment*, Prepared for Wellard Landowners Group.
- Environmental Protection Authority 2016a, *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Western Australia. Available from: <http://www.epa.wa.gov.au/policies-guidance/technical-guidance-flora-and-vegetation-surveys-environmental-impact-assessment>.
- Environmental Protection Authority 2016b, *Environmental Factor Guideline - Flora and Vegetation*.
- Environmental Protection Authority 2016c, *Environmental Factor Guideline - Terrestrial Fauna*.
- Environmental Protection Authority 2019, *EPA Advice: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region*. Available from: [https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Carnaby%27s cockatoo_new FINAL.pdf](https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Carnaby%27s%20cockatoo_new_FINAL.pdf).
- Environmental Protection Authority 2020, *Technical Guidance - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*, EPA, Perth, Western Australia. Available from: https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf.
- Environmental Protection Authority 2021, *Statement of environmental principles, factors, objectives and aims of EIA*.
- GHD 2012, *Report for Rail Reserves in the Shire of Serpentine Jarrahdale. Spring Flora and Vegetation Survey and Fauna and Habitat Assessment*, Report for Public Transport Authority.
- GHD 2018, *Proposed Baldivis District Sporting Complex Flora and Vegetation Assessment*, Report for City of Rockingham.
- GHD 2020, *Hollow survey*, Prepared for Aurizon.
- Gibson, N, Keighery, BJ, Keighery, GJ, Burbidge, AH & Lyons, MN 1994, *A Floristic Survey of the southern Swan Coastal Plain*, Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.).
- Goulburn-Murray Water 2010, *Groundwater. Terms and definitions*. Available from: http://www.g-mwater.com.au/downloads/Groundwater/2977263-v5-GROUNDWATER_TERMS_AND_DEFINITIONS_GLOSS-1.pdf.
- Government of Western Australia (1986), *Environmental Protection Act 1986*.
- Government of Western Australia (2007), *Biosecurity and Agriculture Management Act 2007*.
- Government of Western Australia (2016), *Biodiversity Conservation Act 2016*.
- Government of Western Australia (2018), *Biodiversity Conservation Regulations 2018*.
- Government of Western Australia 2018, *Conservation and Parks Commission*. Available from: <https://www.conservation.wa.gov.au/>.

- Government of Western Australia 2019, '2018 South West Vegetation Complex Statistics. Current as of March 2019' *Department of Biodiversity, Conservation and Attractions*. Available from: <https://catalogue.data.wa.gov.au/dataset/dbca/resource/3d067960-2896-42fd-ba52-1aa46b2edf13>.
- Hatton, T & Evans, R 1998, *Dependence of ecosystems on groundwater and its significance to Australia*, Land and Water Research and Development Corporation (Australia), Occasional Paper No. 12/98. Canberra, ACT.
- He, F 2024, 'The distribution of six cryptic reptile species in the Perth region, Western Australia: appraising their persistence in a transforming landscape', *Journal of the Royal Society of Western Australia*, vol. 107, pp.1–20.
- Hedde, E, Loneragan, O & Havel, J 1980, 'Vegetation of the Darling System', *1980 Atlas of Natural Resources, Darling System, Western Australia*.
- Huang, N 2009, *Reptile fauna of the Gnamptara Sustainability Strategy Study Area: a literature review*, Department of Environment and Conservation.
- Invasive Plants and Animals Committee 2016, *Australian Weeds Strategy 2017 to 2027*, Australian Government; Department of Agriculture and Water Resources Canberra.
- Keighery, BJ 1994, *Bushland Plant Survey - A Guide to Plant Community Survey for the Community*, Western Australia.
- Keighery, BJ, Keighery, GJ, Longman, VM & Clarke, KA 2012, *Weed and Native Flora of the Southern Swan Coastal Plain: 2005 Dataset*.
- Maryam, B, Gaikhorst, G, O'Connell, M & Callan, S 2015, 'Notes on the distribution and conservation status of the Perth Lined Skink, *Lerista lineata*: a small lizard in a big city', *Western Australian Naturalist*, vol. 30, no. 1, pp.12–29. Available from: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.researchgate.net/publication/280920313_Notes_on_the_distribution_and_conservation_status_of_the_Perth_Lined_Skin_k_Lerista_lineata_A_small_lizard_in_a_big_city&ved=2ahUKEwjK8Ov1qSMAXXnkIYBHfRRLB4QFnoECGcQAQ&usq=AOvVaw2W2AGcv778dZBLNTsVnH5Z.
- Menkhorst, P, Rogers, D, Clarke, R, Davies, J, Marsack, P & Franklin, K 2017, *The Australian Bird Guide*, Revised., CSIRO.
- Mitchell, D, Williams, K & Desmond, A 2002, "Swan Coastal Plain 2 (SWA2 - Swan Coastal Plain subregion)" in *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*, eds.NL McKenzie, J May, & S McKenna, Department of Conservation and Land Management, pp.606–623.
- Nicoll, D & French, ME 2021, 'A taxonomic revision of the semi-cryptic narrow-leaved mallees (*Eucalyptus* series *Poranthera*, *Myrtaceae*) from southern Australia', *Swainsona*, vol. 35, pp.73–152.
- NVIS Technical Working Group & Department of the Environment and Energy 2017, *Australian Vegetation Attribute Manual: National Vegetation Information System, Version 7.0*, eds.M Bolton, C DeLacey, & K Bossard, Canberra.
- Olsen, J, Fuentes, E, Bird, D, Rose, AB & Judge, D 2008, 'Dietary shifts based upon prey availability in Peregrine Falcons and Australian Hobbies breeding near Canberra, Australia', *Journal of Raptor Research*, vol. 42, no. 2, pp.125–137.
- Olsen, PD & Olsen, J 1989, 'Breeding of the Peregrine Falcon *Falco peregrinus*: III. Weather, Nest Quality and Breeding Success', *Emu - Austral Ornithology*, vol. 89, no. 1, pp.6–14.
- Peel, MC, Finlayson, BL & McMahon, TA 2007, 'Updated world map of the Köppen-Geiger climate classification', *Hydrology and Earth System Sciences*, vol. 11, pp.1633–1644.
- PGV Environmental 2012, *The Village at Wellard Stages 32-40 Flora and Vegetation Survey*, Prepared for Peet Southern Joint Venture.
- PGV Environmental 2019, *Lot 1488 Patterson Road, East Rockingham Environmental Assessment Report*, Prepared for DevelopmentWA.
- PGV Environmental 2021, *Lot 4 King Road, Oldbury Flora Vegetation and Fauna Survey Assessment*, Prepared for Aigle Royal.
- Pisces Conservation Ltd 2010, *Species Diversity and Richness IV*.
- Pizzey, G & Knight, F 2012, *The Field Guide to the Birds of Australia*, Ninth., ed.S Pizzey, HarperCollins.

- Shepherd, DP, Beeston, GR & Hopkins, AJM 2002, 'Native Vegetation in Western Australia: Extent, Type and Status', *Resource Management Technical Report 249*.
- Singor, M 2024, 'From Field and Study: White-bellied Sea-Eagle breeding sites in southwest Western Australia', *The Western Australian Naturalist*, vol. 33, no. 3, pp.288–297.
- Species and Communities Program & Department of Biodiversity Conservation and Attractions 2022, *Priority Ecological Communities for Western Australia Version 34 (21 December 2022)*. Available from: <https://www.dpaw.wa.gov.au/images/images/documents/plants-animals/threatened-species/Listings/Priority Ecological Communities list.pdf>.
- Strategen JBS&G 2019, *Kwinana Island Vegetation Assessment*, Prepared for Aurizon.
- Terrestrial Ecosystems 2013, *Level 1 Fauna Risk Assessment for the Wellard Village Site*, Prepared for PGV Environmental.
- Threatened Species Scientific Committee 2016, *Approved conservation advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community*, Department of the Environment and Energy. Available from: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=131&status=Endangered>.
- Walker, J & Hopkins, M 1990, "Vegetation" in *Australian Soil and Land Survey. Field Handbook*, eds.R McDonald, R Isbell, J Speight, J Walker, & M Hopkins, Inkata Press, Inkata Press, Melbourne.
- Weeds Australia & Centre for Invasive Species Solutions 2021, *Weeds of National Environmental Significance (WoNS)*. Available from: <https://weeds.org.au/weeds-profiles/>.
- Western Australian Government 2023a, *Government Gazette No. 135, 6 October 2023*. Available from: [https://www.legislation.wa.gov.au/legislation/prod/gazettestore.nsf/FileURL/gg2023_135.pdf/\\$FILE/Gg2023_135.pdf?OpenElement](https://www.legislation.wa.gov.au/legislation/prod/gazettestore.nsf/FileURL/gg2023_135.pdf/$FILE/Gg2023_135.pdf?OpenElement). [27 October 2023].
- Western Australian Government 2023b, 'Biodiversity Conservation (Threatened Ecological Communities) Order 2023', *Government Gazette*, vol. No. 62.
- Western Australian Government 2023c, *Government Gazette No. 62, 26 May 2023*. Available from: [https://www.legislation.wa.gov.au/legislation/prod/gazettestore.nsf/FileURL/gg2023_062.pdf/\\$FILE/Gg2023_062.pdf?OpenElement](https://www.legislation.wa.gov.au/legislation/prod/gazettestore.nsf/FileURL/gg2023_062.pdf/$FILE/Gg2023_062.pdf?OpenElement).
- Western Australian Herbarium 1998, *FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions*. Available from: <https://florabase.dbca.wa.gov.au/search/advanced>.
- Western Australian Herbarium 2024, *FloraBase: Search the Herbarium Specimens*. Available from: <https://florabase.dbca.wa.gov.au/search/advanced>.
- Western Australian Planning Commission 2010, *State Planning Policy 2.8 - Bushland policy for the Perth Metropolitan Region*. Available from: https://www.wa.gov.au/system/files/2021-06/SPP_2-8_bushland_policy_perth_metro.pdf.
- Western Botanical 2018, *Flora and Vegetation Assessment, Mandurah Road, Baldivis*, Prepared for Nickel West.
- Wilson, S & Swan, G 2017, *A Complete Guide to Reptiles of Australia*, 5th edn, Reed New Holland.

MAPS



LEGEND

- Survey Area
- Road Hierarchy**
 - Primary Road
 - Secondary Road
 - Local Road
 - Local Access Road
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas 2000 (DPLH-019)
- DBCA Legislated Lands and Waters (DBCA-011)
- DBCA Lands of Interest (DBCA-012)
- Pre European Vegetation**
 - 1001: Medium very sparse woodland; jarrah, with low woodland; *banksia* and *casuarina*
 - 968: Medium woodland; jarrah, marri & wandoo
 - 998: Medium woodland; tuart

DATA SOURCES:
SOURCE DATA: CLEARING REGULATIONS - ENVIRONMENTALLY SENSITIVE AREAS (DWER 2021), DBCA - LEGISLATED LANDS AND WATERS (DBCA-011) (DBCA 2022), PRE-EUROPEAN VEGETATION (DPIRD-006) (2017), SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015), ROAD HIERARCHY (MRWA, 2024) AND BUSH FOREVER AREAS 2000 (DPLH-019).
BASEMAP: ESRI WORLD IMAGERY (MAXAR 2024)
SERVICE LAYERS: WORLD IMAGERY: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, USGS, NGA



PRE-EUROPEAN VEGETATION,
ESAS, BUSH FOREVER AREAS
AND DBCA LANDS

KEROSENE LANE / BALDIVIS ROAD,
BALDIVIS BIOLOGICAL SURVEY



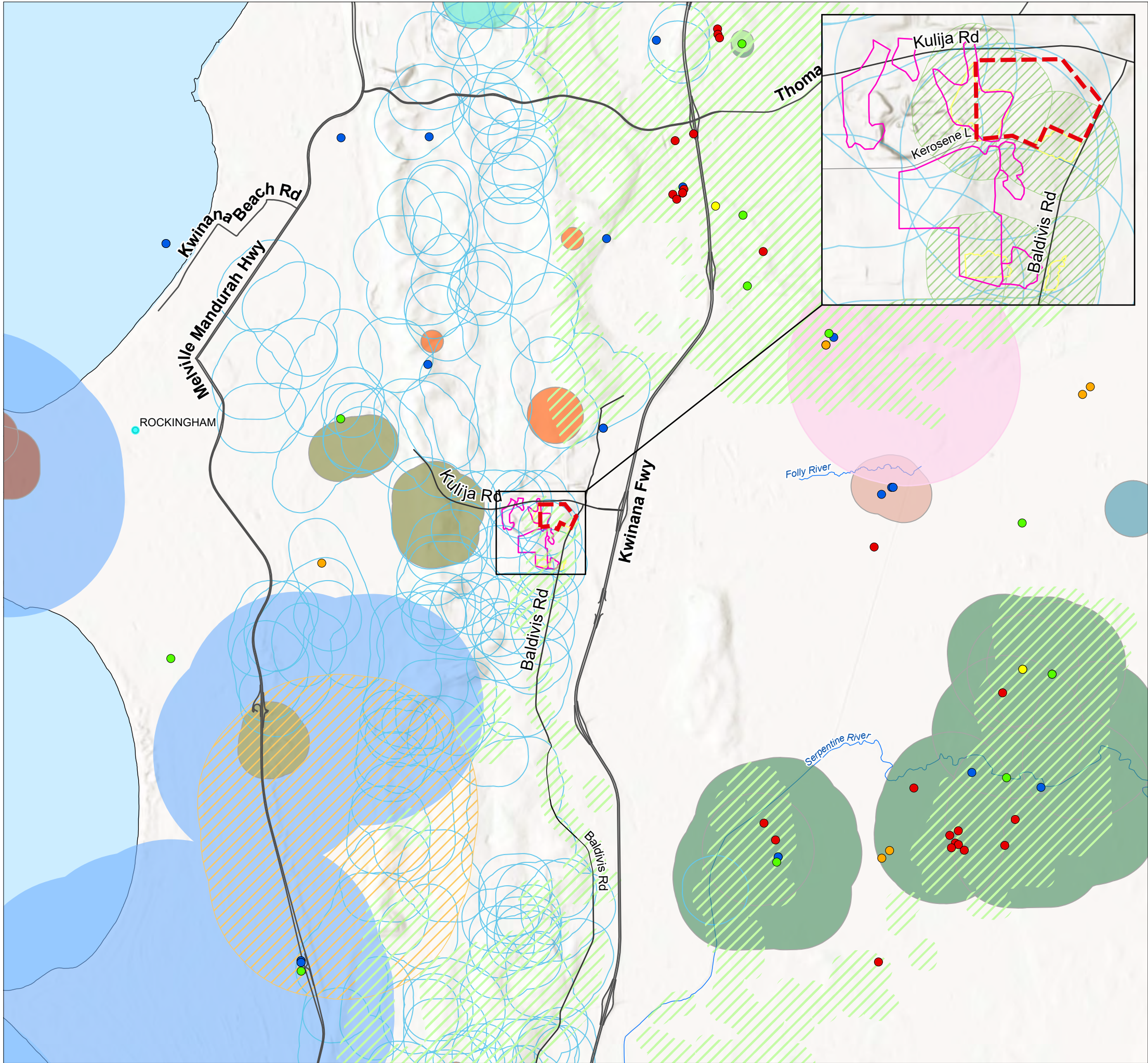
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER



PROJECT NO: 5057-24			
REV	AUTHOR	APPROVED	DATE
0	TD	NW	21/10/2024

MAP

01



LEGEND

Survey Area

Threatened

Priority 1

Priority 2

Priority 3

Priority 4

Main Town

Road Hierarchy

Primary Road

Secondary Road

Local Road

Drainage Lines

DBCA Communities

Northern Spearwood shrublands and woodlands

Banksia Woodlands of the Swan Coastal Plain ecological community

Banksia ilicifolia woodlands

Callitris preissii (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson et al. 1994)

Casuarina obesa Association

Coastal shrublands on shallow sands

Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)

Corymbia calophylla ? *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in Gibson et al. 1994)

Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. 1994)

Low lying *Banksia attenuata* woodlands or shrublands

Southern *Eucalyptus gomphocephala*-*Agonis flexuosa* woodlands

Melaleuca huegelii - *M. systema* shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994)

Microbial community of a coastal saline lake (Lake Walyungup)

Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain

Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in in Gibson et al. 1994)

Stromatolite like microbialite community of coastal freshwater lakes (Lake Richmond)

Subtropical and Temperate Coastal Saltmarsh

DBCA Communities (1 km buffer)

Banksia Woodlands of the Swan Coastal Plain ecological community

Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain

DATA SOURCES:

SOURCE DATA: CONSERVATION-LISTED FLORA, COMMUNITIES AND 1KM BUFFER (DBCA 2024), ROAD HIERARCHY (MRWA 2024), URBAN LOCATIONS (STREETPRO 2009) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015).

BASEMAP: ESRI WORLD IMAGERY (MAXAR 2024)

SERVICE LAYERS: WORLD HILLSHADE: ESRI, GEOSCIENCE AUSTRALIA, NASA, NGA, USGS



DBCA DATABASE SEARCH RESULTS

FLORA AND COMMUNITIES

KEROSENE LANE / BALDIVIS ROAD,

BALDIVIS BIOLOGICAL SURVEY



COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

PROJECTION: TRANSVERSE MERCATOR

DATUM: GDA 1994

UNITS: METER

N

0

2

3 km

SCALE: 1:70,000 @ A3

PROJECT NO: 5057-24

REV 0

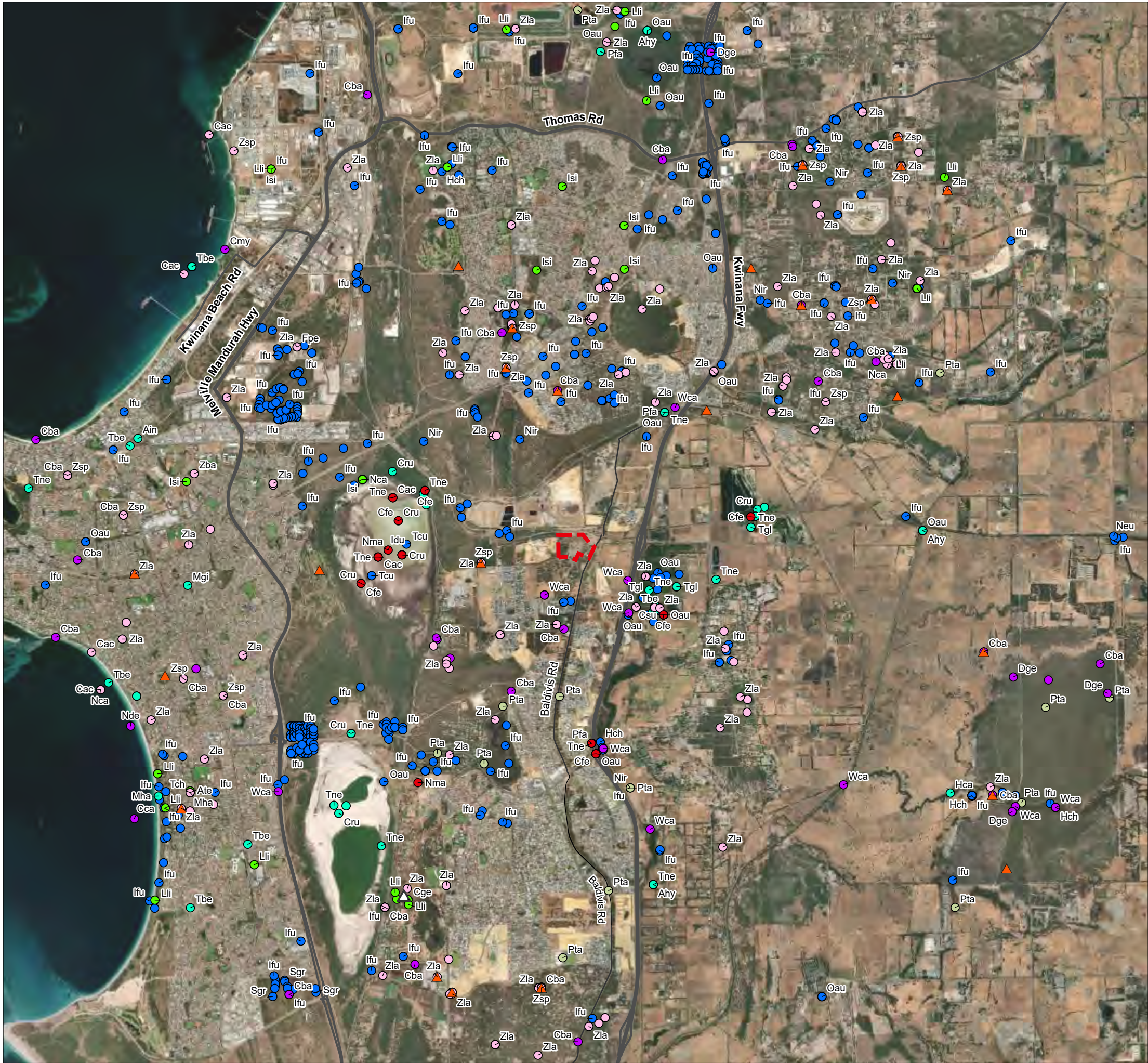
AUTHOR TDV

APPROVED NW

DATE 21/10/2024

MAP

02



LEGEND

- Survey_Area
- Primary Road
- Secondary Road
- Local Road
- Local Access Road

Conservation-listed Fauna (DBCAs, 2024)

- Critically Endangered
- Endangered
- Vulnerable
- Migratory Species
- Conservation Dependent
- Other Specially Protected
- Priority 3
- Priority 4
- Black Cockatoo habitat tree (DBCAs, 2024)
- White-tailed Black Cockatoo habitat tree (DBCAs, 2024)

Code	Taxon	Status	Code	Taxon	Status
Ahy	Actitis hypoleucos	MI	Mgi	Macronectes giganteus	MI
Ate	Anous tenuirostris melanops	EN	Mha	Macronectes halli	MI
Apa	Apus pacificus	MI	Nde	Natator depressus	VU
Ain	Arenaria interpres	MI	Nca	Neelaps calonotos	P3
Cac	Calidris acuminata	MI	Neu	Notamacropus eugenii derbianus	P4
Cfe	Calidris ferruginea	CR	Nir	Notamacropus irma	P4
Cru	Calidris ruficollis	MI	Nma	Numenius madagascariensis	CR
Csu	Calidris subminuta	MI	Oau	Oxyura australis	P4
Cba	Calyptorhynchus banksii naso	VU	Pta	Phascogale tapoatafa wambengeri	CD
Cca	Carcharodon carcharias	VU	Pfa	Plegadis falcinellus	MI
Cac	Caretta caretta	EN	Sgr	Synemon gratioiosa	P4
Cmy	Chelonia mydas	VU	Tch	Thalassarche chrysostoma	VU
Cge	Ctenotus gemmulatus (SCP subpop)	P3	Tbe	Thalasseus bergii	MI
Dge	Dasyurus geoffroii	VU	Tcu	Thinornis cucullatus	P4
Fpe	Falco peregrinus	OS	Tgl	Tringa glareola	MI
Hch	Hydromys chrysogaster	P4	Tne	Tringa nebularia	MI
Hca	Hydroprogne caspia	MI	Tst	Tringa stagnatilis	MI
Isi	Idiosoma sigillatum	P3	Wca	Westralunio carteri	VU
Ifu	Isodon fusciventer	P4	Zba	Zanda baudinii	EN
Idu	Ixobrychus dubius	P4	Zla	Zanda latirostris	EN
Lli	Lerista lineata	P3	Zsp	Zanda sp. 'white-tailed black cockatoo'	EN

DATA SOURCES:
SOURCE DATA: CONSERVATION-LISTED FAUNA AND BLACK COCKATOO DATA (DBCAs 2024). CLEARING REGULATIONS - ENVIRONMENTALLY SENSITIVE AREAS (DWER-046) (DWER 2021). DBCAs - LEGISLATED LANDS AND WATERS (DBCAs-011) (DBCAs 2022). ROAD NETWORK (MRWA 2023). SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015).
BASEMAP: ESRI (2024)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

ecoscape

DBCAs DATABASE
SEARCH RESULTS - FAUNA,
BLACK COCKATOO TREES

KEROSENE LANE / BALDIVIS ROAD,
BALDIVIS BIOLOGICAL SURVEY



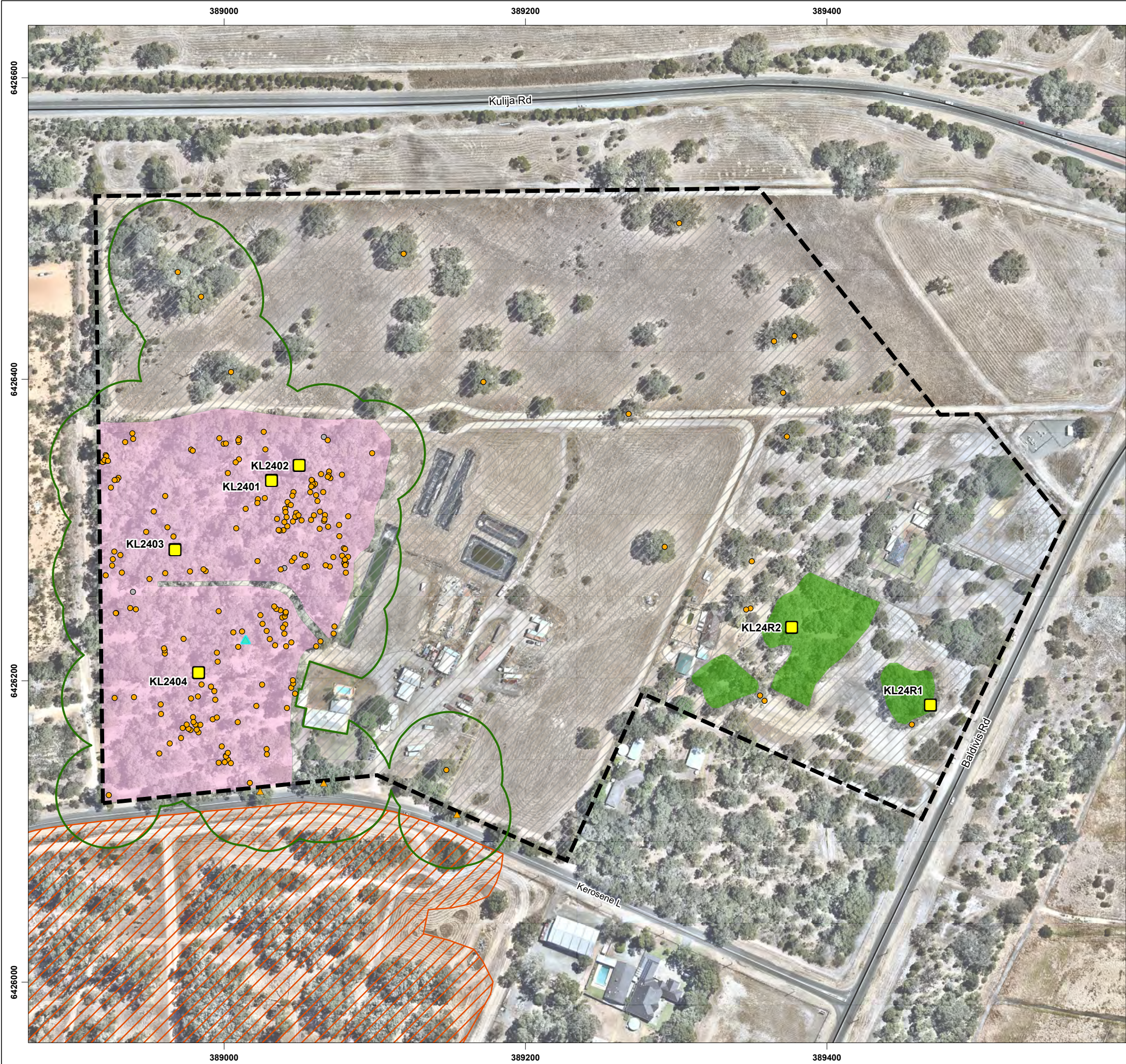
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER



PROJECT NO: 5057-24			
REV	AUTHOR	APPROVED	DATE
0	TDV	XX	21/10/2024

MAP

03



LEGEND

- Survey Area
 - Quadrat / Relève
 - Secondary Road
 - Local Access Road
 - Eucalyptus gomphocephala* - road reserve (indicative location)
 - Eucalyptus gomphocephala*
 - Other - Dead Tuart
 - Tuart Woodlands TEC
 - Contiguous Tuart Woodlands TEC (approximate - Emerge Associates (2021b))
- Vegetation Type**
- CcMOF: *Corymbia calophylla* mid open forest
 - CcEgEmMOF: *Corymbia calophylla*, *Eucalyptus gomphocephala* and *Eucalyptus marginata* subsp *marginata* mid open forest
 - Cleared/Not Native Vegetation

DATA SOURCES:
SOURCE DATA: QUADRATS, RELÈVES, TREE AND VEGETATION DATA (ECOSCAPE 2024) AND ROAD HIERARCHY (MRWA 2024).
BASEMAP: NEARMAPS (2025)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, USGS, NGA



**VEGETATION TYPES, TEC AND
TUART TREE LOCATIONS**

**KEROSENE LANE / BALDIVIS ROAD,
BALDIVIS BIOLOGICAL SURVEY**



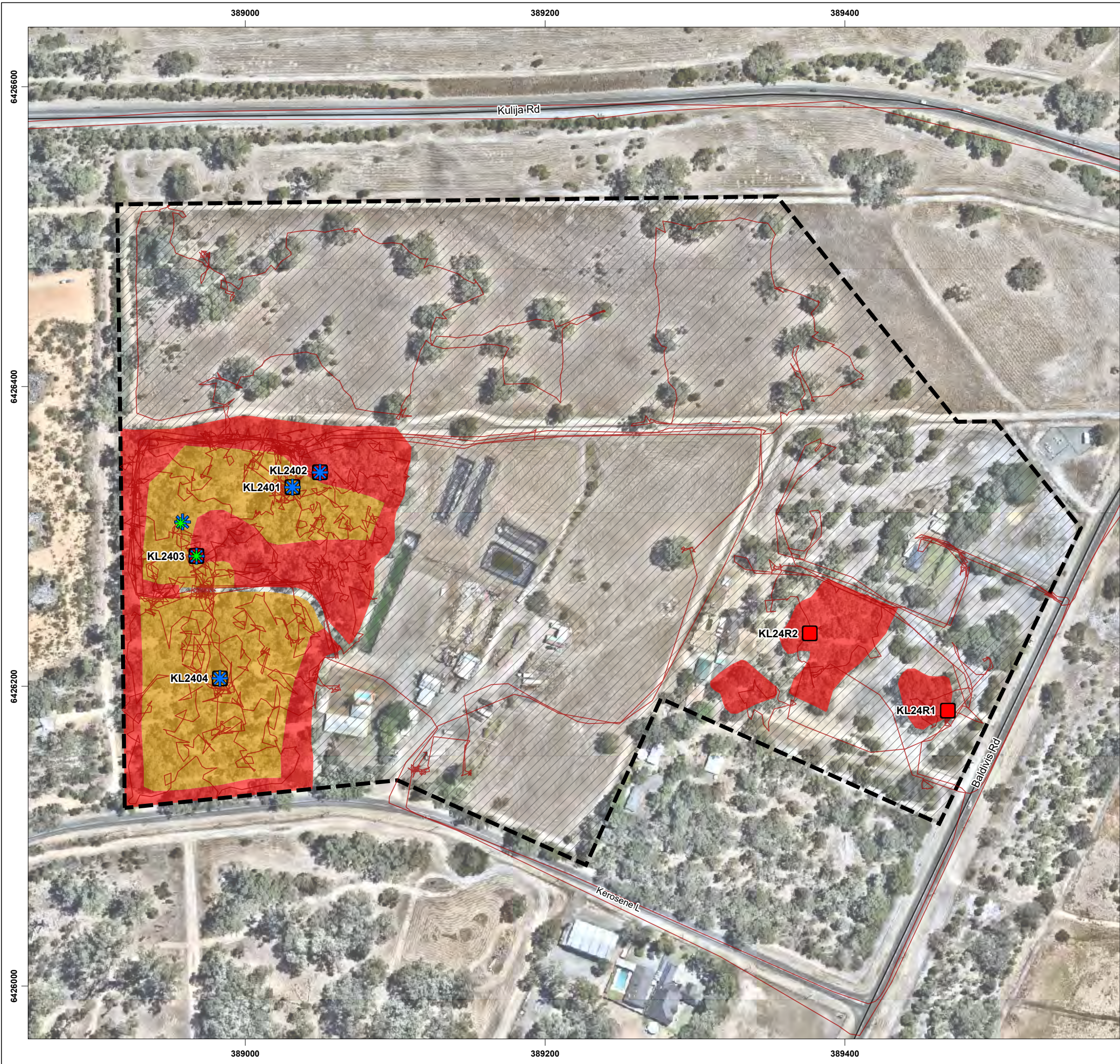
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER



PROJECT NO: 5057-24			
REV	AUTHOR	APPROVED	DATE
1	NW	LA	27/03/2025
2	TDV	LA	29/04/2025
3	TDV	LA	30/05/2025

MAP

04



LEGEND

- Survey Area
- Secondary Road
- Local Access Road
- Survey Track
- Quadrat / Relève Condition**
 - Completely Degraded
 - Degraded
- Significant Weeds**
 - Asparagus asparagoides*
 - Zantedeschia aethiopica*
- Vegetation Condition**
 - Completely Degraded
 - Degraded
 - Cleared / Not Native Vegetation

DATA SOURCES:
SOURCE DATA: QUADRATS, RELÈVES, SIGNIFICANT WEEDS, SURVEY TRACKS AND VEGETATION (ECOSCAPE 2024) AND ROAD HIERARCHY (MRWA 2024).
BASEMAP: NEARMAPS (2025)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, USGS, NGA

ecoscape

VEGETATION CONDITION,
SIGNIFICANT WEEDS
AND SURVEY TRACKS

KEROSENE LANE / BALDIVIS ROAD,
BALDIVIS BIOLOGICAL SURVEY



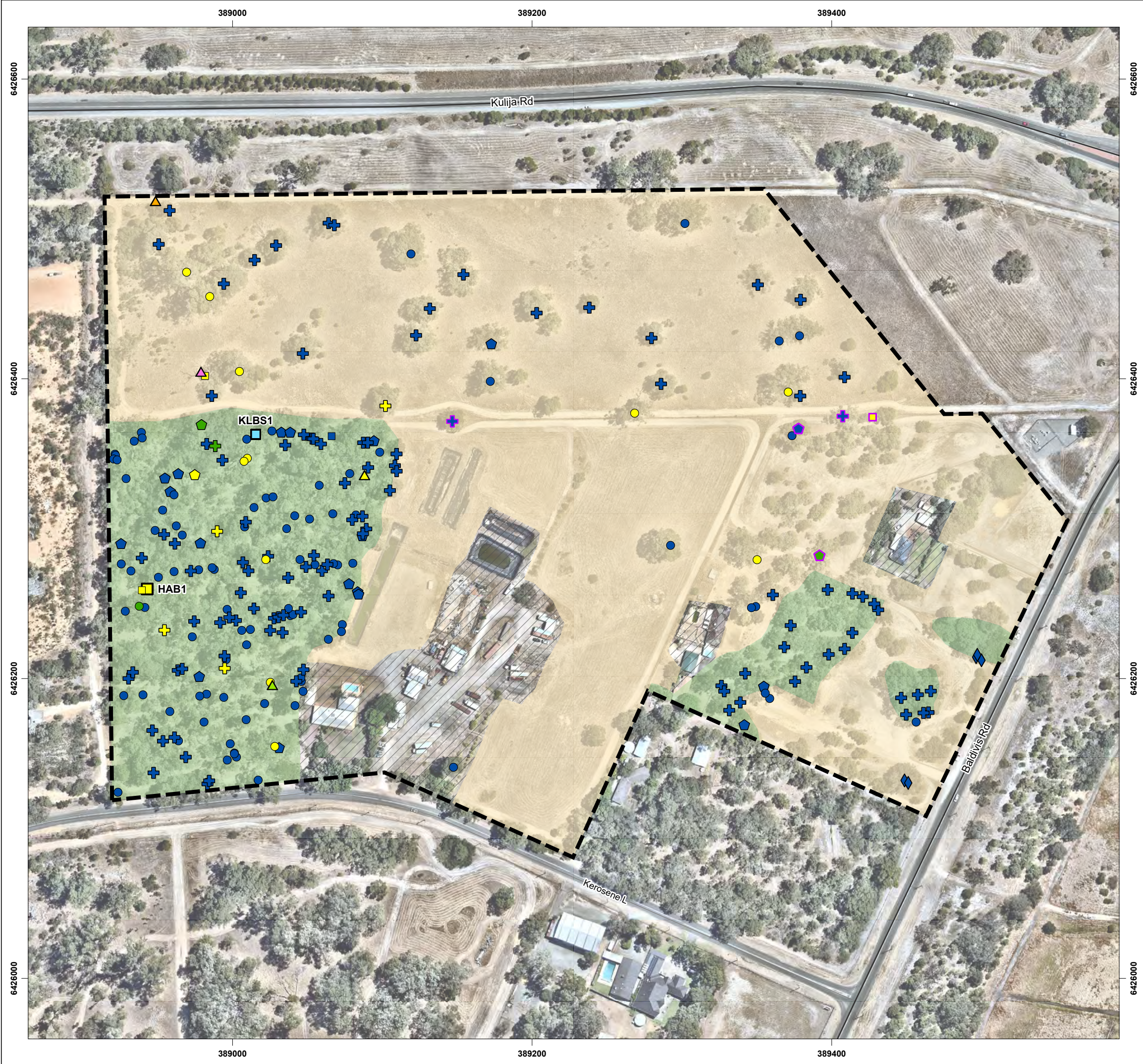
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER



PROJECT NO: 5057-24			
REV	AUTHOR	APPROVED	DATE
0	TDV	LA	08/11/2024
1	NW	LA	25/03/2025

MAP

05



LEGEND

Survey Area

Habitat Assessment Point

Bird Survey

Secondary Road

Local Access Road

Coterra Habitat Trees

Corymbia calophylla, Class 5

Eucalyptus marginata, Class 4

Eucalyptus marginata, Class 5

Dead, Class 3

Fauna Location

Forest Red-tailed Black Cockatoo

Quenda

Raptor nest

White-bellied Sea-Eagle nest

Habitat Trees

Class 3

Corymbia calophylla

Eucalyptus gomphocephala

Eucalyptus marginata

Dead

Class 4

Corymbia calophylla

Eucalyptus gomphocephala

Eucalyptus marginata

Class 5

Corymbia calophylla

Eucalyptus gomphocephala

Eucalyptus marginata

Eucalyptus rudis

Dead

Fauna Habitat

Eucalypt Woodland

Isolated Trees over Grassland

Not habitat

DATA SOURCES:
SOURCE DATA: FAUNA DATA (ECOSCAPE 2024), COTERRA HABITAT TREES (COTERRA 2025) AND ROAD HIERARCHY (MRWA 2024).
IMAGERY: NEARMAPS (2025)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, USGS, NGA

**FAUNA HABITAT,
BLACK COCKATOO TREES
AND FAUNA LOCATIONS**
**KEROSENE LANE / BALDIVIS ROAD,
BALDIVIS BIOLOGICAL SURVEY**

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

SCALE: 1:2,500 @ A3
0 50 100 m

PROJECT NO: 5057-24

REV	AUTHOR	APPROVED	DATE
0	TDV	LA	08/11/2024
1	NW	LA	27/03/2025

MAP
06

APPENDIX ONE

ACRONYMS AND ABBREVIATIONS

Table 16: Acronyms and abbreviations

Acronyms	
BAM Act	Western Australian <i>Biosecurity and Agriculture Management Act 2007</i>
BC Act	Western Australian <i>Biodiversity Conservation Act 2016</i>
BoM	Bureau of Meteorology
C1, C2, C3	Declared Pest categories under the BAM Act
CD	Conservation Dependent (fauna; specially protected species under the Western Australian BC Act)
CR	Critically Endangered (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
DAWE	Commonwealth Department of Agriculture, Water and Environment (2020-2022, now DCCEEW)
DBCA	Western Australian Department of Biodiversity, Conservation and Attractions
DBH	Diameter at Breast Height (1.3 m)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts (2007-2010, now DCCEEW)
DotEE	Commonwealth Department of the Environment and Energy (2016-2020)
DPIRD	Western Australian Department of Primary Industries and Regional Development
DSEWPac	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (2010-2013, now DCCEEW)
DWER	Western Australian Department of Water and Environmental Regulation
EN	Endangered (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
Ecoscape	Ecoscape (Australia) Pty Ltd
EP Act	Western Australian <i>Environmental Protection Act 1986</i>
EPA	Western Australian Environmental Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDA 94	Geographic Datum of Australia 1994
GDE	Groundwater Dependent Ecosystem
GPS	Global Positioning System
ha	hectare/hectares
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
km	kilometre/kilometres
m	metre/metres
MA	Marine species (fauna; protected under international agreements and EPBC Act)
MI	Migratory species (fauna; specially protected species under the Western Australian BC Act, also EPBC Act)
NVIS	National Vegetation Inventory System
MNES	Matters of National Environmental Significance
OS	Other specially protected species (fauna; specially protected species under the Western Australian BC Act)
P; P1, P2, P3, P4, P5	Priority Flora and Fauna species rankings (P1-P4) or Priority Ecological Communities (P1-P5)
PEC	Priority Ecological Community
PF	Priority Flora
PMST	Protected Matters Search Tool (hosted by DCCEEW, used to search for MNES)
sp.	Species (generally referring to an unidentified taxon or when a phrase name has been applied)
subsp.	Subspecies (infrataxon)
TEC	Threatened Ecological Community
TF	Threatened Flora (formerly termed Declared Rare Flora, DRF, in Western Australia)
var.	Variety (infrataxon)
VU	Vulnerable (listed under Commonwealth EPBC Act and/or Western Australian BC Act)
WAH	Western Australian Herbarium

Acronyms	
WONS	Weeds of National Significance
*	Introduced flora species (i.e. weed)

APPENDIX TWO

LEGISLATIVE CONTEXT, DEFINITIONS AND CRITERIA

COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act is a legal framework to protect and manage matters of national environmental significance (MNES) including important flora, fauna, ecological communities and heritage areas listed under the Act.

Threatened taxa (flora and fauna) are protected under the EPBC Act, which lists species and ecological communities that have been assessed as meeting the criteria to be listed as Critically Endangered, Endangered, Vulnerable, Conservation Dependant, Extinct, or Extinct in the Wild, as detailed in **Table 17**.

Threatened Ecological Communities protected under the EPBC Act are categorised as Critically Endangered, Endangered or Vulnerable, also detailed in this table.

Migratory species subject to international agreements are also protected under the EPBC Act. The definition of a migratory species under the Act follows that prescribed by the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (DCCEE 2023). 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).

Table 17: EPBC Act categories for flora, fauna and ecological communities

Category	Threatened species	Threatened Ecological Communities
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.	n/a
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.	n/a
Critically Endangered (CR)	A native species is eligible to be included in the <i>critically endangered</i> category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>critically endangered</i> category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria
Endangered (EN)	A native species is eligible to be included in the <i>endangered</i> category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>endangered</i> category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Category	Threatened species	Threatened Ecological Communities
Vulnerable (VU)	A native species is eligible to be included in the <i>vulnerable</i> category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>vulnerable</i> category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.	n/a

WESTERN AUSTRALIAN ENVIRONMENTAL PROTECTION ACT 1986

The Western Australian EP Act was created to provide for an Environmental Protection Authority (the EPA) that has the responsibility for:

- prevention, control and abatement of pollution and environmental harm
- conservation, preservation, protection, enhancement and management of the environment
- matters incidental to or connected with the above.

The EPA is responsible for providing the guidance and policy under which environmental assessments are conducted. It conducts environmental impact assessments (based on the information provided by the proponent), initiates measures to protect the environment and provides advice to the Minister responsible for environmental matters.

WESTERN AUSTRALIAN BIODIVERSITY CONSERVATION ACT 2016

The Western Australian BC Act provides for the conservation, protection and ecologically sustainable use of biodiversity and biodiversity components in Western Australia.

Threatened Species

Threatened species (both flora and fauna) and ecological communities (see below) that meet the categories listed within the BC Act are protected under this legislation and require authorisation by the Minister to take or disturb. These are known as Threatened Flora, Threatened Fauna and Threatened Ecological Communities. The conservation categories of Critically Endangered, Endangered and Vulnerable are detailed in **Table 18**; these categories align with those of the EPBC Act. Some State-listed threatened species and ecological communities are provided with additional protection as they are also listed under the Commonwealth EPBC Act (see **Table 17** for conservation status category descriptions).

The most recent Western Australian flora and fauna listings were published in the Government Gazette on 6 October 2023 (Western Australian Government 2023a) and ecological communities listings on 26 May 2023 (Western Australian Government 2023b).

Priority-Listed Species

Flora are listed as PF where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to TF categories. Whilst PF are not specifically listed in the BC Act, some may qualify as being of special conservation interest and thereby have a greater level of protection than unlisted species.

There are three categories covering Western Australian-listed TF and four categories covering PF species which are outlined in **Table 18**. PF for Western Australia are regularly reviewed by the DBCA whenever new information becomes available, with species status altered or removed from the list when data indicates that they no longer meet these requirements.

Conservation significant fauna species are listed by the DBCA as Priority Fauna where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to threatened fauna categories. Whilst Priority Fauna are not specifically listed in the BC Act, these have a greater level of significance than other native species. The categories covering Priority Fauna species are outlined in **Table 18**.

Flora and fauna species may be listed as being of special conservation interest if they have a naturally low population, have a restricted natural range, are subject to or recovering from a significant population decline or reduction of range or are of special interest, and the Minister considers that taking may result in depletion of the species. Migratory species and those subject to international agreement are also listed under the Act. These are known as 'specially protected species' in the BC Act.

Table 18: Conservation category definitions for Western Australian flora and fauna (DBCA 2023b)

Conservation Category Definitions for Western Australian Fauna and Flora	
Threatened, Extinct and Specially Protected fauna or flora ¹ are species ² which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.	
Categories of Threatened, Extinct and Specially Protected fauna and flora are:	
T	Threatened species Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the <i>Biodiversity Conservation Act 2016</i> (BC Act). Threatened fauna is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species. Threatened flora is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species. The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 2 that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria³, and is based on the national distribution of the species.

Conservation Category Definitions for Western Australian Fauna and Flora	
CR	<i>Critically endangered species</i> 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.
EN	<i>Endangered species</i> 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.
VU	<i>Vulnerable species</i> 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 Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	<i>Extinct species</i> 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).
EW	<i>Extinct in the wild species</i> 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). Currently there are no fauna or flora species listed as extinct in the wild.
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting 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 species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as specially Protected species.	
MI	<i>Migratory species</i> 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)⁴, China (CAMBA)⁵ and The Republic of Korea (ROKAMBA)⁶, and fauna subject to the <i>Convention on the Conservation of Migratory Species of Wild Animals</i> (Bonn Convention)⁷, 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.
CD	<i>Species of special conservation interest (conservation dependent)</i> Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Currently only fauna are listed as species of special conservation interest.
OS	<i>Other specially protected species</i> 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). Currently only fauna are listed as species otherwise in need of special protection.

Conservation Category Definitions for Western Australian Fauna and Flora	
P	Priority species Priority is not a listing category under the BC Act. All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land). Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey 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 prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened. Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of priority status 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.
1	<i>Priority 1: Poorly-known species – known from few locations, none on conservation lands</i> 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, for example, 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. These species are in urgent need of further survey.
2	<i>Priority 2: Poorly-known species – known from few locations, some on conservation lands</i> 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, for example, 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 for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.
3	<i>Priority 3: Poorly-known species – known from several locations</i> 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. These species need further survey.
4	<i>Priority 4: Rare, Near Threatened and other species in need of monitoring</i> (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy. (d) Other species in need of monitoring.
¹ The definition of flora includes algae, fungi and lichens. ² Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population). ³ Western Australia has assigned species to threat categories using the <i>IUCN Red List of Threatened Species Categories and Criteria</i> since 1996 (referencing all criteria). ⁴ JAMBA - first included in the WA migratory species list in 1980. ⁵ CAMBA - first included in the WA migratory species list in 2010. ⁶ ROKAMBA - first included in the WA migratory species list in 2010. ⁷ Bonn Convention (Birds) - first included in the WA migratory species list in 2015.	

Threatened and Priority Ecological Communities

Western Australian TECs are protected under the BC Act and are categorised much like those of the EPBC Act. Western Australian definitions and criteria for TECs are shown in **Table 19**.

Currently described TECs are listed on the DBCA website, with the most recent list endorsed by the Minister for Environment published in the Government Gazette on 26 May 2023 (Western Australian Government 2023c) and updated by DBCA on 28 November 2023 (DBCA 2023c).

DBCA also maintains a list of Priority Ecological Communities (PECs). PECs include potential TECs that do not meet survey criteria, or that are not adequately defined. They are not protected under legislation but are taken into consideration as part of the environmental approvals process. Currently described PECs are listed on the DBCA website, with the most recent list dated 19 June 2023 (DBCA 2023a). Currently described PECs are listed on the DBCA website, with the most recent list dated 21 December 2022 (Species and Communities Program, DBCA 2022).

Definitions and criteria for PECs are shown in **Table 19**.

Table 19: DBCA definitions and criteria for TECs and PECs (DBCA 2023d)

Criteria	Definition
Listed Ecological Communities	
Collapsed ecological communities (CO)	An ecological community listed by order of the Minister as collapsed under section 31(1) of the BC Act. As determined by criteria set out in section 32 of the BC Act, an ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time — (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover — (i) its species composition or structure; or (ii) its species composition and structure.
Critically endangered ecological communities (CR)	A threatened ecological community listed in the category of critically endangered under section 27(1)(a) of the BC Act, as determined by criteria set out in section 28 of the BC Act and the ministerial guidelines. A critically endangered ecological community faces an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines.
Endangered ecological communities (EN)	A threatened ecological community listed in the category of endangered ecological community under section 27(1)(b) of the BC Act, as determined by criteria set out in section 29 of the BC Act and the ministerial guidelines. A threatened ecological community faces a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines.
Vulnerable ecological communities (VU)	A threatened ecological community listed in the category of vulnerable ecological community under section 27(1)(c) of the BC Act, as determined by criteria set out in section 30 of the BC Act and the ministerial guidelines. A vulnerable ecological community faces a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines.
Priority ecological communities	
Priority One (P1)	<i>Poorly known ecological communities – very few occurrences, very restricted distribution</i> Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). 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 Two (P2)	<i>Poorly known ecological communities – few occurrences, restricted distribution</i> Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) 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.

Criteria	Definition
Priority Three (P3)	<i>Poorly known ecological communities inadequately surveyed or not well defined</i> 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. This category includes three sub-categories: - 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. - Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years). - Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change, etc.
Priority Four (P4)	<i>Adequately known ecological communities – rare, near threatened, or recently removed from the threatened list</i> Ecological communities that are adequately known and are rare but not threatened near threatened, or 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 as conservation dependent, but that are close to qualifying for a higher threat category. - Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority Five (P5)	<i>Conservation Dependent Ecological Communities</i> 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.

FLORA CRITERIA

Other Significant Flora

According to the Flora and Vegetation Technical Guidance (EPA 2016a) other than being listed as Threatened or Priority Flora, a species can be considered as significant if it is considered to be:

- locally endemic or association with a restricted habitat type (e.g. Groundwater Dependent Ecosystems, Sheet Flow Dependent Vegetation)
- a new species or has anomalous features that indicate a potential new species
- at the extremes of range, recently discovered range extensions (generally considered greater than 100 km or in a different bioregion), or isolated outliers of the main range
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Introduced Flora

Introduced plant species, known as weeds, are plants that are not indigenous to an area and have been introduced either directly or indirectly (unintentionally) through human activity. Species are regarded as introduced if they are listed as 'alien' on *FloraBase* (Western Australian Herbarium [WAH] 1998-2024) and are designated with an asterisk (*) in this document.

Weeds of National Significance

At a national level there are 32 weed species listed as Weeds of National Significance (WoNS) (Weeds Australia & Centre for Invasive Species Solutions 2021). The Commonwealth *Australian Weeds Strategy 2017-2027* (Invasive Plants and Animals Committee 2016) describes broad goals and objectives to manage these species.

Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Under the BAM Act, Declared Pests are listed as one of the three categories, or exempt:

- C1 (exclusion), that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment
- C2 (eradication), that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- C3 (management), that applies to established pests where it is not feasible or desirable to manage them in order to limit their damage
- exempt (no category).

VEGETATION CRITERIA

Other Significant Vegetation

According to the Flora and Vegetation Technical Guidance (EPA 2016a) other than being listed as a TEC or PEC, vegetation can be considered as significant if it is considered to have:

- restricted distribution
- a degree of historical impact from threatening processes
- a role as a refuge
- provides an important function required to maintain ecological integrity of a significant ecosystem.

Groundwater Dependent Vegetation may be considered as significant, described below.

Groundwater Dependent Vegetation

Groundwater Definition

Groundwater is water that is found in the saturated zone of the soil, where all soil pores are filled with water. The water table is the upper surface of the saturated zone in an unconfined aquifer. Groundwater may also occur as a perched aquifer located above unsaturated rock formations as a result of a discontinuous permeable layer or held under pressure in a confined aquifer (Goulburn-Murray Water 2010).

Groundwater Dependent Ecosystems Definition

Groundwater Dependent Ecosystems (GDEs) have been defined as ecosystems that are dependent on groundwater for their survival at some stage or stages of their lifecycle, however groundwater use cannot be equated with groundwater dependence (Eamus 2009). In some contexts (including that of a flora and vegetation assessment), GDEs are also known as Groundwater Dependent Vegetation (GDV).

Hatton and Evans (1998) identified four types of GDEs based on their geographic setting: terrestrial vegetation (vegetation communities and dependent fauna that have seasonal or episodic dependence on groundwater), river base flow systems (aquatic and riparian ecosystems that exist in or adjacent to streams that are fed by groundwater base flow), aquifer and cave ecosystems, and wetlands.

Eamus *et al.* (2006) identified three primary classes based on type of groundwater reliance:

1. Aquifer and cave ecosystems.
2. All ecosystems dependent on the surface expression of groundwater:
 - a) river base flows
 - b) wetlands, swamplands
 - c) seagrass beds in estuaries
 - d) floodplains
 - e) mound springs
 - f) riparian vegetation
 - g) saline discharge to lakes

- h) low lying forests.
- 3. All ecosystems dependent on the subsurface presence of groundwater, often accessed via the capillary fringe (non-saturated zone above the water table) when roots penetrate this zone:
 - a) River Red Gum (*Eucalyptus camaldulensis*) forests
 - b) Banksia woodlands**
 - c) Riparian vegetation in the wet/dry tropics.

ENVIRONMENTALLY SENSITIVE AREAS

There are a number of areas within Western Australia identified as being of environmental significance within which the exemptions to the Native Vegetation Clearing Regulations do not apply. These are referred to as Environmentally Sensitive Areas (ESAs), and are declared under section 51B of the EP Act and described in the *Environmental Protection (Environmentally Sensitive Areas) Notice*.

CONSERVATION ESTATE

The National Reserve System is a network of protected areas managed for conservation under international guidelines. The objective of placing areas of bushland into the Conservation Estate is to achieve and maintain a comprehensive, adequate and representative reserve system for Western Australia. The Conservation and Parks Commission is the vesting body for conservation lands, forest and marine reserves that are managed by DBCA (Government of Western Australia 2018).

APPENDIX THREE FIELD SURVEY CRITERIA

Table 20: NVIS structural formation terminology, terrestrial vegetation (NVIS Technical Working Group & DotEE 2017)

	Cover characteristics							
	Foliage cover *	70-100	30-70	10-30	<10	>> 0 (scattered)	0-5 (clumped)	unknown
	Cover code	d	c	i	r	bi	bc	unknown
Growth Form	Height Ranges (m)	Structural Formation Classes						
tree, palm	<10,10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	tree, palm
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	tree mallee
shrub, cycad, grass-tree, tree-fern	<1,1-2,>2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrub, cycad, grass-tree, tree-fern
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrub
heath shrub	<1,1-2,>2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrub
chenopod shrub	<1,1-2,>2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrub
samphire shrub	<0.5,>0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrub
hummock grass	<2,>2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grass
tussock grass	<0.5,>0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grass
other grass	<0.5,>0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grass
sedge	<0.5,>0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedge
rush	<0.5,>0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rush
forb	<0.5,>0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forb
fern	<1,1-2,>2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	fern
bryophyte	<0.5	closed bryophyte-land	bryophyte-land	open bryophyteland	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophyte
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichen
vine	<10,10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vine

Table 21: NVIS height classes (NVIS Technical Working Group & DotEE 2017)

Height		Growth form				
Height Class	Height Range (m)	Tree, vine (M & U), palm (single-stemmed)	Shrub, heath shrub, chenopod shrub, ferns, samphire shrub, cycad, tree-fern, grass-tree, palm (multi-stemmed)	Tree mallee, mallee shrub	Tussock grass, hummock grass, other grass, sedge, rush, forbs, vine (G)	Bryophyte, lichen, seagrass, aquatic
8	>30	tall	NA	NA	NA	NA
7	10-30	mid	NA	tall	NA	NA
6	<10	low	NA	mid	NA	NA
5	<3	NA	NA	low	NA	NA
4	>2	NA	tall	NA	tall	NA
3	1-2	NA	mid	NA	tall	NA
2	0.5-1	NA	low	NA	mid	tall
1						<(based on Walker & Hopkins 1990)(based on Walker & Hopkins 1990)

Table 22: Vegetation condition scale for the South West and Interzone Botanical Provinces (EPA 2016a) and Keighery (1994)

Condition rating	EPA (2016a) Description	Keighery (1994) Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	No obvious signs of disturbance.
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.	Vegetation structure intact; disturbance only affecting individual species; weeds are non-aggressive species.
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.	Vegetation structure altered; obvious signs of disturbance e.g.: from repeated fires, dieback, logging, grazing. Aggressive weeds present.
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.	Vegetation structure altered but retains basic vegetation structure or ability to regenerate it. Obvious signs of disturbance, e.g. from partial clearing, dieback, logging, grazing. Presence of very aggressive weeds.
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.	Basic vegetation structure severely impacted by disturbance. Requires intensive management. Disturbance evident such as partial clearing, dieback, logging and grazing. Presence of very aggressive weeds at high density.

Condition rating	EPA (2016a) Description	Keighery (1994) Description
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Vegetation structure is no longer intact and the area is completely or almost completely without native flora. Equivalent to 'Parkland Cleared'.

Table 23: Grading system for the assessment of potential nest trees for Black Cockatoos (BCE 2025) (BCE 2025)

Class	Description of tree and hollows/activity
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow. Can also be used for a known nest tree active in the previous 12 months (although this should be noted in the description). Note that activity at a hollow does not absolutely mean that breeding is occurring unless a young bird in hollow is observed.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present - as suggested by structure of tree, such as large, vertical trunk broken off at a height of >8m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5m so in a Wheatbelt breeding site a lower criterion may be more appropriate. Note that Rank 3 trees are the most likely to be reassessed with a pole camera and/or drone, and can be either downgraded or upgraded. The Rank 3 assessment should be considered precautionary as it is a tree that has or appears likely to have a suitable nesting hollow.
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos. Also, a tree with hollows that might be large enough for a black-cockatoo, but in a trunk or branch of insufficient diameter to contain a hollow of preferred size. Trees with low but otherwise suitable hollows can also be assigned a rank or 4, depending on the context (e.g. south-west forest or Wheatbelt).
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.
Significance	Significance rank for Class 3 and above trees
1 (Very High Value)	Very high value: large tree with obvious large vertical hollow above 5 m (height above ground) with future potential to create more hollows, ideal for Black Cockatoos
2 (High Value)	High value: large/medium (often healthy) tree with suitable vertical or near vertical hollow with potential to create future hollows
3 (Moderate-Low Value)	Moderate/low value: outer diameter of hollow at least 10 cm, height from ground at least 3 m, often in smaller trees or stags with limited potential for future hollows

Table 24: Black Cockatoo foraging quality scoring tool (DAWE 2022)

Foraging quality scoring tool template				
Starting Score		Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo
10		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. This tool only applies to sites equal to or larger than 1 hectare in size.	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 roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size	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. This tool only applies to sites equal to or larger than 1 hectare in size.
Attribute	Sub-tractions	Context adjustor (attributes reducing functionality of foraging habitat)		
Foraging Potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity	-2	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	-1	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	-1	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total Score		<i>Enter score</i>	<i>Enter score</i>	<i>Enter score</i>

Foraging quality scoring tool template			
Starting Score	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo
Appraisal	To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.		

Table 25: Black Cockatoo foraging value scoring system (BCE 2023)

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

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

Site condition: vegetation composition, condition and structure scoring			
Site Score	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo
4	Moderate foraging value. Examples: - Woodland/low forest with tree banksias (of key species <i>B. attenuata</i> and <i>B. menziesii</i>) 20-40% projected foliage cover. - Kwongan/Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover. - Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover. Depending on understorey condition (and thus long-term viability) and Marri density, may downgrade to 3 or upgrade to 5.	Moderate foraging value. Examples: - Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover. - Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. - Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover. - Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: - Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover. - Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. - Sheoak Forest with 40-60% projected foliage cover.
5	Moderate to High foraging value. Examples: - Banksia Low Forest (of key species <i>B. attenuata</i> and <i>B. menziesii</i>) with 40-60% projected foliage cover - Banksia Low Forest (of key species <i>B. attenuata</i> and <i>B. menziesii</i>) with >60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. - Pine plantations with trees more than 10 years old (but see pine notes below in moderation section).	Moderate to High foraging value. Examples: - Marri-Jarrah Forest with 40-60% projected foliage cover. - Marri-Jarrah Forest with >60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.	Moderate to High foraging value. Examples: - Marri-Jarrah Forest with 40-60% projected foliage cover. - Marri-Jarrah Forest with >60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. - Sheoak Forest with >60% projected foliage cover.
6	High foraging value. Example: Banksia Low Forest (of key species <i>B. attenuata</i> and <i>B. menziesii</i>) with >60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: Marri-Jarrah Forest with >60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: Marri-Jarrah Forest with >60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).
Site context	Percentage of the 'local' (i.e. within 15 km) area native vegetation that the survey area represents		
Score	'Local' breeding known/likely		'Local' breeding unlikely
3	>5%		>10%
2	1-5%		5-10%
1	0.1-1%		1-5%
0	<0.1%		<1%

Site condition: vegetation composition, condition and structure scoring	
Site Score	Carnaby's Cockatoo Baudin's Cockatoo Forest Red-tailed Black Cockatoo
Species density/stocking rate	
1	Species is regularly reported/recorded and/or abundant foraging evidence or Direct evidence lacking but at least moderate condition score and site is part of connected habitat where Black Cockatoos are known to occur.
0	Species is irregularly or very infrequently reported and little or no foraging evidence is present.
Moderation (for score out of 10)	
If vegetation composition, condition and structure score is 3-6, context score and species density are added as above.	
If vegetation composition, condition and structure score is 0-2, context score = 0 and species density = 0	

APPENDIX FOUR TEC ASSESSMENT CRITERIA

BANKSIA WOODLANDS TEC

The criteria outlined in the *Approved Conservation Advice for the Banksia Woodlands of the Swan Coastal Plain* TEC (TSSC 2016) was used to determine if the TEC occurs, as below.

The key characteristics for vegetation to be included in this TEC are that:

- it occurs on the Swan Coastal Plain IBRA region, including the Dandaragan Plateau and adjacent to the Jarrah Forest IBRA region on the lower parts of the Darling and Whicher escarpments
- it generally occurs on low-nutrient sandy substrates, including sandy colluvium and aeolean sands although may occur occasionally on other substrates (usually on the Bassendean and Spearwood sands)
- the structure is typically low woodland or forest with a distinct upper stratum of low trees dominated or co-dominated by one or more of four characteristic Banksia species (*Banksia attenuata*, *B. menziesii*, *B. prionotes*, *B. ilicifolia*) although emergent trees are sometimes present but cannot be the dominant stratum
- the understorey is typically a highly diverse shrub and herb layer
- it meets the thresholds in the table that follows (with vegetation type mapping extrapolated outside the survey area to be included in the extent calculations).

Table 26: Condition categories and thresholds for inclusion in the Banksia Woodlands TEC (TSSC 2016)

Condition threshold	Indicative condition measures (typical)		Minimum patch size
	Native vegetation composition ¹	Weed cover	
Pristine	Native plant species diversity	Native plant species diversity	No minimum
Excellent	High native plant species	High native plant species	0.5 ha / 5,000 m ²
Very Good	Moderate native plant species	Moderate native plant species	1 ha / 10,000 m ²
Good	Low native plant species	Low native plant species	2 ha / 20,000 m ²
Degraded	Very low native plant species	Very low native plant species	Not representative
Completely Degraded	Very low to no native species	Very low to no native species	Not representative

¹ Relative to expected natural range of diversity for that vegetation (e.g. Floristic Community Type; FCT), where comparative data exists.

Whilst FCTs, as defined in Gibson *et al.* (1994) can be used as a guide they do not necessarily define all vegetation that may be included in the TEC. Vegetation defined by Gibson *et al.* FCTs may be listed as TECs in Western Australia or as Priority Ecological Communities (PECs) by DBCA (combined into the EPBC-listed Banksia Woodlands of the Swan Coastal Plain TEC). Some Banksia woodlands on the eastern side of the Swan Coastal Plain (FCT 20 group) are not included in this TEC and have different conservation listings; these Banksia woodland types are not subject to the same thresholds as above to be considered representative of the relevant TEC or PEC.

TUART WOODLANDS TEC

The EPBC-listed critically endangered *Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community* ('Tuart Woodlands') TEC was declared in 2019.

The criteria for inclusion in the TEC, as outlined in the Approved Conservation Advice (DotEE 2019), includes:

- confirming that the vegetation meets the diagnostic criteria (primarily being located within the Swan Coastal Plain and having at least two mature, living Tuart trees in the upper stratum with a gap of less than 60 m between outer edges of the canopies)
- the mapped extent of Tuart-dominated vegetation (woodlands, forests or mallee) meets various mapping criteria, and takes into consideration the entire extent of Tuart woodland regardless of changes in condition, structure or complexity, and extends to 30 m beyond the outer canopy of mature and dead Tuart trees (DBH greater than 15 cm). The Approved Conservation Advice includes additional information regarding mapping and condition assessment, noting that the condition assessment scale is not the equivalent of other scales generally used in Western Australia.
- patches occupying less than 0.5 ha are not included in the TEC; patches of 0.5-5 ha may be representative depending on vegetation condition; patches of 5 ha or greater that meet the diagnostic criteria are included in the TEC
- Tuart woodlands over 5 ha in extent do not require additional surveys to demonstrate inclusion in the TEC; smaller extents (0.5-5 ha) require ground surveys to determine inclusion, as per the following table.

Table 27: Condition categories and thresholds for inclusion in the Tuart Woodlands TEC (DotEE 2019)

Patch size		
Biotic threshold	≥2 ha - <5 ha	≥0.5 ha - <2 ha
Very high condition ≥80% of all understorey vegetation cover is native Or At least 12 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Medium sized patches with very high condition understorey. PART OF THE PROTECTED ECOLOGICAL COMMUNITY	Smaller patches with very high condition understorey. PART OF THE PROTECTED ECOLOGICAL COMMUNITY
High condition ≥60% of all understorey vegetation cover is native Or At least 8 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Medium sized patches with high condition understorey. PART OF THE PROTECTED ECOLOGICAL COMMUNITY	Smaller patches with high condition understorey. AND That either: have an important landscape role (≤100 m to native vegetation)* OR have a habitat role (≥2 very large trees per 0.5 ha)* OR show regeneration (≥15 seedlings and/or saplings per 0.5 ha)* PART OF THE PROTECTED ECOLOGICAL COMMUNITY
Moderate condition ≥50% of all understorey vegetation cover is native Or At least 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Medium sized patches with moderate condition understorey. AND That either: have an important landscape role (≤100 m to native vegetation)* OR have a habitat role (≥2 very large trees per 0.5 ha)* OR show regeneration (≥15 seedlings and/or saplings per 0.5 ha)* PART OF THE PROTECTED ECOLOGICAL COMMUNITY	NOT PART OF THE PROTECTED ECOLOGICAL COMMUNITY (but may be a focus for local protection or restoration)

Patch size		
Biotic threshold	≥2 ha - <5 ha	≥0.5 ha - <2 ha
Poor Has minimal or no native cover and species richness. That is: <50% of all understorey vegetation cover is native And Less than 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	NOT PART OF THE PROTECTED ECOLOGICAL COMMUNITY (but may be a focus for local protection or restoration)	NOT PART OF THE PROTECTED ECOLOGICAL COMMUNITY (but may be a focus for local protection or restoration)

Note:

- understorey is considered as being <3 m in height (i.e. ground or mid stratum)
- *'important landscape role' or 'habitat role' takes into consideration:
 - o proximity to other native vegetation that has ≥50% of vegetation cover being native
 - o the patch contains ≥2 very large trees (≥50 cm DBH) of any native species per 0.5 ha
 - o the patch shows evidence of natural regeneration of any native Eucalypt species (<15 cm DBH) of at least 15 individuals per 0.5 ha.

APPENDIX FIVE

DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Table 28: Flora database search results, habitat and likelihood assessment

Blue shading indicates high ('Likely') likelihood; dark blue indicates species is 'Known' (recorded) from the survey area

Database		Taxon	Conservation status***		Closest (km)**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**		EPBC	WA					Desktop	Post-survey
Threatened Flora										
Likely		<i>Andersonia gracilis</i>	EN	VU	-	-	-	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Very unlikely	Very unlikely
May		<i>Banksia mimica</i>	EN	VU	-	-	-	White or grey sand over laterite, sandy loam	Very unlikely	Very unlikely
Likely	TPFL	<i>Caladenia huegelii</i>	EN	CR	6.8	6	2022	Grey or brown sand, clay loam.	Unlikely	Very unlikely
Known		<i>Diuris drummondii</i>	VU	EN	-	-	-	Low-lying depressions, swamps.	May	Very unlikely
Likely	WAH, TPFL	<i>Diuris micrantha</i>	VU	VU	5.8	7	2019	Brown loamy clay. Winter-wet swamps, in shallow water.	Very unlikely	Very unlikely
Likely		<i>Diuris purdiei</i>	EN	EN	-	-	-	Grey-black sand, moist. Winter-wet swamps.	Very unlikely	Very unlikely
Known	TPFL	<i>Drakaea elastica</i>	EN	CR	6.3	9	2022	White or grey sand. Low-lying situations adjoining winter-wet swamps.	Very unlikely	Very unlikely
Likely		<i>Drakaea micrantha</i>	VU	EN	-	-	-	White-grey sand.	Very unlikely	Very unlikely
May		<i>Eleocharis keigheryi</i>	VU	VU	-	-	-	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Very unlikely	Very unlikely
May		<i>Eucalyptus x balanites</i>	EN	CR	-	-	-	Sandy soils with lateritic gravel.	Very unlikely	Very unlikely
May		<i>Grevillea curviloba</i> (no longer listed as subsp. <i>curviloba</i>)	EN	EN	-	-	-	Grey sand, sandy loam. Winter-wet heath.	Very unlikely	Very unlikely
May		<i>Lepidosperma rostratum</i>	EN	EN	-	-	-	Peaty sand, clay.	Very unlikely	Very unlikely
May		<i>Morelotia australiensis</i> (<i>Tetraria australiensis</i>)	VU	VU	-	-	-	Flat low-lying grey or brown sand or sandy loam.	Very unlikely	Very unlikely
Likely		<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	CR	CR	-	-	-	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Very unlikely	Very unlikely
May		<i>Synaphea</i> sp. Pinjarra Plain (A.S.George 17182)	EN	EN	-	-	-	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.	Very unlikely	Very unlikely
May	WAH	<i>Synaphea</i> sp. Serpentine (G.R.Brand 103)	CR	CR	5.3	2	2008	Grey or brown clay-loam or loamy sand, sometimes with laterite. Flat or gentle slope, wetland edges, damplands.	Very unlikely	Very unlikely

DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Database		Taxon	Conservation status***		Closest (km)**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**		EPBC	WA					Desktop	Post-survey
	TPFL	<i>Thelymitra variegata</i>	-	CR	5.7	1	2020	Sandy clay, sand, laterite.	Unlikely	Very unlikely
May		<i>Verticordia plumosa</i> var. <i>ananeotes</i>	EN	CR	-	-	-	Sandy loam. Seasonally inundated plains.	Very unlikely	Very unlikely
Priority 1										
	WAH, TPFL	<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (G.J. Keighery 5026)			8.1	2	1992	Grey or black sand over clay. Swampy areas, winter wet lowlands.	Very unlikely	Very unlikely
	WAH	<i>Acacia</i> sp. Binningup (G. Cockerton et al. WB 37784)			3.9	1	2017	Sand with Banksia, Agonis or Tuart.	Likely	Very unlikely
	WAH	<i>Boronia juncea</i> subsp. <i>juncea</i>			5.4	1	2005	Sand, peaty sand, clay. Seasonally swampy areas or low scrub.	Very unlikely	Very unlikely
Priority 2										
	WAH, TPFL	<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i>			8.4	2	1992	Grey-white-yellow sand. Flats, seasonally-wet sites.	Very unlikely	Very unlikely
	WAH	<i>Netrostylis</i> sp. Chandal (G.J. Keighery 17055)			5.9	1	2010	Damplands, streams, mound springs.	Very unlikely	Very unlikely
Priority 3										
	WAH	<i>Beyeria cinerea</i> subsp. <i>cinerea</i>			9.0	1	1999	Brown, yellow or grey sand over limestone.	Unlikely	Very unlikely
	WAH	<i>Carex tereticaulis</i>			9.0	1	2009	Black peaty sand.	Very unlikely	Very unlikely
	WAH, TPFL	<i>Cyathochaeta teretifolia</i>			5.1	3	2007	Grey sand, sandy clay. Swamps, creek edges.	Very unlikely	Very unlikely
	WAH	<i>Dampiera triloba</i>			5.6	1	2018	Mostly damplands but also in Banksia woodland on sand.	Very unlikely	Very unlikely
	WAH, TPFL	<i>Dillwynia dillwynioides</i>			7.0	3	1994	Sandy soils. Winter-wet depressions.	Very unlikely	Very unlikely
	WAH	<i>Jacksonia gracillima</i>			6.0	2	2010	Mostly damp areas with <i>Melaleuca preissiana</i> but also in Banksia woodland on sand.	Unlikely	Very unlikely
	WAH	<i>Pimelea calcicola</i>			3.9	1	2014	Sand. Coastal limestone ridges.	Likely	Very unlikely
	WAH	<i>Sphaerolobium calcicola</i>			7.0	1	1993	White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas.	Very unlikely	Very unlikely
Priority 4										
	WAH, TPFL	<i>Aponogeton hexatepalus</i>			5.4	4	1997	Mud. Freshwater: ponds, rivers, claypans.	Very unlikely	Very unlikely
	WAH, TPFL	<i>Dodonaea hackettiana</i>			1.5	3	2003	Sand. Outcropping limestone.	Likely	Very unlikely
	WAH	<i>Eucalyptus foecunda</i> subsp. <i>foecunda</i>			3.2	9	1999	Limestone, white or yellow sand.	Likely	Very unlikely
	WAH	<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>			9.6	1	1995	Loam. Flats, hillsides.	Very unlikely	Very unlikely
	WAH	<i>Jacksonia sericea</i>			8.1	2	1999	Calcareous & sandy soils.	Very unlikely	Very unlikely
	WAH, TPFL	<i>Parsonsia diaphanophleba</i>			8.4	1	1992	Alluvial soils. Along rivers.	Very unlikely	Very unlikely

DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Database		Taxon	Conservation status***		Closest (km)**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**		EPBC	WA					Desktop	Post-survey
	WAH	<i>Stylidium ireneae</i>			4.8	1	2014	Sandy loam. Valleys near creek lines, woodland, often with Agonis.	Unlikely	Very unlikely
	WAH, TPFL	<i>Stylidium longitubum</i>			5.6	2	1995	Sandy clay, clay. Seasonal wetlands.	Very unlikely	Very unlikely

* PMST likelihood of occurrence or likelihood of habitat occurring

** WAH = herbarium record (vouchered specimen)

TPFL = Threatened and Priority Flora Report Form record; may be unconfirmed i.e. without vouchered specimen

*** Commonwealth EPBC Act and Western Australian BC Act conservation status

Table 29: Fauna database results and likelihood assessments

Blue shading indicates high ('Likely') likelihood; darker blue indicates species is 'Known' (recorded) from the survey area

Database		Species	Common name	Conservation status***		Closest**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**			EPBC	WA					Desktop	Post-survey
Mammals											
Known		<i>Bettongia penicillata ogilbyi</i>	Woylie	EN	EX	-	-	-	Forest, woodlands, shrublands, proteaceous heath, mallee heath	Very Unlikely	Very Unlikely
Known	x	<i>Dasyurus geoffroii</i>	chuditch, western quoll	VU	VU	7.8	6	2017	Forest, woodlands, shrublands, heathland, mallee heath	Unlikely	Unlikely
	x	<i>Hydromys chrysogaster</i>	water-rat, rakali		P4	3.3	26	2022	Vegetated waterways and wetlands; forages for aquatic species	Very Unlikely	Very Unlikely
	x	<i>Isoodon fusciventer</i>	quenda, southwestern brown bandicoot		P4	0.7	705	2024	Forests, woodlands with dense understorey	Likely	Known
Likely		<i>Neophoca cinerea</i>	Australian Sea-lion, Australian Sea Lion	EN	EN	-	-	-	Sandy beaches	Very Unlikely	Very Unlikely
	x	<i>Notamacropus eugenii derbianus</i>	tammar wallaby		P4	9.3	1	2015	Dense low vegetation	Very Unlikely	Very Unlikely
	x	<i>Notamacropus irma</i>	western brush wallaby		P4	1.8	8	2019	Forests (not Karri), woodland, mallee, scrubby thickets, grassy wetland flats	Unlikely	Unlikely
	x	<i>Phascogale tapoatafa wambenger</i>	south-western brush-tailed phascogale, wambenger		CD	2.5	14	2023	Forests (Jarrah),open woodlands with hollow-bearing trees	May	May
Likely		<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit	CR	CR	-	-	-	Near-coastal Peppermint woodlands, tuart forests	Very Unlikely	Very Unlikely
May		<i>Setonix brachyurus</i>	Quokka	VU	VU	-	-	-	Riparian vegetation, shrubland, heathland, particularly around swamps	Very Unlikely	Very Unlikely
Birds											

DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Database		Species	Common name	Conservation status***		Closest**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**			EPBC	WA					Desktop	Post-survey
	x	<i>Actitis hypoleucos</i>	common sandpiper	MI	MI	5.9	4	1991	Wader (coastal, occasionally inland in riparian areas)	Very Unlikely	Very Unlikely
May	x	<i>Anous tenuirostris melanops</i>	Australian lesser noddy	VU	EN	7.8	1	2007	Shorelines, islands, occasionally blown inland	Very Unlikely	Very Unlikely
	x	<i>Apus pacificus</i>	fork-tailed swift	MI	MI	1.4	1	2000	Exclusively aerial; all areas	Very Unlikely	Very Unlikely
May		<i>Ardena grisea</i>	Sooty Shearwater	VU & MI	MI	-	-	-	Seabird (ocean-foraging); nests in burrows or rock crevices in coastal areas	Very Unlikely	Very Unlikely
	x	<i>Arenaria interpres</i>	ruddy turnstone	MI	MI	7.7	1	2002	Wader (coastal); does not breed in Australia	Very Unlikely	Very Unlikely
Likely		<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	EN	-	-	-	Coastal marshes, wetlands	Very Unlikely	Very Unlikely
Known	x	<i>Calidris acuminata</i>	sharp-tailed sandpiper	MI	MI	1.2	11	2010	Wader (widespread); does not breed in Australia	Unlikely	Very Unlikely
Known		<i>Calidris canutus</i>	Red Knot, Knot	VU & MI	EN	-	-	-	Wader (coastal); does not breed in Australia	Very Unlikely	Very Unlikely
Known	x	<i>Calidris ferruginea</i>	curlew sandpiper	CR & MI	CR	1.7	12	2008	Wader (also occurs inland); does not breed in Australia	Unlikely	Very Unlikely
	x	<i>Calidris ruficollis</i>	red-necked stint	MI	MI	1.2	20	2010	Wader (mostly coastal); does not breed in Australia	Unlikely	Very Unlikely
	x	<i>Calidris subminuta</i>	long-toed stint	MI	MI	1.7	2	1992	Wader (coastal or near-coastal wetlands); does not breed in Australia	Unlikely	Very Unlikely
Known	x	<i>Calyptorhynchus banksii naso</i>	forest red-tailed black cockatoo	VU	VU	1.3	47	2021	Forests, woodlands	Likely	Known
Likely		<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	VU & MI	VU	-	-	-	Wader (shorelines and estuaries); does not breed in Australia	Very Unlikely	Very Unlikely
May		<i>Diomedea amsterdamensis</i>	Amsterdam Albatross	EN & MI	CR	-	-	-	Oceanic	Very Unlikely	Very Unlikely
May		<i>Diomedea dabbenena</i>	Tristan Albatross	EN & MI	CR	-	-	-	Oceanic	Very Unlikely	Very Unlikely
May		<i>Diomedea epomophora</i>	Southern Royal Albatross	VU & MI	VU	-	-	-	Oceanic	Very Unlikely	Very Unlikely
Likely		<i>Diomedea exulans</i>	Wandering Albatross	VU & MI	VU	-	-	-	Oceanic	Very Unlikely	Very Unlikely
May		<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN & MI	EN	-	-	-	Oceanic	Very Unlikely	Very Unlikely
	x	<i>Falco peregrinus</i>	peregrine falcon		OS	1.4	3	2009	Most habitats with abundant prey and secure nest sites; nests in cliffs or tall structures	May	May
May		<i>Halobaena caerulea</i>	Blue Petrel	VU	-	-	-	-	Oceanic	Very Unlikely	Very Unlikely
	x	<i>Hydroprogne caspia</i>	Caspian tern	MI	MI	7.7	1	1990	Wader (coastal or near-coastal wetlands)	Very Unlikely	Very Unlikely
	x	<i>Ixobrychus dubius</i>	Australian little bittern		P4	3.0	1	1939	Freshwater wetlands (vegetated)	Very Unlikely	Very Unlikely
Likely		<i>Leipoa ocellata</i>	Malleefowl	VU	VU	-	-	-	Scrub or woodland (mallee, wattle)	Very Unlikely	Very Unlikely
Known		<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	EN	CR	-	-	-	Wader (mostly coastal mudflats); does not breed in Australia	Very Unlikely	Very Unlikely

DESKTOP ASSESSMENT RESULTS AND LIKELIHOOD ASSESSMENTS

Database		Species	Common name	Conservation status***		Closest**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**			EPBC	WA					Desktop	Post-survey
Known		<i>Limosa limosa</i>	Black-tailed Godwit	EN	MI	-	-	-	Wader (coastal)	Very Unlikely	Very Unlikely
May	x	<i>Macronectes giganteus</i>	southern giant petrel	EN & MI	MI	6.6	1	1981	Oceanic	Very Unlikely	Very Unlikely
Likely	x	<i>Macronectes halli</i>	northern giant petrel	VU & MI	MI	7.8	2	2002	Oceanic	Very Unlikely	Very Unlikely
Likely	x	<i>Numenius madagascariensis</i>	eastern curlew	CR & MI	CR	3.0	2	1948	Wader (coastal mudflats); does not breed in Australia	Very Unlikely	Very Unlikely
	x	<i>Oxyura australis</i>	blue-billed duck		P4	1.0	81	2014	Deep freshwater wetlands; rarely seen on land	Unlikely	Very unlikely
Likely		<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)	VU	-	-	-	-	Oceanic	Very Unlikely	Very Unlikely
May		<i>Phaethon rubricauda westralis</i>	Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird	EN	MI & P4	-	-	-	Oceanic	Very Unlikely	Very Unlikely
	x	<i>Plegadis falcinellus</i>	glossy ibis	MI	MI	2.6	5	2001	Wader (mostly freshwater marshes, occasionally estuaries or salt marshes)	Unlikely	Very Unlikely
May		<i>Pterodroma mollis</i>	Soft-plumaged Petrel	VU	-	-	-	-	Oceanic	Very Unlikely	Very Unlikely
Known		<i>Rostratula australis</i>	Australian Painted Snipe	EN	EN	-	-	-	Wader	Very Unlikely	Very Unlikely
Known		<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU	VU	-	-	-	Shorebird (forages on fish)	Very Unlikely	Very Unlikely
Likely		<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	VU & MI	EN	-	-	-	Oceanic	Very Unlikely	Very Unlikely
Likely		<i>Thalassarche cauta</i>	Shy Albatross	EN & MI	VU	-	-	-	Oceanic	Very Unlikely	Very Unlikely
	x	<i>Thalassarche chrysostoma</i>	grey-headed albatross	EN & MI	VU	7.8	1	1990	Oceanic	Very Unlikely	Very Unlikely
May		<i>Thalassarche impavida</i>	Campbell Albatross, Campbell Black-browed Albatross	VU & MI	VU	-	-	-	Oceanic	Very Unlikely	Very Unlikely
Likely		<i>Thalassarche melanophris</i>	Black-browed Albatross	VU & MI	EN	-	-	-	Oceanic	Very Unlikely	Very Unlikely
May		<i>Thalassarche steadi</i>	White-capped Albatross	VU		-	-	-	Oceanic	Very Unlikely	Very Unlikely
	x	<i>Thalasseus bergii</i>	crested tern	MI	MI	1.2	21	2012	Shorebird (forages on fish, marine animals)	Unlikely	Very Unlikely
	x	<i>Thinornis cucullatus</i>	hooded plover, hooded dotterel		P4	2.7	3	1998	Wader (coastal)	Unlikely	Very Unlikely
	x	<i>Tringa glareola</i>	wood sandpiper	MI	MI	1.1	8	2011	Wader (inland vegetated wetlands); does not breed in Australia	Unlikely	Very Unlikely
Known	x	<i>Tringa nebularia</i>	common greenshank	MI	MI	1.1	43	2010	Wader (mainly coastal); does not breed in Australia	Unlikely	Very Unlikely
	x	<i>Tringa stagnatilis</i>	marsh sandpiper	MI	MI	3.5	2	1992	Wader (widespread in mudflats); does not breed in Australia	Unlikely	Very Unlikely
Known	x	<i>Zanda baudinii</i>	Baudin's cockatoo	EN	EN	6.6	1	1939	Forests, woodlands	Unlikely	Unlikely
Known	x	<i>Zanda latirostris</i>	Carnaby's cockatoo	EN	EN	1.1	268	2018	Forests, woodlands	Likely	Known
Reptiles											
	x	<i>Ctenotus gemmula</i> (Swan Coastal Plain subpopulation)	jewelled southwest ctenotus (Swan Coastal Plain subpopulation)		P3	6.7	1	2004	Sandy soil	May	Unlikely

Database		Species	Common name	Conservation status***		Closest**	Number of records**	Date (recent)**	Habitat	Likelihood of occurrence	
PMST*	DBCA**			EPBC	WA					Desktop	Post-survey
	x	<i>Lerista lineata</i>	Perth slider, lined skink		P3	6.2	32	2016	Under leaf litter in sandy soils; coastal heaths, woodlands	May	Unlikely
	x	<i>Neelaps calonotos</i>	black-striped snake, black-striped burrowing snake		P3	3.6	3	2013	Loose sands; dunes, shrublands and woodlands	May	Unlikely

* PMST likelihood of occurrence or likelihood of habitat occurring

** DBCA record ('x')

*** Commonwealth EPBC Act and Western Australian BC Act conservation status

Table 30: Excluded species and reason for exclusion

Database		Species	Common name	Conservation status***		Reason for exclusion
PMST*	DBCA**			EPBC	WA	
Mammals						
Likely		<i>Balaenoptera musculus</i>	Blue Whale	EN & MI	EN	Marine - no habitat
Known		<i>Eubalaena australis</i>	Southern Right Whale	EN & MI	VU	Marine - no habitat
Reptiles						
Known	x	<i>Caretta caretta</i>	loggerhead turtle	EN & MI	EN	Marine - no habitat
Known	x	<i>Chelonia mydas</i>	green turtle	VU & MI	VU	Marine - no habitat
Known		<i>Dermochelys coriacea</i>	Leatherback Turtle, Leathery Turtle, Luth	EN & MI	VU	Marine - no habitat
Known	x	<i>Natator depressus</i>	flatback turtle	VU & MI	VU	Marine - no habitat
Fish						
Likely		<i>Carcharias taurus</i> (west coast population)	Grey Nurse Shark (west coast population)	VU	VU	Marine - no habitat
Known	x	<i>Carcharodon carcharias</i>	great white shark	VU & MI	VU	Marine - no habitat
May		<i>Pristis pristis</i>	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	VU & MI	MI & P3	Aquatic - no habitat
May		<i>Rhincodon typus</i>	Whale Shark	VU & MI	MI	Marine - no habitat
Known		<i>Sphyrna lewini</i>	Scalloped Hammerhead	CD		Marine - no habitat
Invertebrates						
	x	<i>Idiosoma sigillatum</i>	Swan Coastal Plain shield-backed trapdoor spider		P3	Not in scope of survey
	x	<i>Synemon gratiosa</i>	graceful sunmoth		P4	Not in scope of survey
Known	x	<i>Westralunio carteri</i>	Carter's freshwater mussel	VU	VU	Not in scope of survey

* PMST likelihood of occurrence or likelihood of habitat occurring

** DBCA record ('x')

*** Commonwealth EPBC Act and Western Australian BC Act conservation status

APPENDIX SIX FIELD SURVEY RESULTS (FLORA)

Table 31: Flora inventory (site x species matrix)

'*' = introduced species; 'X' indicates presence

Family	Species	Introduced	KL2401	KL2402	KL2403	KL2404	KL24R1	KL24R2	Opportunistic
Anacardiaceae	<i>Schinus terebinthifolia</i>	*							X
Apiaceae	<i>Daucus glochidiatus</i>					X			
Amaranthaceae	<i>Ptilotus polystachyus</i>								X
Apocynaceae	<i>Gomphocarpus fruticosus</i>	*							X
Araceae	<i>Zantedeschia aethiopica</i>	*	X	X	X	X			
Asparagaceae	<i>Acanthocarpus preissii</i>					X			
	<i>Asparagus asparagoides</i>	*			X				
	<i>Thysanotus arenarius</i>								X
Asteraceae	<i>Hypochaeris glabra</i>	*	X		X	X			
	<i>Sonchus oleraceus</i>	*	X		X	X			
	<i>Urospermum picroides</i>	*	X						
	<i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	*				X			
Casuarinaceae	<i>Allocasuarina fraseriana</i>			X					
Colchicaceae	<i>Burchardia congesta</i>					X			
Euphorbiaceae	<i>Euphorbia terracina</i>	*	X	X	X			X	
	<i>Ricinoscarpos glaucus</i>								X
Fabaceae	<i>Acacia lasiocarpa</i>		X			X			
	<i>Acacia longifolia</i>	*		X					
	<i>Acacia rostellifera</i>				X				
	<i>Gompholobium tomentosum</i>					X			
	<i>Hardenbergia comptoniana</i>		X	X	X				
	<i>Jacksonia sternbergiana</i>					X			
	<i>Kennedia prostrata</i>		X						
	<i>Lotus subbiflorus</i>	*							X
	<i>Lupinus cosentinii</i>	*							X
	<i>Lupinus luteus</i>	*							X
	<i>Trifolium arvense</i>	*							X

Family	Species	Introduced	KL2401	KL2402	KL2403	KL2404	KL24R1	KL24R2	Opportunistic
Fabaceae cont'	<i>Trifolium campestre</i>	*				X		X	
	<i>Vicia sativa</i>	*							X
Geraniaceae	<i>Pelargonium capitatum</i>	*	X		X	X			
Haemodoraceae	<i>Conostylis aculeata</i> subsp. <i>aculeata</i>					X			
Hemerocallidaceae	<i>Caesia micrantha</i>		X		X	X			
	<i>Dianella revoluta</i>		X						
	<i>Tricoryne elatior</i>					X			
Iridaceae	<i>Freesia leichtlinii</i> subsp. <i>alba</i> x <i>leichtlinii</i> subsp. <i>leichtlinii</i>	*	X						
	<i>Gladiolus caryophyllaceus</i>	*							X
Lobeliaceae	<i>Lobelia tenuior</i>					X			
Malvaceae	<i>Brachychiton populneus</i>	*		X					
Myrtaceae	<i>Agonis flexuosa</i>								X
	<i>Corymbia calophylla</i>			X	X		X	X	
	<i>Corymbia ficifolia</i>	*							X
	<i>Eucalyptus gomphocephala</i>		X	X		X			
	<i>Eucalyptus marginata</i> subsp. <i>marginata</i>				X	X			
	<i>Eucalyptus tottiana</i>								X
	<i>Lophostemon confertus</i>	*							
Onagraceae	<i>Oenothera stricta</i>	*							X
Oxalidaceae	<i>Oxalis pes-caprae</i>	*							X
Poaceae	<i>Austrostipa flavescens</i>		X						
	<i>Avena barbata</i>	*	X		X				
	<i>Briza maxima</i>	*	X		X	X			
	<i>Bromus diandrus</i>	*	X				X		
	<i>Cenchrus clandestinus</i>	*					X		
	<i>Cynodon dactylon</i>	*							X
	<i>Ehrharta calycina</i>	*	X		X	X		X	
	<i>Ehrharta longiflora</i>	*		X					
	<i>Eragrostis curvula</i>	*							X

FIELD SURVEY RESULTS (FLORA)

Family	Species	Introduced	KL2401	KL2402	KL2403	KL2404	KL24R1	KL24R2	Opportunistic
Poaceae cont'	<i>Hordeum leporinum</i>	*							X
	<i>Lagurus ovatus</i>	*			X				
Poaceae cont'	<i>Vulpia myuros</i> forma <i>myuros</i>	*							X
Primulaceae	<i>Lysimachia arvensis</i>	*	X		X	X			
Proteaceae	<i>Banksia attenuata</i>		X						
	<i>Banksia grandis</i>				X				
	<i>Banksia sessilis</i>		X						
Tropaeolaceae	<i>Tropaeolum majus</i>	*					X		
Zamiaceae	<i>Macrozamia riedlei</i>		X		X	X			

Table 32: Tuart tree locations (in Tuart Woodlands TEC/PEC) (Zone 50 GDA94)

Tree no	Species	DBH range (mm)	Easting	Northing
6	<i>Eucalyptus gomphocephala</i>	1,000-1,250	389026.2984	6426365.1305
9	<i>Eucalyptus gomphocephala</i>	1,250-1,500	388939.1370	6426364.1244
10	<i>Eucalyptus gomphocephala</i>	750-1,000	388939.6758	6426360.4904
11	<i>Eucalyptus gomphocephala</i>	500-750	388934.3342	6426358.3436
12	<i>Eucalyptus gomphocephala</i>	500-750	388921.5026	6426349.6849
13	<i>Eucalyptus gomphocephala</i>	500-750	388921.8749	6426348.9020
14	<i>Eucalyptus gomphocephala</i>	150-500	388920.7119	6426345.6177
15	<i>Eucalyptus gomphocephala</i>	150-500	388919.4820	6426345.1213
16	<i>Eucalyptus gomphocephala</i>	500-750	388920.6037	6426346.4576
17	<i>Eucalyptus gomphocephala</i>	500-750	388922.9460	6426345.8619
20	<i>Eucalyptus gomphocephala</i>	150-500	388978.0717	6426353.3746
23	<i>Eucalyptus gomphocephala</i>	150-500	388979.1962	6426352.6431
24	<i>Eucalyptus gomphocephala</i>	150-500	388996.8604	6426360.8820
25	<i>Eucalyptus gomphocephala</i>	150-500	388999.6992	6426357.2300
26	<i>Eucalyptus gomphocephala</i>	150-500	389001.2072	6426357.4060
27	<i>Eucalyptus gomphocephala</i>	150-500	389010.0533	6426360.7836
28	<i>Eucalyptus gomphocephala</i>	150-500	389009.6804	6426358.3656
29	<i>Eucalyptus gomphocephala</i>	500-750	389009.4488	6426359.6544
30	<i>Eucalyptus gomphocephala</i>	1,750-2,000	389009.8564	6426346.9088
31	<i>Eucalyptus gomphocephala</i>	500-750	389007.6602	6426344.9077
32	<i>Eucalyptus gomphocephala</i>	150-500	389002.5338	6426337.7545
33	<i>Eucalyptus gomphocephala</i>	150-500	389027.3926	6426353.5047
38	Dead (<i>Eucalyptus gomphocephala</i>)	1,500-1,750	389066.1907	6426361.7391
39	<i>Eucalyptus gomphocephala</i>	150-500	389068.7718	6426359.6013
43	<i>Eucalyptus gomphocephala</i>	750-1,000	389098.2479	6426350.9876
49	<i>Eucalyptus gomphocephala</i>	1,250-1,500	389078.2249	6426336.7217
50	<i>Eucalyptus gomphocephala</i>	150-500	389069.6588	6426338.8113
51	<i>Eucalyptus gomphocephala</i>	150-500	389070.4958	6426334.4246
52	<i>Eucalyptus gomphocephala</i>	150-500	389069.3429	6426336.2684
53	<i>Eucalyptus gomphocephala</i>	150-500	389068.7165	6426335.3299
54	<i>Eucalyptus gomphocephala</i>	150-500	389064.3788	6426337.1124
56	<i>Eucalyptus gomphocephala</i>	150-500	389065.7790	6426325.1907
57	<i>Eucalyptus gomphocephala</i>	150-500	389059.3571	6426329.5130
58	<i>Eucalyptus gomphocephala</i>	150-500	389060.3223	6426330.6006
59	<i>Eucalyptus gomphocephala</i>	150-500	389058.4153	6426332.8721
60	<i>Eucalyptus gomphocephala</i>	150-500	389058.7477	6426330.5036
61	<i>Eucalyptus gomphocephala</i>	150-500	389058.0467	6426333.2228
62	<i>Eucalyptus gomphocephala</i>	150-500	389057.1687	6426325.0773
63	<i>Eucalyptus gomphocephala</i>	150-500	389061.0307	6426323.1176
64	<i>Eucalyptus gomphocephala</i>	150-500	389061.9632	6426319.2154
65	<i>Eucalyptus gomphocephala</i>	150-500	389046.0340	6426325.1661
66	<i>Eucalyptus gomphocephala</i>	750-1,000	389057.8549	6426328.8697
67	<i>Eucalyptus gomphocephala</i>	150-500	389045.3176	6426322.7224
68	<i>Eucalyptus gomphocephala</i>	500-750	389022.4102	6426320.4615
69	<i>Eucalyptus gomphocephala</i>	500-750	389026.9976	6426321.1648
70	<i>Eucalyptus gomphocephala</i>	150-500	389022.0911	6426317.9435
71	<i>Eucalyptus gomphocephala</i>	500-750	389014.3122	6426314.0686
72	<i>Eucalyptus gomphocephala</i>	750-1,000	388960.9256	6426322.5523
75	<i>Eucalyptus gomphocephala</i>	150-500	388929.8894	6426334.6152
76	<i>Eucalyptus gomphocephala</i>	1,000-1,250	388928.9215	6426333.3783
77	<i>Eucalyptus gomphocephala</i>	150-500	388927.3765	6426333.1515
78	<i>Eucalyptus gomphocephala</i>	150-500	388924.8906	6426328.1755

Tree no	Species	DBH range (mm)	Easting	Northing
79	<i>Eucalyptus gomphocephala</i>	750-1,000	388948.2948	6426298.7814
80	<i>Eucalyptus gomphocephala</i>	500-750	388953.3393	6426312.3516
81	<i>Eucalyptus gomphocephala</i>	500-750	388962.4238	6426301.8072
83	<i>Eucalyptus gomphocephala</i>	1,000-1,250	388966.4091	6426295.6966
86	<i>Eucalyptus gomphocephala</i>	500-750	389008.0514	6426301.1357
89	<i>Eucalyptus gomphocephala</i>	1,500-1,750	389022.1832	6426279.3727
92	Dead (<i>Eucalyptus gomphocephala</i>)	150-500	389039.9985	6426274.7464
93	<i>Eucalyptus gomphocephala</i>	150-500	389037.5954	6426273.8905
94	<i>Eucalyptus gomphocephala</i>	750-1,000	389045.0197	6426279.3899
95	<i>Eucalyptus gomphocephala</i>	150-500	389046.6576	6426281.6501
96	<i>Eucalyptus gomphocephala</i>	1,250-1,500	389051.4017	6426306.4066
97	<i>Eucalyptus gomphocephala</i>	150-500	389045.6637	6426305.6815
98	<i>Eucalyptus gomphocephala</i>	150-500	389041.9508	6426302.5079
99	<i>Eucalyptus gomphocephala</i>	150-500	389039.3586	6426299.8921
100	<i>Eucalyptus gomphocephala</i>	150-500	389036.8144	6426299.5620
101	<i>Eucalyptus gomphocephala</i>	500-750	389036.1634	6426299.9879
102	<i>Eucalyptus gomphocephala</i>	150-500	389040.0153	6426305.2843
103	<i>Eucalyptus gomphocephala</i>	150-500	389035.1305	6426307.3721
104	<i>Eucalyptus gomphocephala</i>	150-500	389040.5299	6426314.0669
105	<i>Eucalyptus gomphocephala</i>	150-500	389042.8200	6426317.1518
106	<i>Eucalyptus gomphocephala</i>	150-500	389042.1171	6426318.5715
107	<i>Eucalyptus gomphocephala</i>	150-500	389044.2742	6426316.6157
108	<i>Eucalyptus gomphocephala</i>	150-500	389047.8155	6426311.3515
109	<i>Eucalyptus gomphocephala</i>	150-500	389047.7269	6426308.6494
110	<i>Eucalyptus gomphocephala</i>	150-500	389047.1462	6426308.8518
111	<i>Eucalyptus gomphocephala</i>	150-500	389049.3709	6426309.8028
112	<i>Eucalyptus gomphocephala</i>	150-500	389040.7490	6426311.9205
113	<i>Eucalyptus gomphocephala</i>	500-750	389041.4980	6426308.5833
114	<i>Eucalyptus gomphocephala</i>	150-500	389063.4186	6426300.8145
115	<i>Eucalyptus gomphocephala</i>	150-500	389069.0354	6426302.1866
116	<i>Eucalyptus gomphocephala</i>	150-500	389066.3345	6426306.0478
117	<i>Eucalyptus gomphocephala</i>	150-500	389057.7076	6426306.7127
118	<i>Eucalyptus gomphocephala</i>	150-500	389059.6115	6426309.7853
119	<i>Eucalyptus gomphocephala</i>	150-500	389063.6366	6426312.2030
120	<i>Eucalyptus gomphocephala</i>	500-750	389066.9186	6426309.9063
121	<i>Eucalyptus gomphocephala</i>	150-500	389066.6449	6426307.0712
122	<i>Eucalyptus gomphocephala</i>	150-500	389076.3036	6426303.3658
124	<i>Eucalyptus gomphocephala</i>	500-750	389082.3156	6426309.0952
129	<i>Eucalyptus gomphocephala</i>	150-500	389076.4865	6426295.8892
130	<i>Eucalyptus gomphocephala</i>	150-500	389079.4175	6426287.9261
131	<i>Eucalyptus gomphocephala</i>	150-500	389080.2674	6426287.4633
132	<i>Eucalyptus gomphocephala</i>	150-500	389078.3100	6426282.9065
133	<i>Eucalyptus gomphocephala</i>	150-500	389072.4960	6426282.0583
134	<i>Eucalyptus gomphocephala</i>	150-500	389082.2525	6426282.1843
135	<i>Eucalyptus gomphocephala</i>	150-500	389080.8300	6426277.9212
136	<i>Eucalyptus gomphocephala</i>	150-500	389079.7364	6426278.0383
137	<i>Eucalyptus gomphocephala</i>	150-500	389080.1450	6426280.3618
138	<i>Eucalyptus gomphocephala</i>	500-750	389080.2860	6426276.8651
139	<i>Eucalyptus gomphocephala</i>	150-500	389080.4861	6426276.6866
140	<i>Eucalyptus gomphocephala</i>	150-500	389080.7573	6426271.7062
144	<i>Eucalyptus gomphocephala</i>	500-750	389073.2613	6426236.0033
145	<i>Eucalyptus gomphocephala</i>	500-750	389072.7003	6426231.3195
146	<i>Eucalyptus gomphocephala</i>	500-750	389063.9568	6426226.1576

Tree no	Species	DBH range (mm)	Easting	Northing
147	<i>Eucalyptus gomphocephala</i>	150-500	389061.0982	6426222.8502
151	<i>Eucalyptus gomphocephala</i>	1,250-1,500	389070.1448	6426275.7983
152	<i>Eucalyptus gomphocephala</i>	500-750	389067.3698	6426276.6240
154	<i>Eucalyptus gomphocephala</i>	150-500	389051.6658	6426283.8370
155	<i>Eucalyptus gomphocephala</i>	150-500	389053.7721	6426283.2766
157	<i>Eucalyptus gomphocephala</i>	500-750	389054.9894	6426275.9333
158	<i>Eucalyptus gomphocephala</i>	150-500	389053.4238	6426275.3438
161	<i>Eucalyptus gomphocephala</i>	500-750	388987.7679	6426272.8123
162	<i>Eucalyptus gomphocephala</i>	500-750	388986.3590	6426273.9330
163	<i>Eucalyptus gomphocephala</i>	500-750	388977.3756	6426272.5479
167	<i>Eucalyptus gomphocephala</i>	500-750	388960.9559	6426271.3599
168	<i>Eucalyptus gomphocephala</i>	1,000-1,250	388950.5011	6426267.5348
169	Dead (<i>Eucalyptus gomphocephala</i>)	750-1,000	388940.6371	6426259.0607
170	<i>Eucalyptus gomphocephala</i>	500-750	388932.1551	6426271.7584
172	<i>Eucalyptus gomphocephala</i>	150-500	388921.4545	6426269.9376
173	<i>Eucalyptus gomphocephala</i>	500-750	388925.7047	6426276.4274
174	<i>Eucalyptus gomphocephala</i>	150-500	388926.1498	6426280.6653
175	<i>Eucalyptus gomphocephala</i>	150-500	388931.1577	6426283.4038
176	<i>Eucalyptus gomphocephala</i>	150-500	388927.1763	6426285.7083
178	<i>Eucalyptus gomphocephala</i>	1,500-1,750	388941.4642	6426247.4082
179	<i>Eucalyptus gomphocephala</i>	500-750	388928.3854	6426244.9070
180	<i>Eucalyptus gomphocephala</i>	150-500	388928.1652	6426244.8627
183	<i>Eucalyptus gomphocephala</i>	1,500-1,750	388927.3683	6426188.5871
184	<i>Eucalyptus gomphocephala</i>	500-750	388940.2138	6426189.1170
185	<i>Eucalyptus gomphocephala</i>	500-750	388923.5142	6426124.1187
187	<i>Eucalyptus gomphocephala</i>	150-500	388957.0338	6426151.7501
191	<i>Eucalyptus gomphocephala</i>	1,000-1,250	389017.0902	6426132.2170
193	<i>Eucalyptus gomphocephala</i>	150-500	389028.3996	6426151.2066
194	<i>Eucalyptus gomphocephala</i>	1,000-1,250	389028.2066	6426154.6847
195	<i>Eucalyptus gomphocephala</i>	750-1,000	389009.0701	6426172.5609
196	<i>Eucalyptus gomphocephala</i>	500-750	389002.6027	6426147.6207
197	<i>Eucalyptus gomphocephala</i>	150-500	389004.5044	6426145.3267
198	<i>Eucalyptus gomphocephala</i>	150-500	389000.3993	6426145.9930
199	<i>Eucalyptus gomphocephala</i>	500-750	388996.4495	6426145.6205
200	<i>Eucalyptus gomphocephala</i>	500-750	389001.2336	6426150.2915
201	<i>Eucalyptus gomphocephala</i>	500-750	389001.2064	6426149.7945
202	<i>Eucalyptus gomphocephala</i>	150-500	389002.5222	6426152.1710
203	<i>Eucalyptus gomphocephala</i>	500-750	388998.4596	6426156.4612
204	<i>Eucalyptus gomphocephala</i>	150-500	388983.0248	6426165.7611
205	<i>Eucalyptus gomphocephala</i>	150-500	388981.8534	6426167.5712
206	<i>Eucalyptus gomphocephala</i>	150-500	388977.7020	6426167.3527
207	<i>Eucalyptus gomphocephala</i>	150-500	388992.4442	6426174.4533
208	<i>Eucalyptus gomphocephala</i>	150-500	388984.2386	6426170.7992
209	<i>Eucalyptus gomphocephala</i>	750-1,000	388980.9498	6426170.9712
210	<i>Eucalyptus gomphocephala</i>	150-500	388976.4005	6426168.1563
211	<i>Eucalyptus gomphocephala</i>	150-500	388975.1644	6426170.9413
212	<i>Eucalyptus gomphocephala</i>	150-500	388972.5182	6426168.6654
213	<i>Eucalyptus gomphocephala</i>	150-500	388971.4121	6426162.0102
214	<i>Eucalyptus gomphocephala</i>	500-750	388963.9181	6426158.4088
218	<i>Eucalyptus gomphocephala</i>	500-750	388958.1491	6426177.9943
219	<i>Eucalyptus gomphocephala</i>	150-500	388957.9511	6426184.3534
222	<i>Eucalyptus gomphocephala</i>	150-500	388960.7061	6426218.0552
223	<i>Eucalyptus gomphocephala</i>	150-500	388960.5726	6426220.1940

Tree no	Species	DBH range (mm)	Easting	Northing
224	<i>Eucalyptus gomphocephala</i>	150-500	388960.1415	6426221.4964
226	<i>Eucalyptus gomphocephala</i>	1,750-2,000	388937.6952	6426248.2347
227	<i>Eucalyptus gomphocephala</i>	500-750	388973.1046	6426227.8100
229	<i>Eucalyptus gomphocephala</i>	150-500	388995.2138	6426218.6437
231	<i>Eucalyptus gomphocephala</i>	500-750	388995.7449	6426212.6539
234	<i>Eucalyptus gomphocephala</i>	150-500	388985.0236	6426197.5189
235	<i>Eucalyptus gomphocephala</i>	150-500	388991.3375	6426196.1026
236	<i>Eucalyptus gomphocephala</i>	150-500	388993.5168	6426193.1135
237	<i>Eucalyptus gomphocephala</i>	750-1,000	388982.6630	6426189.5909
238	<i>Eucalyptus gomphocephala</i>	500-750	388978.0833	6426188.2740
239	<i>Eucalyptus gomphocephala</i>	150-500	388979.3923	6426175.8247
240	<i>Eucalyptus gomphocephala</i>	150-500	388979.7268	6426172.6232
241	<i>Eucalyptus gomphocephala</i>	150-500	388995.2262	6426175.6474
242	<i>Eucalyptus gomphocephala</i>	500-750	388994.1391	6426187.4233
243	<i>Eucalyptus gomphocephala</i>	750-1,000	389021.3913	6426183.2803
244	<i>Eucalyptus gomphocephala</i>	500-750	389041.7093	6426181.9321
245	<i>Eucalyptus gomphocephala</i>	500-750	389047.0867	6426191.4431
246	<i>Eucalyptus gomphocephala</i>	150-500	389044.5518	6426195.3848
247	<i>Eucalyptus gomphocephala</i>	500-750	389045.9239	6426198.1153
248	<i>Eucalyptus gomphocephala</i>	500-750	389045.6284	6426200.3526
250	<i>Eucalyptus gomphocephala</i>	>2,000	389025.2338	6426197.4537
251	<i>Eucalyptus gomphocephala</i>	750-1,000	389009.3568	6426222.5013
252	<i>Eucalyptus gomphocephala</i>	1,500-1,750	389011.9078	6426232.7193
253	<i>Eucalyptus gomphocephala</i>	500-750	389006.1416	6426232.1141
257	<i>Eucalyptus gomphocephala</i>	500-750	388996.3870	6426246.1346
260	<i>Eucalyptus gomphocephala</i>	150-500	389024.0800	6426243.5204
261	<i>Eucalyptus gomphocephala</i>	150-500	389025.5025	6426237.7610
263	<i>Eucalyptus gomphocephala</i>	150-500	389028.2510	6426233.0374
264	<i>Eucalyptus gomphocephala</i>	150-500	389030.3135	6426227.6195
265	<i>Eucalyptus gomphocephala</i>	150-500	389033.8400	6426223.5208
266	<i>Eucalyptus gomphocephala</i>	150-500	389041.1449	6426222.8906
267	<i>Eucalyptus gomphocephala</i>	150-500	389044.6225	6426225.4512
268	<i>Eucalyptus gomphocephala</i>	150-500	389040.5638	6426237.3341
269	<i>Eucalyptus gomphocephala</i>	150-500	389039.0455	6426235.2115
270	<i>Eucalyptus gomphocephala</i>	150-500	389039.9753	6426231.2369
275	<i>Eucalyptus gomphocephala</i>	500-750	389038.6445	6426241.9905
276	<i>Eucalyptus gomphocephala</i>	500-750	389040.3319	6426242.6957
277	<i>Eucalyptus gomphocephala</i>	150-500	389040.7957	6426244.6944
278	<i>Eucalyptus gomphocephala</i>	150-500	389040.9578	6426245.5432
279	<i>Eucalyptus gomphocephala</i>	500-750	389037.4286	6426246.7540
280	<i>Eucalyptus gomphocephala</i>	150-500	389034.6432	6426247.6518
281	<i>Eucalyptus gomphocephala</i>	150-500	389033.2856	6426249.3098

APPENDIX SEVEN FLORISTIC QUADRAT DATA

KL2401

Staff LJA **Date** 30/10/2024 **Season** E
Revisit
Type Q 10 m x 10 m
Location Kerosene Lane
MGA Zone 50 389032 mE 6426333 mN **Lat.** -32.2943 **Long.** 115.8214
Habitat Mid-Slope
Aspect SW **Slope** Very Gentle
Soil Type Grey sand
Rock Type None
Loose Rock 0 % cover **Litter** 75 % cover ; 1 cm in depth
Bare ground <1 % cover **Weeds** 85 % cover
Vegetation U+ ^*Eucalyptus gomphocephala*,^*Banksia attenuata*\^tree\7\c;G ^^*Ehrharta calycina*,*Bromus diandrus*,*Caesia micrantha*\^tussock grass,other grass,forb\2\ld
Veg. Condition Degraded
Disturbance Unknown
Fire Age
Notes



Species	WA Cons.	Height (m)	Cover (%)	Count
<i>Acacia lasiocarpa</i>		0.2	<1	
<i>Austrostipa flavescens</i>		1	<1	
* <i>Avena barbata</i>		0.5	2	

<i>Banksia attenuata</i>	10	10
<i>Banksia sessilis</i>	3.5	<1
* <i>Briza maxima</i>	0.2	2
* <i>Bromus diandrus</i>	0.5	25
<i>Caesia micrantha</i>	0.1	15
<i>Dianella revoluta</i>	0.7	<1
* <i>Ehrharta calycina</i>	0.7	50
<i>Eucalyptus gomphocephala</i>	25	35
* <i>Euphorbia terracina</i>	0.2	<1
* <i>Freesia leichtlinii</i> subsp. <i>alba</i> x <i>leichtlinii</i> subsp. <i>leichtlinii</i>	0.1	10
<i>Hardenbergia comptoniana</i>	0.2	<1
* <i>Hypochaeris glabra</i>	0.2	1
<i>Kennedia prostrata</i>	0.1	<1
* <i>Lysimachia arvensis</i>	0.2	<1
<i>Macrozamia riedlei</i>	0.4	<1
* <i>Pelargonium capitatum</i>	0.5	2
* <i>Sonchus oleraceus</i>	0.4	<1
* <i>Urospermum picroides</i>	0.4	<1
* <i>Zantedeschia aethiopica</i>	0.5	6

KL2402

Staff LJA **Date** 30/10/2024 **Season** E
Revisit
Type Q 10 m x 10 m
Location Kerosene Lane
MGA Zone 50 389050 mE 6426343 mN **Lat.** -32.2942 **Long.** 115.8216
Habitat Mid-Slope
Aspect S **Slope** Very Gentle
Soil Type Grey sand
Rock Type None
Loose Rock 0 % cover **Litter** 95 % cover ; 1 cm in depth
Bare ground 0 % cover **Weeds** 99 % cover
Vegetation U+ ^*Corymbia calophylla*,^*Allocasuarina fraseriana*,*Eucalyptus gomphocephala*^tree\7\c;M
^*Acacia longifolia*^shrub\4\r;G ^*Zantedeschia aethiopica*,*Ehrharta longiflora*^forb,other grass\2\d
Veg. Condition Completely Degraded
Disturbance Unknown
Fire Age
Notes Unmeasured quadrat



Species	WA Cons.	Height (m)	Cover (%)	Count
* <i>Acacia longifolia</i>		3	5	
<i>Allocasuarina fraseriana</i>		7	5	
* <i>Brachychiton populneus</i>		3	1	

<i>Corymbia calophylla</i>	18	65
* <i>Ehrharta longiflora</i>	0.3	2
<i>Eucalyptus gomphocephala</i>	6	3
* <i>Euphorbia terracina</i>	0.2	<1
<i>Hardenbergia comptoniana</i>	2	<1
* <i>Zantedeschia aethiopica</i>	1	95

KL2403

Staff LJA **Date** 30/10/2024 **Season** E
Revisit
Type Q 10 m x 10 m
Location Kerosene Lane
MGA Zone 50 388968 mE 6426287 mN **Lat.** -32.2947 **Long.** 115.8207
Habitat Lower-Slope
Aspect S **Slope** Very Gentle
Soil Type Grey sand
Rock Type None
Loose Rock 0 % cover **Litter** 100 % cover ; 1 cm in depth
Bare ground 0 % cover **Weeds** 99 % cover
Vegetation U+ ^*Eucalyptus marginata* subsp. *marginata*, ^*Corymbia calophylla*, *Banksia grandis* ^tree\6i; M
^*Acacia rostellifera* ^shrub\4lr; G ^^*Ehrharta calycina*, *Briza maxima*, *Zantedeschia aethiopica* ^tussock grass, other grass, forb\2\ d
Veg. Condition Completely Degraded
Disturbance Unknown
Fire Age
Notes



Species	WA Cons.	Height (m)	Cover (%)	Count
<i>Acacia rostellifera</i>		2	2	
* <i>Asparagus asparagoides</i>		0.5	1	

* <i>Avena barbata</i>	1	<1
<i>Banksia grandis</i>	7	2
* <i>Briza maxima</i>	0.4	40
<i>Caesia micrantha</i>	0.1	<1
<i>Corymbia calophylla</i>	10	2
* <i>Ehrharta calycina</i>	0.6	45
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	8	5
* <i>Euphorbia terracina</i>	0.4	2
<i>Hardenbergia comptoniana</i>	1	2
* <i>Hypochaeris glabra</i>	0.2	<1
* <i>Lagurus ovatus</i>	0.3	<1
* <i>Lysimachia arvensis</i>	0.2	<1
<i>Macrozamia riedlei</i>	0.4	<1
* <i>Pelargonium capitatum</i>	0.5	1
* <i>Sonchus oleraceus</i>	0.4	<1
* <i>Zantedeschia aethiopica</i>	0.5	5

KL2404

Staff LJA **Date** 30/10/2024 **Season** E
Revisit
Type Q 10 m x 10 m
Location Kerosene Lane
MGA Zone 50 388983 mE 6426205 mN **Lat.** -32.2954 **Long.** 115.8209
Habitat Mid-Slope
Aspect N **Slope** Very Gentle
Soil Type Grey sand
Rock Type None
Loose Rock 0 % cover **Litter** 95 % cover ; 1 cm in depth
Bare ground 0 % cover **Weeds** 75 % cover
Vegetation U+ ^*Eucalyptus marginata* subsp. *marginata*, ^*Eucalyptus gomphocephala* ^tree\7\c;G ^^*Ehrharta calycina*, *Caesia micrantha*, *Briza maxima* ^tussock grass, forb, other grass\2\d
Veg. Condition Degraded
Disturbance Unknown
Fire Age >10 years

Notes



Species	WA Cons.	Height (m)	Cover (%)	Count
<i>Acacia lasiocarpa</i>		0.6	<1	
<i>Acanthocarpus preissii</i>		0.1	<1	
* <i>Briza maxima</i>		0.2	10	

<i>Burchardia congesta</i>	0.5	<1
<i>Caesia micrantha</i>	0.2	30
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	0.3	5
<i>Daucus glochidiatus</i>	0.1	<1
* <i>Ehrharta calycina</i>	1	50
<i>Eucalyptus gomphocephala</i>	20	10
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	15	25
<i>Gompholobium tomentosum</i>	0.2	1
* <i>Hypochaeris glabra</i>	0.2	<1
<i>Jacksonia sternbergiana</i>	0.3	<1
<i>Lobelia tenuior</i>	0.2	<1
* <i>Lysimachia arvensis</i>	0.1	<1
<i>Macrozamia riedlei</i>	0.5	<1
* <i>Pelargonium capitatum</i>	0.3	2
* <i>Sonchus oleraceus</i>	0.3	<1
<i>Tricoryne elatior</i>	0.5	3
* <i>Trifolium campestre</i>	0.1	<1
* <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	0.2	<1
* <i>Zantedeschia aethiopica</i>	0.3	2

KL24R1

Staff

LJA

Date

30/10/2024

Season

E

Revisit

Type

R

Location

Kerosene Lane

MGA Zone

50

389469 mE

6426184 mN

Lat.

-32.2957

Long.

115.8261

Habitat

Lower-Slope

Aspect

E

Slope

Very Gentle

Soil Type

Grey sand

Rock Type

None

Loose Rock

0 % cover

Litter

100 % cover

Bare ground

0 % cover

Weeds

100 % cover

Vegetation

+ 7dG *Cenchrus clandestinus*,*Bromus diandrus*,\^tussock grass,other grass,forb\1\d

Veg. Condition

Completely Degraded

Disturbance

Soil mounds, previous clearing

Fire Age

Notes



Species	WA Cons.	Height (m)	Cover (%)	Count
* <i>Bromus diandrus</i>		0.3	30	
* <i>Cenchrus clandestinus</i>		0.4	50	
<i>Corymbia calophylla</i>		20	75	

**Tropaeolum majus*

0.3

10

KL24R2

Staff

LJA

Date

30/10/2024

Season

E

Revisit

Type

R

Location

Kerosene Lane

MGA Zone

50

389377 mE

6426235 mN

Lat.

-32.2952

Long.

115.8251

Habitat

Mid-Slope

Aspect

E

Slope

Gentle

Soil Type

Grey sand

Rock Type

None

Loose Rock

0 % cover

Litter

75 % cover

Bare ground

0 % cover

Weeds

98 % cover

Vegetation

U+ ^Corymbia calophylla^tree\7c;G ^Ehrharta calycina,^Euphorbia terracina,Trifolium campestre^tussock grass,forb\2d

Veg. Condition

Completely Degraded

Disturbance

Parkland cleared

Fire Age

Notes



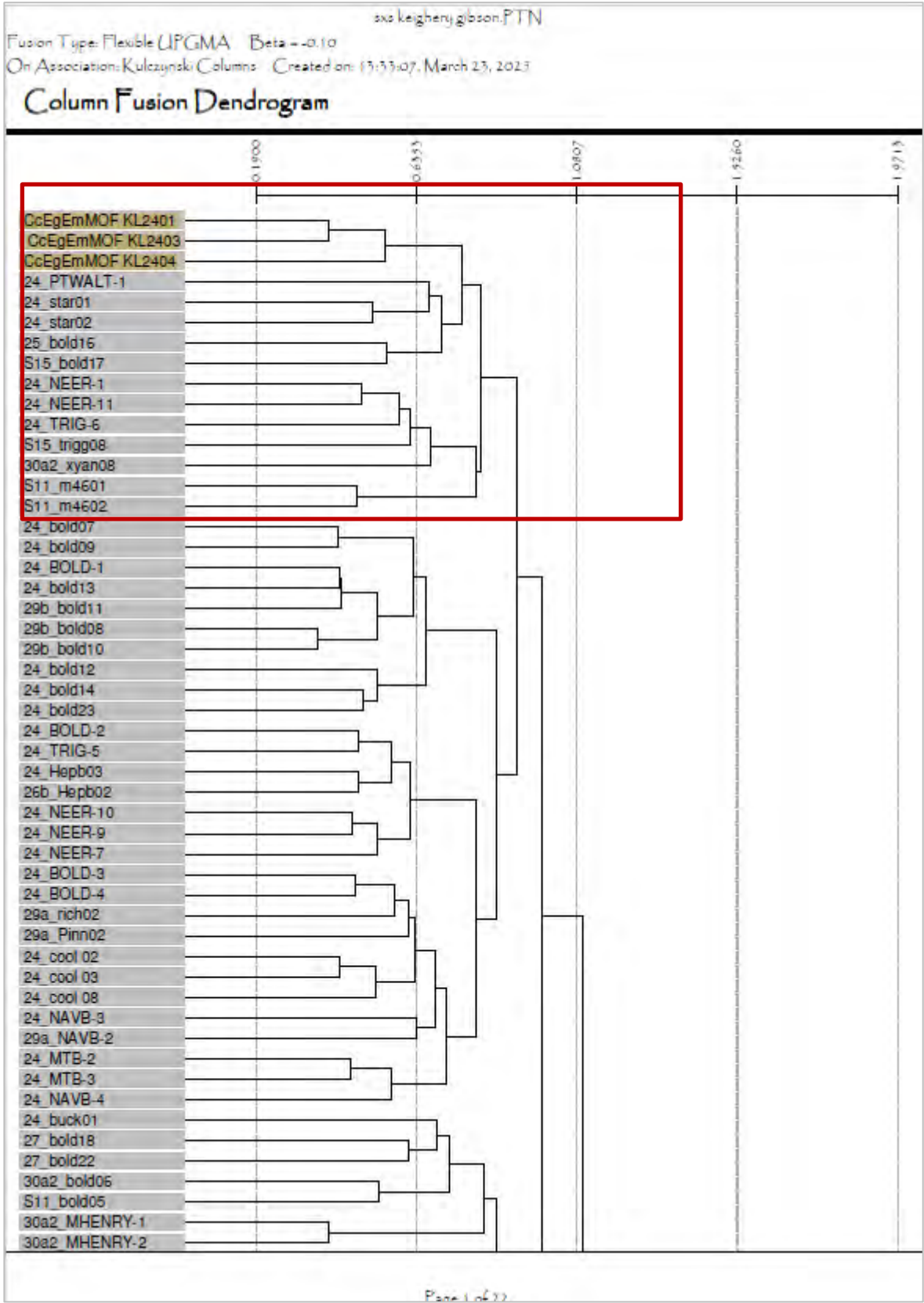
Species	WA Cons.	Height (m)	Cover (%)	Count
Corymbia calophylla		22	70	
*Ehrharta calycina		1	75	
*Euphorbia terracina		0.3	20	

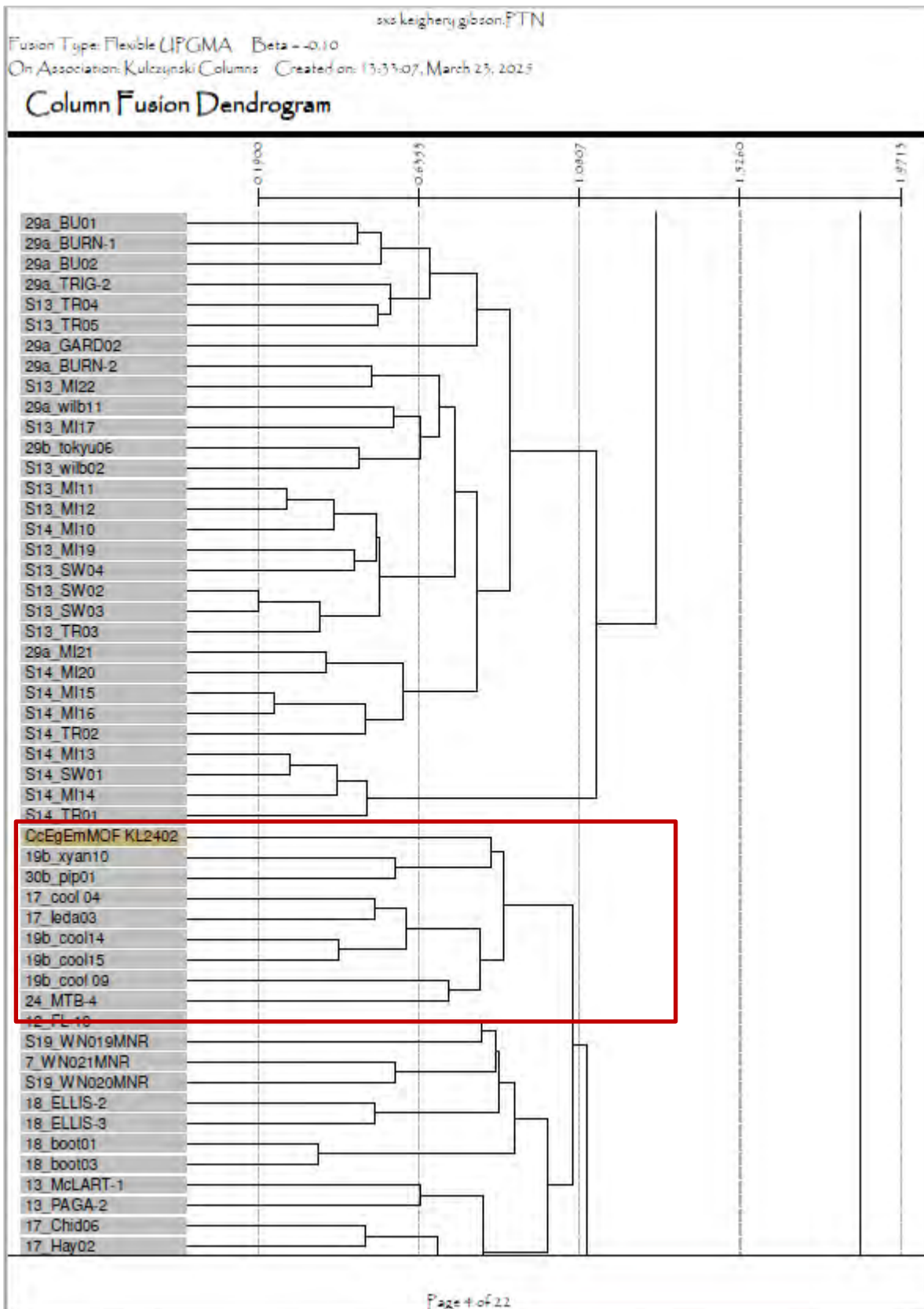
**Trifolium campestre*

0.1

2

APPENDIX EIGHT FCT ANALYSIS DENDROGRAM





APPENDIX NINE FIELD SURVEY RESULTS (FAUNA)

Table 33: Fauna inventory

Family	Species	Common name	Observation type	EPBC status	WA status	Native
Mammals						
Peramelidae	<i>Isoodon fusciventer</i>	Quenda	Sighted, secondary evidence (diggings)		Priority 4 (DBCA)	Yes
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	Secondary evidence (diggings)			Yes
Birds						
Acanthizidae	<i>Acanthiza chrysorrhoa</i> subsp. <i>chrysorrhoa</i>	Yellow-rumped Thornbill	Heard, sighted			Yes
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk	Sighted			Yes
Anatinae	<i>Anas superciliosa</i>	Pacific Black Duck	Sighted			Yes
Meliphagidae	<i>Anthochaera lunulata</i>	Western Little Wattlebird	Heard, sighted			Yes
Psittacidae	<i>Cacatua sanguinea</i>	Little Corella	Heard, sighted			Yes
Psittacidae	<i>Cacatua roseicapilla</i>	Galah	Heard, sighted			Yes
Psittacidae	<i>Calyptorhynchus banksii</i> <i>naso</i>	Forest Red-tailed Black Cockatoo	Foraging evidence	Vulnerable	Vulnerable	Yes
Campephagidae	<i>Coracina novaehollandiae</i> subsp. <i>novaehollandiae</i>	Black-faced Cuckoo-shrike	Heard, sighted			Yes
Corvidae	<i>Corvus coronoides</i>	Australian Raven	Heard, sighted			Yes
Cracticidae	<i>Cracticus tibicen</i>	Australian Magpie	Heard, sighted			Yes
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Sighted			No
Falconidae	<i>Falco cenchroides</i>	Australian Kestrel	Sighted			Yes
Acanthizidae	<i>Gerygone fusca</i> subsp. <i>fusca</i>	Western Gerygone	Heard, sighted			Yes
Meliphagidae	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	Heard			Yes
Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark	Heard, sighted			Yes
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Sighted	Marine		Yes
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite	Heard, sighted			Yes
Meliphagidae	<i>Lichmera indistincta</i> subsp. <i>indistincta</i>	Brown Honeyeater	Heard, sighted			Yes
Pachycephalidae	<i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i>	Rufous Whistler	Heard			Yes
Pardalotidae	<i>Pardalotus punctatus</i> subsp. <i>punctatus</i>	Spotted Pardalote	Heard			Yes
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote	Heard			Yes
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian Pelican	Sighted			Yes
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing	Sighted			Yes

Family	Species	Common name	Observation type	EPBC status	WA status	Native
Dicruridae	<i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i>	Willie Wagtail	Heard, sighted			Yes
Acanthizidae	<i>Smicromis brevirostris</i>	Weebill	Heard, sighted			Yes
Halcyonidae	<i>Todiramphus sanctus</i>	Sacred Kingfisher	Sighted			Yes
Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Heard, sighted			No
Psittacidae	<i>Zanda latirostris</i>	Carnaby's Cockatoo	Heard	Endangered	Endangered	Yes
Zosteropidae	<i>Zosterops lateralis</i>	Silvereye	Heard, sighted			Yes
Reptile						
Scincidae	<i>Cryptoblepharus buchanani</i>	Buchanan's Snake-Eyed Skink	Sighted			Yes

Table 34: Habitat assessment point

Attribute	Details	Photo
Location GDA94 Zone 50	388943.051 E, 6426259.758 N	
Habitat Unit	Woodland	
Landform	Lower slope	
Slope	Very gentle	
Aspect	East	
Rock type	None	
Soil description	Grey-yellow sand	
Litter cover	30%	
Disturbance	Very dense weed cover	
Fire age	>10 years	
Vegetation	Marri, Tuart, Jarrah woodland, occasional Banksia, weeds (few shrubs)	
Notes	Very few logs or larger woody debris. Many small holes and diggings in soil undulations.	

Table 35: Black Cockatoo habitat tree locations (GDA94, Zone 50)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
1	<i>Eucalyptus gomphocephala</i>	Multi stem	750-1,000	0	5		No		389147.4803	6426140.7974
2	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		389292.3667	6426288.8393
3	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389035.2047	6426355.7097
4	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389032.6374	6426364.4564
5	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389038.5226	6426364.4006
6	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		389026.2984	6426365.1305
7	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388982.7808	6426356.5271
8	<i>Eucalyptus marginata</i>	Single stem	1,000-1,250	2	4		No		388979.2669	6426369.5242
9	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		388939.1370	6426364.1244
10	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		388939.6758	6426360.4904
11	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388934.3342	6426358.3436
12	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388921.5026	6426349.6849
13	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388921.8749	6426348.9020
16	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388920.6037	6426346.4576
17	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388922.9460	6426345.8619
18	<i>Eucalyptus marginata</i>	Single stem	750-1,000	0	5		No		388963.7671	6426336.7879
19	<i>Eucalyptus marginata</i>	Single stem	1,000-1,250	4	3	2 (high)	No		388974.7996	6426336.1096
21	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388993.2914	6426345.6524
22	<i>Corymbia calophylla</i>	Single stem	1,500-1,750	1	4		No		388988.4741	6426355.1340
29	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389009.4488	6426359.6544
30	<i>Eucalyptus gomphocephala</i>	Single stem	1,750-2,000	1	3	2 (high)	No		389009.8564	6426346.9088
31	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	3	3	2 (high)	No		389007.6602	6426344.9077
34	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389047.5911	6426362.6952
35	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389052.9825	6426360.1569
36	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389053.9480	6426359.9562
37	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389059.0080	6426356.5259
38	Dead (<i>E. gomphocephala</i>)	Single stem	1,500-1,750	0	5		No		389066.1907	6426361.7391
40	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389087.2776	6426357.3614
41	<i>Corymbia calophylla</i>	Multi stem	500-750	0	5		No		389090.2798	6426357.3899
42	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389094.3773	6426358.7163
43	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389098.2479	6426350.9876
44	<i>Corymbia calophylla</i>	Multi stem	500-750	0	5		No		389109.5044	6426349.8760
45	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389108.4043	6426342.0580
46	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389109.5573	6426338.3852
47	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389105.0819	6426325.4756

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
48	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389090.5337	6426340.8077
49	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		389078.2249	6426336.7217
55	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389075.0207	6426330.3664
66	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389057.8549	6426328.8697
68	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389022.4102	6426320.4615
69	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389026.9976	6426321.1648
71	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389014.3122	6426314.0686
72	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		388960.9256	6426322.5523
73	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		388958.4545	6426324.8911
74	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		388954.8718	6426333.8518
76	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		388928.9215	6426333.3783
79	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		388948.2948	6426298.7814
80	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388953.3393	6426312.3516
81	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388962.4238	6426301.8072
82	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388954.3099	6426296.0993
83	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		388966.4091	6426295.6966
84	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		388961.5485	6426290.0572
85	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	3	3	2 (high)	No		388989.7647	6426298.2444
86	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389008.0514	6426301.1357
87	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389008.8480	6426304.3928
88	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389023.8046	6426281.6282
89	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	6	3	2 (high)	No		389022.1832	6426279.3727
90	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389037.1520	6426267.2515
91	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389049.0558	6426274.5099
94	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389045.0197	6426279.3899
96	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		389051.4017	6426306.4066
101	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389036.1634	6426299.9879
113	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389041.4980	6426308.5833
120	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389066.9186	6426309.9063
123	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389079.9569	6426305.9241
124	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389082.3156	6426309.0952
125	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389086.7894	6426308.2351
126	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389089.2809	6426299.8491
127	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389087.0436	6426296.6558
128	<i>Eucalyptus marginata</i>	Single stem	750-1,000	0	5		No		389086.6869	6426295.3424
138	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389080.2860	6426276.8651

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
141	<i>Eucalyptus marginata</i>	Single stem	1,000-1,250	0	5		No		389077.7632	6426263.3418
142	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389083.5256	6426257.9813
143	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389084.1381	6426256.4022
144	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389073.2613	6426236.0033
145	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389072.7003	6426231.3195
146	<i>Eucalyptus gomphocephala</i>	Multi stem	500-750	0	5		No		389063.9568	6426226.1576
148	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389045.7479	6426244.3327
149	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389064.1063	6426255.1158
150	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389059.7549	6426271.9214
151	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		389070.1448	6426275.7983
152	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389067.3698	6426276.6240
153	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389063.3866	6426276.1019
156	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389054.3314	6426282.1406
157	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389054.9894	6426275.9333
159	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389010.6294	6426271.8750
160	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389006.9262	6426277.5275
161	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388987.7679	6426272.8123
162	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388986.3590	6426273.9330
163	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388977.3756	6426272.5479
164	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		388978.5834	6426290.5026
166	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388972.1175	6426271.7819
167	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388960.9559	6426271.3599
168	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250		5		No		388950.5011	6426267.5348
169	Dead (<i>E. gomphocephala</i>)	Single stem	750-1,000	4	3	3 (moderate-low)	No		388940.6371	6426259.0607
170	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388932.1551	6426271.7584
171	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388939.4239	6426280.4256
173	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388925.7047	6426276.4274
177	<i>Eucalyptus marginata</i>	Single stem	750-1,000	0	5		No		388925.5786	6426290.1158
178	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	0	5		No		388941.4642	6426247.4082
179	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388928.3854	6426244.9070
181	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388930.5989	6426200.0174
182	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		388933.4470	6426204.1846
183	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	0	5		No		388927.3683	6426188.5871
184	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388940.2138	6426189.1170
185	<i>Eucalyptus gomphocephala</i>	Multi stem	500-750	0	5		No		388923.5142	6426124.1187
186	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		388947.2776	6426137.1101

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
188	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		388968.7837	6426147.6091
189	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		388983.2867	6426129.7341
190	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		388984.4421	6426131.8049
191	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		389017.0902	6426132.2170
192	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		389031.0670	6426153.9868
194	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	1	3	2 (high)	No		389028.2066	6426154.6847
195	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389009.0701	6426172.5609
196	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389002.6027	6426147.6207
199	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388996.4495	6426145.6205
200	<i>Eucalyptus gomphocephala</i>	Multi stem	500-750	0	5		No		389001.2336	6426150.2915
201	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389001.2064	6426149.7945
203	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388998.4596	6426156.4612
209	<i>Eucalyptus gomphocephala</i>	Multi stem	750-1,000	0	5		No		388980.9498	6426170.9712
214	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388963.9181	6426158.4088
215	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388961.2608	6426160.7239
216	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388953.5962	6426158.2746
217	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388946.5154	6426165.3911
218	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388958.1491	6426177.9943
220	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		388963.4111	6426205.4838
221	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388966.4478	6426206.4887
225	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	3	3	2 (high)	No		388954.5703	6426232.2837
226	<i>Eucalyptus gomphocephala</i>	Single stem	1,750-2,000	1	4	2 (high)	No		388937.6952	6426248.2347
227	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388973.1046	6426227.8100
228	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388974.4373	6426238.1842
230	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388994.6870	6426215.0614
231	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388995.7449	6426212.6539
232	<i>Corymbia calophylla</i>	Single stem	750-1,000	1	3		No		388994.7704	6426206.8237
233	<i>Eucalyptus marginata</i>	Single stem	500-750	0	5		No		388977.7887	6426201.4573
237	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		388982.6630	6426189.5909
238	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388978.0833	6426188.2740
242	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388994.1391	6426187.4233
243	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389021.3913	6426183.2803
244	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389041.7093	6426181.9321
245	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389047.0867	6426191.4431
247	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389045.9239	6426198.1153
248	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389045.6284	6426200.3526

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
249	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389042.6062	6426198.1652
250	<i>Eucalyptus gomphocephala</i>	Single stem	>2,000	5	3	1 (very high)	Yes	Large unattended raptor nest. Chew marks consistent with galah at one hollow (not vertical, so not suitable for BC)	389025.2338	6426197.4537
251	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389009.3568	6426222.5013
252	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	0	5		No		389011.9078	6426232.7193
253	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389006.1416	6426232.1141
254	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389002.3037	6426238.7856
255	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388997.8700	6426240.7442
256	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388991.7663	6426237.3443
257	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		388996.3870	6426246.1346
258	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389005.5296	6426257.2779
259	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389014.2797	6426246.7305
262	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389025.1452	6426232.0936
271	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389033.4575	6426230.6689
272	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389027.6426	6426240.2483
273	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389030.7018	6426240.9399
274	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389034.0158	6426242.2771
275	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389038.6445	6426241.9905
276	<i>Eucalyptus gomphocephala</i>	Multi stem	500-750	0	5		No		389040.3319	6426242.6957
279	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389037.4286	6426246.7540
282	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389047.3488	6426205.9564
283	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389464.6116	6426177.4076
284	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389461.2921	6426177.0975
285	<i>Eucalyptus gomphocephala</i>	Multi stem	500-750	0	5		No		389456.3156	6426170.9625
286	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389449.7012	6426175.9537
287	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389446.3453	6426187.1415
288	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389457.4735	6426189.2408
289	<i>Corymbia calophylla</i>	Single stem	1,250-1,500	0	5		No		389466.1304	6426191.6341
290	<i>Eucalyptus rudis</i>	Single stem	750-1,000	0	5		No		389499.9552	6426212.2292
291	<i>Eucalyptus rudis</i>	Single stem	750-1,000	0	5		No		389496.4033	6426214.3011
292	<i>Eucalyptus rudis</i>	Single stem	1,500-1,750	0	5		No		389497.1748	6426215.8358
293	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	1	3	2 (high)	No		389350.1426	6426279.2540
294	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		389349.2593	6426248.0003
295	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389346.3851	6426247.2431
296	<i>Corymbia calophylla</i>	Multi stem	500-750	0	5		No		389360.6999	6426255.8340

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
297	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389372.5939	6426235.4172
298	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389368.3360	6426221.0004
299	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389375.5097	6426198.0178
300	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389383.1093	6426207.4371
301	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389397.9572	6426216.0787
302	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389408.6010	6426219.8299
303	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389413.7857	6426230.5438
304	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389431.0414	6426245.8690
305	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389428.3730	6426249.8574
306	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389420.7061	6426254.6309
307	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389413.8464	6426256.7381
308	<i>Corymbia calophylla</i>	Multi stem	500-750	0	5		No		389397.3380	6426259.2428
309	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389358.5827	6426186.6828
310	<i>Eucalyptus gomphocephala</i>	Single stem	500-750	0	5		No		389355.6107	6426190.2172
311	<i>Eucalyptus marginata</i>	Single stem	750-1,000	0	5		No		389354.6789	6426194.9450
312	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389342.2629	6426203.4215
313	<i>Corymbia calophylla</i>	Single stem	1,500-1,750	0	5		No		389326.3896	6426195.1979
314	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389328.2582	6426191.5354
315	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389331.5970	6426178.8340
316	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		389338.9566	6426184.0910
317	<i>Eucalyptus marginata</i>	Multi stem	500-750	0	5		No		389341.6303	6426169.2698
318	<i>Eucalyptus rudis</i>	Single stem	500-750	0	5		No		389448.5911	6426132.0519
319	<i>Eucalyptus rudis</i>	Multi stem	750-1,000	0	5		No		389451.0645	6426130.3918
320	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		389379.2231	6426354.6988
321	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388958.0083	6426512.2315
322	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		388950.7300	6426489.7239
323	<i>Eucalyptus gomphocephala</i>	Single stem	1,750-2,000	3	3	2 (high)	No		388969.3320	6426471.0876
324	<i>Eucalyptus gomphocephala</i>	Single stem	>2,000	1	3	2 (high)	No		388984.7858	6426454.7885
325	<i>Corymbia calophylla</i>	Single stem	1,500-1,750	0	5		No		388994.1832	6426463.3781
326	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389014.7179	6426479.2217
327	<i>Corymbia calophylla</i>	Multi stem	750-1,000	0	5		No		389029.0524	6426488.9219
328	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389064.1699	6426503.8835
329	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389067.9838	6426502.4492
330	<i>Eucalyptus gomphocephala</i>	Single stem	>2,000	0	5		No		389119.1129	6426483.2554
331	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389154.1359	6426469.5068
332	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389131.6792	6426446.8397

FIELD SURVEY RESULTS (FAUNA)

Tree no.	Species	Single/multi-stemmed	DBH range (mm)	No. hollows	Tree class	Tree significance	Bees	Notes	Easting	Northing
333	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389122.5278	6426428.9675
334	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389203.0151	6426443.8812
335	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389238.1479	6426447.4800
336	<i>Eucalyptus gomphocephala</i>	Single stem	1,000-1,250	0	5		No		389172.0527	6426398.2485
337	<i>Eucalyptus marginata</i>	Multi stem	1,000-1,250	0	5		No		389172.7518	6426423.4393
338	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	1	3	3 (moderate-low)	No		389102.0825	6426381.8856
339	<i>Corymbia calophylla</i>	Single stem	1,000-1,250	0	5		No		389046.9669	6426416.8583
340	<i>Eucalyptus gomphocephala</i>	Single stem	1,750-2,000	1	3		No		389004.5977	6426404.8447
341	Dead	Single stem	1,500-1,750	1	3	2 (high)	No	Raptor possibly sea eagle nest	388981.6899	6426401.9741
342	<i>Corymbia calophylla</i>	Single stem	500-750	0	5		No		388986.1645	6426388.5950
343	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	2	3		Yes		389370.9261	6426391.1120
344	<i>Eucalyptus gomphocephala</i>	Single stem	750-1,000	0	5		No		389364.9170	6426425.1945
345	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389378.9796	6426388.5431
346	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389408.5830	6426401.0652
347	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	0	5		No		389378.4933	6426428.6264
348	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389379.2054	6426452.7324
349	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389350.7123	6426462.7075
350	<i>Eucalyptus gomphocephala</i>	Single stem	1,500-1,750	0	5		No		389301.9674	6426503.5493
351	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389279.6933	6426427.1407
352	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No		389286.0642	6426396.5974
353	<i>Eucalyptus gomphocephala</i>	Single stem	1,250-1,500	1	3	2 (high)	No		389268.4128	6426377.0294
C1	Dead (<i>C. calophylla</i>)	Single stem	1,250-1,500	1	3	3 (moderate-low)	No	Coterra Environment tree	389427.3184	6426374.4386
C2	<i>Eucalyptus marginata</i>	Single stem	1,500-1,750	1	4		No	Coterra Environment tree	389391.8281	6426282.2961
C3	<i>Eucalyptus marginata</i>	Single stem	750-1,000	0	5		No	Coterra Environment tree	389377.7667	6426366.9190
C4	<i>Corymbia calophylla</i>	Single stem	750-1,000	0	5		No	Coterra Environment tree	389407.3575	6426375.0361
C5	<i>Corymbia calophylla</i>	Multi stem	500-750	0	5		No	Coterra Environment tree	389146.7401	6426371.6131

APPENDIX TEN

CLASS 3 BLACK COCKATOO HABITAT TREES



Tree 19 Eucalyptus marginata (2).jpg



Tree 19 Eucalyptus marginata.jpg



Tree 30 Eucalyptus
gomphocephala.jpg



Tree 31 Eucalyptus gomphocephala.jpg



Tree 85 Corymbia calophylla (2).jpg



Tree 85 Corymbia calophylla.jpg



Tree 89 Eucalyptus gomphocephala.jpg



Tree 169 dead.jpg



Tree 194 Eucalyptus
gomphocephala....



Tree 225 *Corymbia calophylla*.jpg



Tree 232 *Corymbia calophylla*.jpg



Tree 232 *Corymbia calophylla*.jpg



Tree 250 *Eucalyptus gomphocephala* ...



Tree 250 *Eucalyptus gomphocephala* ...



Tree 250 *Eucalyptus gomphocephala*....



Tree 293 *Eucalyptus gomphocephala* ...



Tree 293 *Eucalyptus gomphocephala*....



Tree 323 *Eucalyptus gomphocephala*....



Tree 324 Eucalyptus gomphocephala....



Tree 338 Corymbia calophylla (2).jpg



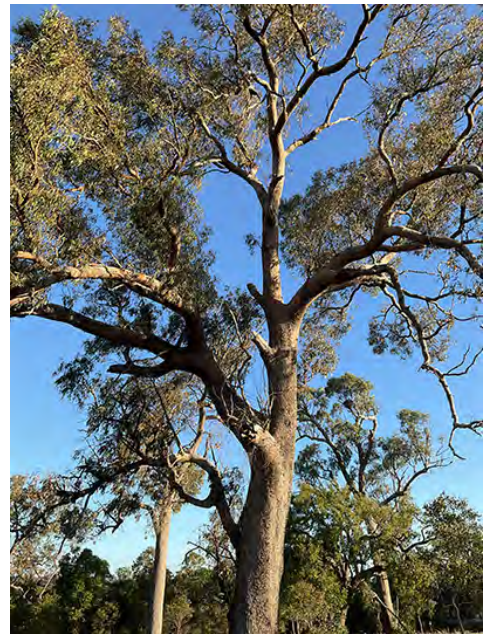
Tree 338 Corymbia calophylla.jpg



Tree 340 Eucalyptus gomphocephala....



Tree 341 dead.jpg



Tree 343 Eucalyptus gomphocephala....



Tree 353 Eucalyptus gomphocephala....



Tree C1 dead (2).JPEG



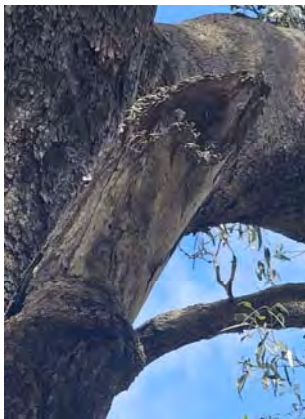
Tree C1 dead.JPEG



Appendix 2 Stage 1 Hollow Inspection (Harewood, 2025)

ID	Coordinates (MGA 2020/Z50)	389350 mE	6426279 mN	Tree Species	Tuart	Survey Date	21/10/2025
293	Comments	Tuart tree with a large side entry hollow. At the time of the October 2025 survey the hollow was being used for nesting purposes by an eastern long-billed corella, which are an invasive introduced species from the eastern states. The hollow entrance was examined using a drone and appears to provide entry into a relatively large vertical hollow, though the internal size and therefore suitability for black cockatoos remains uncertain. No evidence of previous use by black cockatoos. Original classification retained though use by corellas may lessen the probability of it ever being used by black cockatoos, even if suitable.				Original Classification (Ecoscape 2025)	3 - 2 (high value)
						Reviewed Classification (Harewood 2025)	3 - 2 (high value)



ID	Coordinates (MGA 2020/Z50)	389371 mE	6426391 mN	Tree Species	Tuart	Survey Date	21/10/2025
343	Comments	Large tuart tree with two obvious spout type hollows. The upper hollow (pictured below right) is occupied by bees, is horizontal and appears to be too small for black cockatoos and therefore is unsuitable. Lower hollow (picture in centre 2 photos below) also showed some bee activity but could possibly represent a potentially suitable hollow. Observations and drone pictures were however inconclusive. No evidence of any current or previous black cockatoo nesting activity. Grade 3 classification retained with a moderated to low significance applied based on observations made.				Original Classification (Ecoscape 2025)	3
						Reviewed Classification (Harewood 2025)	3 – 3 (moderate -low value)
📍 176°S (M) • 50S 389367 6426413 ±3m  ZOOTOPA24 Oct 2025 12:01:35 pm    							



ID	Coordinates (MGA 2020/Z50)	389268 mE	6426378 mN	Tree Species	Tuart	Survey Date	21/10/2025
353	Comments	Identified by Ecoscape as having one large hollow however it was at the time of the October 2025 review as to which hollow they were referring. Three potential hollows were identified but all appeared to be unsuitable for black cockatoos. An upper horizontal hollow branch was occupied by bees and also appeared too small (pictured centre left below). A lower horizontal branch was obstructed with debris and had weeds growing in the entrance (pictured centre right below). A horizontal chimney type trunk was had no depth. Reclassified to Grade 4 based on observations made.				Original Classification (Ecoscape 2025)	3 - 2 (high value)
						Reviewed Classification (Harewood 2025)	4



ID	Coordinates (MGA 2020/Z50)	389427 mE	6426375 mE	Tree Species	Marri	Survey Date	21/10/2025
C1	Comments	Large near dead Marri initially identified as having a potentially large chimney type hollow. When examined with drone (see picture below) the potential hollow was found to be non-existent. Re-classified to Grade 4 based on observations made.				Original Classification (Coterra 2025)	3 - 3 (moderate/low)
						Reviewed Classification (Harewood 2025)	4

📍 128°SE (M) • 50S 389422 6426383 ±4m



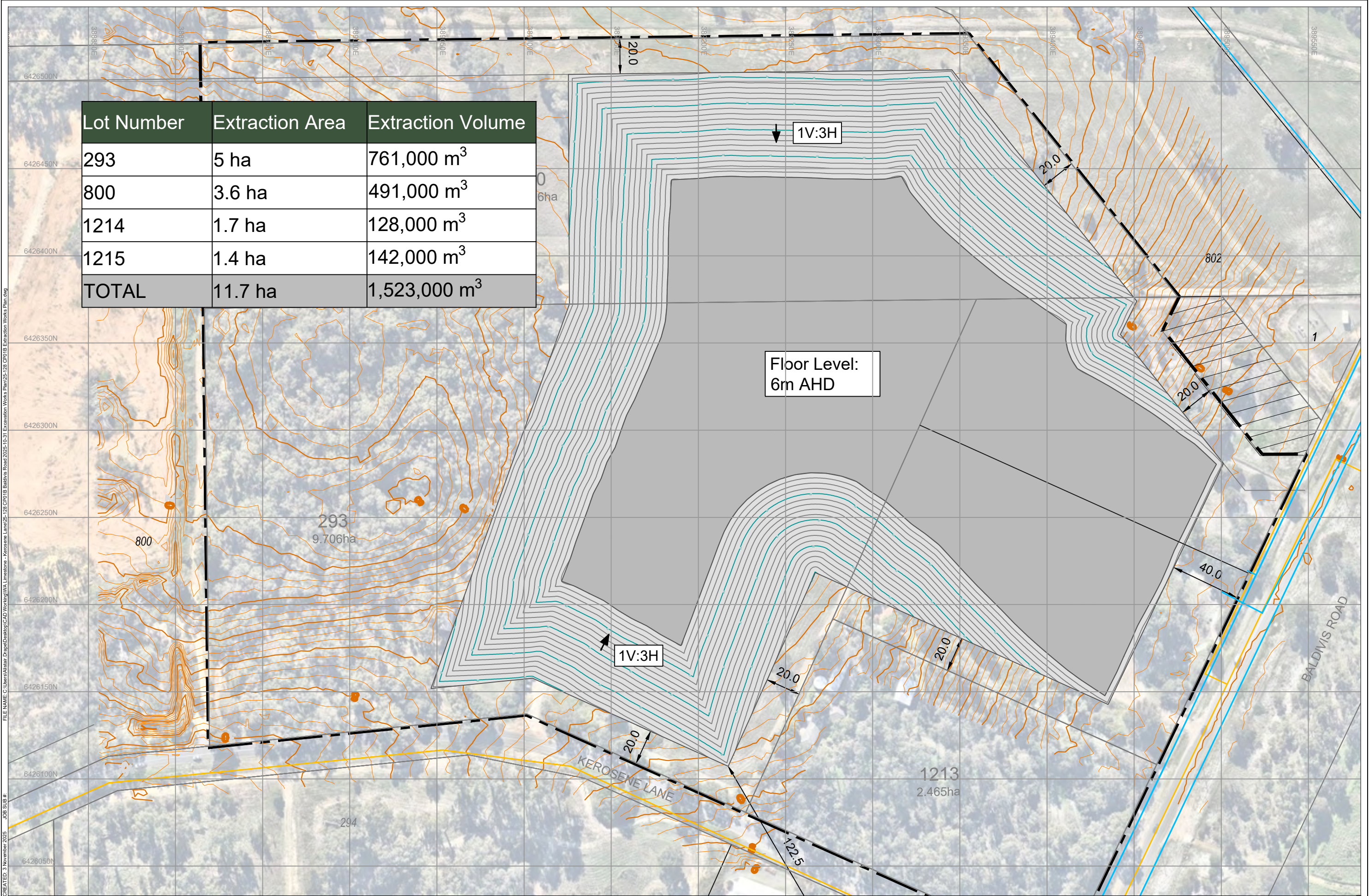
ZOOTOPIA21 Oct 2025 12:51:11 pm







Appendix 3 Site Levels Plan



Lot Number	Extraction Area	Extraction Volume
293	5 ha	761,000 m ³
800	3.6 ha	491,000 m ³
1214	1.7 ha	128,000 m ³
1215	1.4 ha	142,000 m ³
TOTAL	11.7 ha	1,523,000 m ³

REV	DESCRIPTION	DATE	BY

DATA SOURCES:
Photography: Nearmap, Captured 2025/06/25
Topography: Harley Dykstra, UAV Survey, Captured 2024/09/17
Cadastral: Other:
Ecosystem: Other:

The content contained within this document may be based on third party data.
SLR Consulting Australia Pty Ltd does not guarantee the accuracy of any such information.

Legend:

- Quarry Floor
- Quarry Slopes (1V:3H)
- Site Boundary

- Lot Boundary
- Survey Contours (0.5m)
- Existing Power Infrastructure
- Existing Water Infrastructure

PROJECT:	Kerosene Lane
CLIENT:	CWM Property Holdings Pty Ltd

TITLE:

Kerosene Lane QDP

SCALE: 1:2000

0 40m

DRAWING NUMBER: 675.073585.00001

REVISION: 0

DATE: 10 November 2025

PRINTED: 10 November 2025

DRAWN: AD

CHECKED: CP

DATUM: HORIZONTAL / VERTICAL / ZONE

GDA94 / MGA 55 / AHD /

Appendix 4 Injured Fauna Protocol



COTERRA
ENVIRONMENT

Level 1, 98 Colin Street
West Perth WA 6005

T (08) 9381 5513

www.coterra.com.au
info@coterra.com.au

Our Ref: CWMKER02

Job Name: Kerosene Lane Stage 1 EMP

Injured Fauna Protocol

Should injured, abandoned, or distressed fauna be found onsite the following Injured Fauna Protocol will be undertaken:

1. Animal found.
2. Identify animal, if possible (determine if potentially venomous).
3. Contact Project Manager, Fauna Relocator or Environmental Consultant for instructions. If these representatives cannot be reached, contact the DBCA Wildcare helpline (**9474 9055**).
4. If unable to stay with the animal, clearly mark its position so it is visible to all personnel that approach the site.
5. First preference is to leave the animal alone until experienced assistance arrived. If this is not possible the following handling and temporary holding instructions may be enacted (only if absolutely necessary and only as a last resort)
 - Adult nesting birds (and all avifauna) are protected by the *Biodiversity Conservation Act 2016* and should be left undisturbed if uninjured. Young birds found within a nest should only be removed if considered by a specialist to be abandoned or injured.
 - For any small mammals found at any time on site, the best method of storage and transportation would be within hessian sacks. Mammals may become stressed and agitated in traps or hard containers, sometimes resulting in injury. Mammals transported in hessian sacks remain calmer due to the dark environment and if kept in the shade and on a soft, secure surface can be transported with relatively limited stress and injury.
 - Reptiles can, in most cases, be transported within calico bags of varying size to suit the animal. Plastic carry boxes can also be used with some air holes, leaf litter and sand within them. The animals should always be placed within an area of shade so that they do not overheat.
6. If in any doubt about whether the animal is venomous, do not under any circumstances attempt to handle it. Instead, monitor the location of the animal from a safe distance and await arrival of an experienced wildlife officer or reptile handler.
7. Fauna Consultant to contact DBCA or wildlife carers as appropriate.

Appendix 5 Dust Assessment

Dust Assessment

This assessment has been undertaken with reference to the 'Guideline for managing impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities' (DEC, 2011).

Site Classification Assessment

Table 1 and Table 2 below present the completed Site Classification Assessment Charts sourced from the DEC guidelines.

Table 1: Part A Assessment Criteria – Nature of the Site

Item	Score Options				Score
1. Nuisance potential of soil, when disturbed	Very Low	Low	Medium	High	2
	1	2	4	6	
2. Topography and protection provided by undisturbed vegetation	Sheltered and Screened	Medium Screening	Little Screening	Exposed and wind prone	6
	1	6	12	18	
3. Area of site disturbed by the works	Less than 1 ha	Between 1 and 5 ha	Between 5 and 10 ha	More than 10 ha	9
	1	3	6	9	
4. Type of work being done	Roads or shallow trenches	Roads, drains and medium depth sewers	Roads, drains, sewers and partial earthworks	Bulk earthworks and deep trenches	9
	1	3	6	9	
Total Score for Part A					26

Source: DEC, 2011

Table 2 Part B Assessment Criteria – Proximity to Other Land Uses

Item	Score Options				Score
Distance of other and uses from site	More than 1km	Between 1km and 500m	Between 100m and 500m	Less than 100m	12
	1	6	12	18	
Effect of prevailing wind direction (at time of construction) on other land uses	Not affected	Isolated land uses affected by one wind direction	Dense land uses affected by one wind direction	Dense / sensitive land uses highly affected by prevailing winds	1
	1	6	9	12	
Total Score for Part B					13

Source: DEC 2011

Site Classification Score (A x B)	338
--	------------

Site Classification Levels:

- Site classification 1 (Negligible risk) — under 199
- Site classification 2 (Low risk) — 200 to 399
- Site classification 3 (Medium risk) — 400 to 799
- Site classification 4 (High risk) — over 800

The classification score for the proposed resource extraction at the site is 338, which considers the site as Classification 2 and at low risk for dust impacts. This classification forms the basis of dust management provisions, contingency arrangements and monitoring requirements as per DEC (2011) guidelines.

COTERRA ENVIRONMENT

Level 1, 98 Colin Street
West Perth WA 6005

T (08) 9381 5513

www.coterra.com.au
info@coterra.com.au

