

Native Vegetation Clearing Permit Supporting Document - Addendum

Neerabup Resource Recovery Precinct



Prepared for City of Wanneroo

23 July 2025

Project Number: TW25008

DOCUMENT CONTROL

| Version | Description | Date | Author | Reviewer | Approver |
|---------|-------------------|------------|--------|----------|----------|
| 0.1 | Internal review | 23/07/2025 | LC | LS | |
| 1.0 | Release to Client | 24/07/2025 | LC | LS | LS |
| | | | | | |

Approval for Release

| Name | Position | File Reference |
|------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Lee-Anne Stewart | Principal Environmental Consultant Team Lead Approvals & Assessments | TW25008_Wanneroo Neerabup_Native Vegetation Clearing Permit_Addendum_0.1 |
| Signature | | |

Copyright of this document or any part of this document remains with Talis Consultants Pty Ltd and cannot be used, transferred or reproduced in any manner or form without prior written consent from Talis Consultants Pty Ltd.

1 Background

Talis Consultants (Talis) were engaged by the City of Wanneroo (the City) to develop a Native Vegetation Clearing Permit (NVCP) for the clearing associated with the Neerabup Resource Recovery Precinct (NRRP) Master Plan (the Project) located on Lot 600, 570 Wattle Ave, Neerabup.

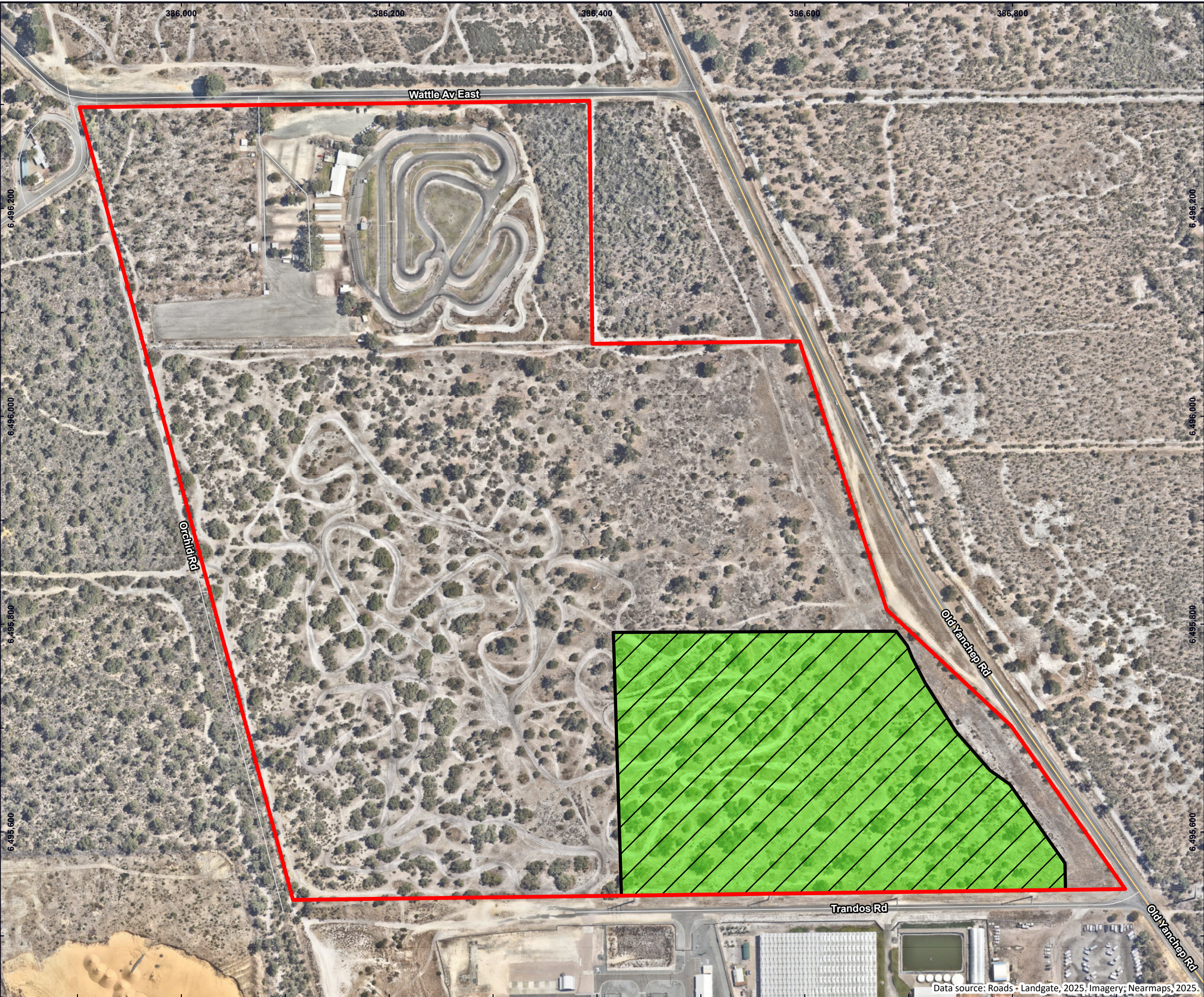
Since submitting the initial NVCP application and supporting document the design and layout of the proposed facilities has been reviewed and amended resulting in changes to the proposed clearing area. The revised clearing area is shown in Figure 1-1 and changes to the context of the original application are outlined in Table 1-1.

Table 1-1: Changes to the Original Application

| Original Section | | Change | Rationale |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1 Background | This NVCP is to clear 8.90 ha of native vegetation. | The total clearing area has slightly increased to 8.92 ha. | |
| 4.1.1 Conservation Significant Habitat | <p>Three potential breeding trees were located within the proposed development area (Figure 4 1). All three of the recorded <i>Eucalyptus rudis</i> trees were classified as class 5 when scored using the scale developed by Dr Mike Bamford (Bamford 2016). These Class 5 trees do not currently exhibit the characteristics necessary for Black Cockatoo use for nesting however, due to the trees being of a suitable size to potentially provide suitable nesting hollows in the future, they were recorded during the survey. These trees, including a 5 m buffer will be excluded from the clearing permit area. The area beneath the tree canopy will not be cleared if larger than the estimated 5 m buffer.</p> <p>Section 5 describes the mitigation used to avoid any potential harm to the trees.</p> | The three trees including the 5m buffer surrounding them initially excluded are now proposed to be cleared. | <p>Shifting the WTS to avoid the trees would result in a larger footprint for the same infrastructure.</p> <p>On review of the design of the proposed Waste Transfer Station (WTS) it was noted that the three trees hinder functionality and possibly safety of the site. The design aims to maximise space (minimise clearing) and support linkages and flows between the different elements on the site. Shifting the WTS to avoid the trees would result in a larger footprint for the same infrastructure and potentially into the ESA. In order to avoid application of clearing approval into the ESA and given the lower value of the habitat trees (Class 5), which has been confirmed by two independent Consultants (Ecoscape 2021 and Western Environmental 2025), the three trees are proposed to be cleared .</p> |
| 5.1 Avoidance | <p>To mitigate the clearing impact of the Project, The City will avoid any potential risk to conservation significant habitat, or environmentally sensitive areas by adhering to the demarcated areas.</p> <p>The proposed clearing area includes 5 m buffers surrounding the three potential cockatoo habitat trees as the project will incorporate the trees into the design of the facility, hence avoiding any harm to the potentially habitable trees. If the area beneath the tree canopies is larger than 5 m in radius, that area will not be cleared to avoid any impact to the trees.</p> | | <p>The City, in undertaking landscaping around the WTS, which will include the use of Black Cockatoo foraging plant species where possible.</p> |

| Original Section | | | Change | Rationale |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table 6-1: Assessment of Project against the Ten Clearing Principles | Principle | Assessment | The three trees including the 5m buffer surrounding them initially excluded are now proposed to be cleared. | The three trees were classified as Class 5 trees according to the Bamford scale (2016) by Ecoscape (2021). These results were confirmed by Western Environmental (2025). Known roosting and breeding sites and better-quality foraging habitat is available outside of the proposed clearing area in association with Bush Forever Sites, Reserves and State Forest. Class 5 trees are described as trees with intact branches and a spreading crown, lacking suitable hollows at the time of assessment (Bamford 2016). Therefore, the outcome is unlikely to change and the proposed clearing is not likely to be variance with Principle (b). |
| | Principle (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia. | <p>The 3 Eucalyptus rudis trees located within the proposed clearing area were assessed as class 5 against the Bamford assessment tool (2016)</p> <p>The potential black cockatoo habitat trees located within the proposed clearing area will not be cleared as they have been excluded from the proposed clearing footprint.</p> <p>Outcome: Not likely to be at variance to this Principle</p> | | |
| 7 Summary of Assessment | <p>The assessment concludes that the clearing of 8.90 ha of native vegetation for the development of the Project is not at variance with the Ten Clearing Principles.</p> <p>The Potential Black Cockatoo Habitat Trees are being avoided and will be retained for the Project. The ESA will not be impacted as a result of the Clearing associated with this Project. The Banksia woodlands TEC and its buffers identified in the desktop survey, was not represented in the in-field survey. There is no presence of the Banksia woodland TEC within the boundary of the</p> | | | |

| Original Section | | Change | Rationale |
|------------------|---------------------------------------------------------------------------------------------------------------|--------|-----------|
| | proposed clearing area. No conservation significant flora or fauna is expected to be impacted by the project. | | |



LEGEND

Lot 600 on DP302260

Revised Clearing Area

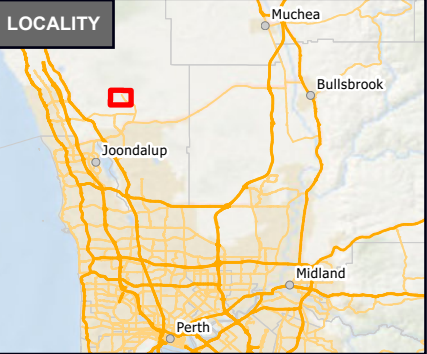
Western Australian Roads

Main Road

Minor Road

Other

© Talis Consultants Pty Ltd ("Talis") Copyright in the drawings, information and data recorded in this document ("the information") is the property of Talis. This document and the information are solely for the use of the authorised recipient and this document may not be used, transferred or reproduced in whole or part for any purpose other than that which it is supplied by Talis without written consent. Talis makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information.

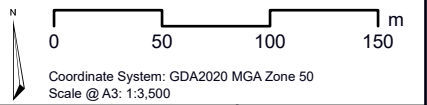


REVISED CLEARING AREA

Neerabup Resource Recovery Precinct

Native Vegetation Clearing Permit

City of Wanneroo



| | | | |
|-----------|-----------|-----------|------------|
| Prepared: | E Jackson | Date: | 30/04/2025 |
| Reviewed: | D Tills | Revision: | A |
| Project: | TW25008 | | |

talisc consultants

Figure 1-2

Data source: Roads - Landgate, 2025. Imagery: Nearmaps, 2025.

APPENDIX A

Western Environmental (2025) Lot 600, Old Yanchep Road and Orchid Road Neerabup Basic Fauna and Targeted Black Cockatoo Habitat Assessment



WESTERN
ENVIRONMENTAL

Lot 600, Old Yanchep Road and Orchid Road Neerabup

Basic Fauna and Targeted Black Cockatoo
Habitat Assessment

Western Environmental Pty Ltd

(08) 6162 8980

PO Box 437, Leederville, WA 6903

enquiries@westenv.com.au

westenv.com.au

Lot 600, Old Yanchep Road and Orchid Road Neerabup

Basic Fauna and Targeted Black Cockatoo Habitat Assessment

Report No:

A25.002_RPT_FSR

Issue Date:

21-Apr-2025

Status

FINAL

Prepared for:

City of Wanneroo
23 Dundobar Road
Wanneroo WA 6065

Prepared by

Western Environmental Approvals Pty Ltd
Unit 5, 162 Colin Street
West Perth WA 6005
westenv.com.au

Internal Review

| Author | Reviewed by | Approved by |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |
| Jack Rogers Environmental Consultant | Andrew Fry Associate Environmental Scientist | Dale Newsome Director |
| 26-Mar-2025 | 17-Apr-2025 | 21-Apr-2025 |

Distribution Record

| Copies | Document ID / Version | Date | Received by |
|--------|---------------------------|-------------|------------------|
| 1 | A25.002_RPT_FSR_A.1_Draft | 21-Apr-2025 | City of Wanneroo |
| 2 | A25.002_RPT_FSR_FINAL | 26-May-2025 | City of Wanneroo |

Statement of Limitations

Copyright Statement

© Western Environmental Pty Ltd (WEPL). All rights reserved. No part of this work may be produced in any material form or communicated by any means without the permission of the copyright owner. The unauthorised copying or reproduction of this report or any of its contents is prohibited.

Scope of Services

This environmental report ("this report") has been prepared for the sole benefit and exclusive use of the Client for the purpose for which it was prepared in accordance with the agreement between the Client and WEPL ("the Agreement"). However, in addressing the requirements of the Contaminated Sites Act 2003, an Accredited Contaminated Sites Auditor may be engaged by the Client to undertake review of this report, prior to its submission to the DWER. The report shall be made available and can be relied upon for the purposes of the Contaminated Sites Act.

WEPL disclaims any and all liability with respect to any use of or reliance upon this report for any other purpose whatsoever.

In particular, it should be noted that this report is based on a scope of services defined by the Client, and is limited by budgetary and time constraints, the information supplied by the Client (and its agents) and, in some circumstances, access and/or site disturbance constraints.

The scope of services did not include any assessment of the title to, or ownership of the properties, buildings and structures referred to in this report, or the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Reliance on Data

In preparing this report, WEPL has relied on data, surveys, analyses, designs, plans and other information provided by the Client (or its agents), other individuals and organisations ("the data").

Except as otherwise stated in this report, WEPL has not verified the accuracy or completeness of the data. WEPL does not represent or warrant that the data is true or accurate and disclaims any and all responsibility or liability with respect to the use of the data.

To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data.

WEPL does not accept any responsibility or liability for any incorrect or inaccurate conclusions should any data be incorrect, inaccurate or incomplete or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WEPL.

The conclusions must also be considered in light of the agreed scope of services (including any constraints or limitation therein) and the methods used to carry out those services, both of which are as stated or referred to in this report.

Environmental Conclusions

In accordance with the scope of services, WEPL has conducted environmental field monitoring and/or testing in the preparation of this report. The nature and extent of monitoring and/or testing conducted is described in this report.

On all sites, varying degrees of non-uniformity of vertical and horizontal conditions in media (soil, water, air, waste or other media as described in the report) are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of media conditions encountered. The conclusions are based on the data and the environmental field monitoring and/or testing actually undertaken and are therefore merely indicative of the environmental condition of the site at the time of preparing this report, including the presence or otherwise of contaminants or emissions. It should be recognised that site conditions, including the extent and concentration of contaminants, can change.

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

Report for Benefit of Client

This report is confidential. Neither the whole nor any part of this report, or any copy or extract thereof, may be disclosed or otherwise made available to any third party without the prior written approval of WEPL.

WEPL accepts no liability or responsibility whatsoever in respect of any use of or reliance upon this report, by any person or organisation who is not a party to the Agreement. Reliance on this report by any person who is not a party to the Agreement is expressly prohibited. Any representation in this report is made only to the parties to the Agreement.

WEPL assumes no responsibility and disclaims any and all liability to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in this report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report (including without limitation matters arising from any negligent act or omission of WEPL or for any loss or damage suffered by any other party using or relying on the matters dealt with or conclusions expressed in this report, even if WEPL has been advised of the possibility of such use or reliance).

Other parties should not rely on this report, or the accuracy or completeness of any conclusions contained in this report and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

This report is intended to be read in its entirety, and sections or parts of this report should therefore not be read and relied on out of context.

WEPL will not be liable to update or revise this report to take into account any events or circumstances or facts becoming apparent after the date of this report.

Executive Summary

Western Environmental Pty Ltd was commissioned by the City of Wanneroo to undertake a Basic Fauna Survey and Targeted Black Cockatoo Habitat Survey of Lot 600, Old Yanchep Road and Orchid Road, Neerabup. The Survey Area is a 23.42 ha in size.

Fauna

The Desktop likelihood of occurrence for conservation listed fauna species found that:

- One conservation listed fauna species *Zanda latirostris* (Carnaby's black cockatoo) Endangered (EN) was recorded as present.
- Three species had a high likelihood of occurrence.
- Two species had a medium likelihood of occurrence.
- Twenty-five species had a low likelihood of occurrence.

The three species were assessed as having a high likelihood of occurrence:

- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) (EN)
- *Isodon fusciventer* (Quenda, southwestern brown bandicoot) Priority 4 (P4)
- *Neelaps calonotos* (Black-striped snake, black-striped burrowing snake) Priority 3 (P3)

The two species were assessed as having a medium likelihood of occurrence:

- *Falco peregrinus* (Peregrine falcon) Other Specially Protected
- *Synemon gratiosa* (Graceful sun-moth) P4

Five fauna habitat types were identified within the Survey Area. These habitats are not considered to provide core habitat services for any of the conservation significant species identified as present or having a high likelihood of occurrence. Supporting habitat is provided for six conservation significant species.

Black Cockatoos

The Survey Area is within the modelled distribution for Carnaby's black cockatoo, and forest red-tailed black cockatoo. The Survey Area is outside of modelled breeding distribution for Baudin's black cockatoo and (DCCEEW, 2022).

Black Cockatoo Breeding Habitat Assessment

No Potential or Known nesting trees were recorded within the Survey Area.

Fifty-nine Potential nesting trees were recorded within the Survey Area. Forty-four Potential future nesting trees were recorded within the Survey Area.

Black Cockatoo Foraging Habitat Assessment

Foraging habitat quality was primarily rated using the Commonwealth Habitat Quality Scoring Tool (DCCEEW, n.d.). As per the Habitat Quality Scoring Tool areas with a site condition score of 2 or lower (low, negligible or none value) are "extremely unlikely to be considered as suitable habitat". These areas are therefore classified as not comprising suitable foraging habitat in this assessment. Foraging habitat was considered for Carnaby's black cockatoo, and forest red-tailed black cockatoo.

The Survey Area was assessed as containing 0.06 ha of suitable foraging habitat for Carnaby's black cockatoo and 0.02 ha of suitable foraging habitat for forest red-tailed black cockatoo. Foraging habitat quality extents within the Survey Area out of ten are:

- Carnaby's black cockatoo: 0.06 ha (8/10), 1.93 ha (6/10), 1.5 ha (2/10), 0.48 ha (1/10), 21.36 ha (0/10). Total of 0.06 ha of suitable foraging habitat and 23.34 ha of unsuitable foraging habitat.
- Forest red-tailed black cockatoo: 0.02 ha (7/10), 1.5 ha (2/10), 0.52 ha (1/10), 21.36 ha (0/10). Total of 0.02 ha of suitable foraging habitat and 23.4 ha of unsuitable foraging habitat.

Carnaby's black cockatoo foraging evidence (chewed banksia cones) was observed within the Survey Area.

Black Cockatoo Roosting Habitat Assessment

No evidence of roosting was recorded. Habitat types FHT-01 contain stands of tall trees which may provide suitable roosting habitat. Access to water is present (in the nearby lake Joondalup and Lake Mariginiup).

Acronyms and Abbreviations

| Abbreviation | Full Title |
|--------------|----------------------------------------------------------------------|
| BC Act | <i>Biodiversity Conservation Act 2016</i> |
| BoM | Bureau of Meteorology |
| °C | Degree Celsius |
| cm | Centimetres |
| CR | Critically Endangered |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DBH | Diameter at Breast Height |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DEWHA | Department of the Environment Water Heritage and the Arts |
| DPIRD | Department of Primary Industries and Regional Development |
| DWER | Department of Water and Environmental Regulation |
| EIA | Environmental Impact Assessment |
| EN | Endangered |
| EP Act | <i>Environmental Protection Act 1986</i> |
| EPA | Environmental Protection Authority |
| EPBC Act | <i>Environment Protection Biodiversity and Conservation Act 1999</i> |
| ESA | Environmentally Sensitive Area |
| GIS | Geographic Information System |
| ha | Hectare |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| IBSA | Index of Biodiversity Surveys for Assessments |
| km | Kilometres |
| m | Metres |
| mm | Millimetres |
| MA | Marine |
| MI | Migratory |
| MNES | Matters of National Environmental Significance |
| OS | Other Specially Protected |
| P | Priority |
| PEC | Priority Ecological Community |
| PMST | Protected Matters Search Tool |
| RAAF | Royal Australian Air Force |
| SCP | Swan Coastal Plain |

| Abbreviation | Full Title |
|--------------|---------------------------------------|
| T | Threatened |
| TEC | Threatened Ecological Community |
| VU | Vulnerable |
| WA | Western Australia |
| WC Act | <i>Wildlife Conservation Act 1950</i> |
| WEPL | Western Environmental Pty Ltd |

Table of Contents

| | | |
|-------|-----------------------------------------------------------------------------|----|
| 1. | Introduction | 1 |
| 1.1 | Project Background | 1 |
| 1.2 | Location | 1 |
| 1.3 | Objectives and Scope of Work | 1 |
| 1.4 | Relevant Legislation and Guidance | 3 |
| 1.5 | Survey Limitations and Constraints..... | 3 |
| 2. | Existing Environment..... | 6 |
| 2.1 | Climate and Pre-Survey Rainfall | 6 |
| 2.2 | Interim Biogeographic Regionalisation for Australia | 7 |
| 2.3 | Geology and Soils | 7 |
| 2.4 | Pre-European Vegetation Types..... | 9 |
| 2.4.1 | Vegetation Association Mapping..... | 9 |
| 2.4.2 | Vegetation Complex Mapping | 9 |
| 2.5 | Environmentally Sensitive Areas, Conservation Estate and Bush Forever | 11 |
| 2.6 | Wetlands and Hydrology | 11 |
| 3. | Methodology..... | 14 |
| 3.1 | Desktop Assessment..... | 14 |
| 3.1.1 | Database Searches | 14 |
| 3.1.2 | Likelihood of Occurrence..... | 14 |
| 3.2 | Basic Fauna Survey | 15 |
| 3.2.1 | Fauna Habitat Type Assessment..... | 16 |
| 3.2.2 | Fauna Taxonomy | 16 |

| | | |
|-------|-----------------------------------------|----|
| 3.3 | Black cockatoo Habitat Assessment..... | 16 |
| 3.3.1 | Breeding Habitat Assessment..... | 17 |
| 3.3.2 | Foraging Habitat Assessment | 19 |
| 3.3.3 | Roosting Habitat Assessment | 19 |
| 4. | Results..... | 20 |
| 4.1 | Literature Review | 20 |
| 4.2 | Fauna Desktop Assessment..... | 20 |
| 4.2.1 | Fauna Likelihood of Occurrence | 21 |
| 4.3 | Basic Fauna Field Survey | 23 |
| 4.3.1 | Fauna Assemblage..... | 23 |
| 4.3.2 | Fauna Habitat Types | 23 |
| 4.3.3 | Threatened and Priority Fauna..... | 30 |
| 4.4 | Black Cockatoo Habitat Assessment | 31 |
| 4.4.1 | Observations and Previous Records | 31 |
| 4.4.2 | Breeding Habitat Assessment..... | 31 |
| 4.4.3 | Foraging Habitat Assessment | 32 |
| 4.4.4 | Roosting Habitat Assessment | 37 |
| 5. | Discussion | 43 |
| 5.1 | Basic Fauna Survey | 43 |
| 5.2 | Black Cockatoo Habitat Assessment | 44 |
| 6. | References | 45 |

Tables (in text)

| | |
|----------------------------------------------------------------|----|
| Table 1: Limitations and Constraints of the Fauna Survey | 4 |
| Table 2 Bush Forever Areas adjacent to the Survey Area | 11 |
| Table 3: Database Searches of the Survey Areas | 14 |
| Table 4: Likelihood of Occurrence Criteria | 14 |

| | |
|-----------------------------------------------------------------------|----|
| Table 5: Survey Team | 15 |
| Table 6: Breeding Habitat Terminology..... | 17 |
| Table 7: Black cockatoo Breeding Habitat Trees- Bamford Class | 17 |
| Table 8: Review of Previous Studies | 20 |
| Table 9: Fauna Habitat Type Descriptions within the Survey Area | 24 |
| Table 10: Black cockatoo Nesting Hollow Characteristics | 31 |
| Table 11 Summary of Black Cockatoo breeding Habitat Trees | 32 |
| Table 12: Foraging Quality Scoring Tool (DCCEEW, 2022)..... | 33 |
| Table 13: Habitat Quality Scoring Tool- Site Condition Extent..... | 34 |
| Table 14: Habitat Quality Scoring Tool-Site Context | 35 |
| Table 15: Final Habitat Quality Scoring Tool Score..... | 35 |
| Table 16: Regional Foraging Habitat Extent | 36 |
| Table 17: Summary of Habitat Values | 43 |

Figures

| | |
|---------------------------------------------------------------------------------------|----|
| Figure 1: Survey Area Location | 2 |
| Figure 2: Geology Systems Intersecting the Survey Area (DIPRD-027) | 8 |
| Figure 3: Vegetation Complexes Intersecting the Survey Area (DBCA-046) | 10 |
| Figure 4: Environmentally Sensitive Areas, Conservation Estate and Bush Forever | 12 |
| Figure 5: Surface Water Features and Geomorphic Wetlands..... | 13 |
| Figure 6: Fauna DBCA Database Search Results (10 km Buffer)..... | 22 |
| Figure 7: Fauna Habitat Types and Conservation Significant Fauna Observations | 29 |
| Figure 8: Known Black Cockatoo Roosting and Breeding Sites within 12 km Buffer | 38 |
| Figure 9: Black Cockatoo Breeding Habitat | 39 |
| Figure 10: Carnaby's Black Cockatoo Foraging Habitat | 40 |
| Figure 11: Forest Red-Tailed Black Cockatoo Foraging Habitat | 41 |
| Figure 12: Black Cockatoo Foraging Habitat Extent (12 km Buffer). | 42 |

Appendices

| | |
|------------|--------------------------------------------------------------------|
| Appendix A | Legislation |
| Appendix B | Definitions and Criteria |
| Appendix C | Desktop Assessment Results and Likelihood of Occurrence Assessment |
| Appendix D | Black Cockatoo Potential Suitable and Known Breeding Trees |

Appendix E Black Cockatoo Habitat Quality Scoring Tool (DCCEEW, n.d)

1. Introduction

1.1 Project Background

The City of Wanneroo (the 'City') received clearing permits from the Department of Water and Environmental Regulation (DWER) (CPS 6359/3) and approvals from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) (EPBC 2007/3479) in 2015 for the development of part of the Lot 600, Old Yanchep Road and Orchid Road Neerabup.

The City intends to apply for a clearing permit for another portion of Lot 600, facilitating its development for a resource recovery centre.

To support the clearing permit in addition to the ecological baseline information provided by Ecoscape (2020), the City commissioned Western Environmental Pty Ltd (WEPL) to undertake a Basic Fauna Survey and Targeted Black Cockatoo Habitat Survey of the additional portion of lot 600 Neerabup (hereby referred to as the 'Survey Area').

1.2 Location

Lot 600 Neerabup (the 'Survey Area') is located approximately 40 kilometres (km) north of the Perth CBD within the Local Government Area of the City of Wanneroo. The Survey Area consists of a 23.42 hectare (ha) portion of Lot 600 and is presented below in Figure 1.

1.3 Objectives and Scope of Work

Specifically, the scope of works included:

- A desktop assessment of the survey with a 10km buffer including:
 - Review of existing biological information.
 - Database searches.
 - Assessment of the likelihood of occurrence of conservation significant fauna species and communities.
- Basic Fauna Survey.
- Black Cockatoo Habitat Assessment.
- Preparation of a technical report detailing the findings of the desktop assessment and field survey.
- Preparation of a geospatial data package prepared in accordance with Index of Biodiversity Surveys for Assessments (IBSA) requirements.

1.4 Relevant Legislation and Guidance

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

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Western Australian Environmental Protection Act 1986* (EP Act).
- *Western Australian Biodiversity Conservation Act 2016* (BC Act).
- *Western Australian Biodiversity Conservation Regulations 2018*.
- Department of the Environment (DotE) (2013). *Matters of National Environmental Significance. Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999*.
- Department of the Environment Water Heritage and the Arts (DEWHA) (2010). *Survey Guidelines for Australia's Threatened Birds*.
- Department of Climate Change, Energy, Environment and Water (DCCEEW) (2022). *Referral Guidelines for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed black cockatoo*.
- DCCEEW (2023- unpublished resource). *Habitat Scoring System for WA black cockatoo foraging habitat'* (the Habitat Quality Scoring Tool)

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. (2020). Technical Guidance – *Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. Known herein as the 'Fauna Survey Technical Guidance'.

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

1.5 Survey Limitations and Constraints

Limitations and constraints of the Basic Fauna Survey and Black Cockatoo Habitat Assessment as outlined in the Fauna Survey Technical Guidance are detailed below in Table 1.

Table 1: Limitations and Constraints of the Fauna Survey

| Possible Limitation | Degree of Limitation (Significant, Moderate or Negligible) | Potential Constraints on Survey Outcomes |
|-----------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Survey Level/ Scope | Negligible | The Basic Fauna Survey and Targeted Black Cockatoo Habitat Assessment is considered suitable based on species expected to be present and the extent and condition of vegetation/habitat present within the Survey Area. The level of information collected is suitable to provide information required to inform and support approvals and referrals. |
| Availability of contextual information at a regional and local scale | Negligible | All data required to complete the scope of works including regional and local contextual information was available. Department of Biodiversity Conservation and Attractions (DBCA) data was requested as part of the desktop assessment. |
| Site Access | Negligible | The Survey Area was readily accessed by vehicle and on foot. |
| Survey Intensity and Extent | Negligible | <p>Suitable survey effort by an experienced ecologist was applied. Survey effort include four person days of sampling of fauna and black cockatoo habitat.</p> <p>All planned Survey Areas were adequately sampled in line with the project scope of works. Survey effort for the Black Cockatoo Habitat Survey included every tree with a suitable DBH for support black cockatoo breeding as well as all areas of potential foraging and roosting habitat within the Survey Area boundary.</p> <p>All planned Survey Areas were adequately sampled in line with the project scope of works.</p> |
| Experience | Negligible | <p>The ecologist leading the Targeted Black Cockatoo Habitat Assessment; Jack Rogers has been conducting Basic Fauna Survey and Black Cockatoo Targeted Assessments in Western Australia for over a year. Jack Rogers is an experienced Ecologist from the UK who has over 3 years' experience in targeted fauna and ornithological surveys. Surveying Ecologist Renae Makin has over five years' experience in environmental consultancy and in undertaking fauna assessments.</p> <p>Technical support was provided by Andrew Fry who has been conducting fauna habitat assessments and black cockatoo targeted assessments in Western Australia for over 10 years including experience in the Swan Coastal Plain bioregion.</p> |
| Timing, weather, season | Negligible | <p>The Targeted Black Cockatoo Habitat Assessment was undertaken within the recommended timing for both foraging and breeding habitat for forest red-tailed black cockatoo (year-round) but outside of the recommended timing for breeding habitat survey for Carnaby's black cockatoo (July to December) (DCCEEW, 2022). Baudin's black cockatoo are not expected to occur within the Survey Area. Targeted searches were undertaken for secondary evidence of the species presence (i.e. foraging evidence which can be identified at any time of year) and to evaluate the potential suitability of the habitat.</p> <p>The temperatures and weather experienced during both field surveys were not considered to be a limitation to the survey and did not affect the ability to record fauna or habitats.</p> |

| Possible Limitation | Degree of Limitation (Significant, Moderate or Negligible) | Potential Constraints on Survey Outcomes |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | A Basic fauna survey aims to identify core and support habitat for a wide assemblages of fauna species, The timing and weather were not considered a significant limitations to the survey as specific species were not surveyed for, while habitat classification was possible throughout year and in a range of climatic conditions. |
| Proportion of the flora and fauna recorded and/or collected, and any identification issues | Negligible | Species sampling was in line with the technical guidance for Basic Fauna survey and Targeted Black Cockatoo Habitat Assessment |
| Mapping Reliability | Negligible | The majority of the Survey Areas was traversed by foot and mapping reliability is considered high. |
| Disturbances (fire, flood etc.) | Negligible | No recent fire evidence was observed within the Survey Area, Survey Area disturbance was at a level expected for a degraded, mixed-use lot. |

2. Existing Environment

2.1 Climate and Pre-Survey Rainfall

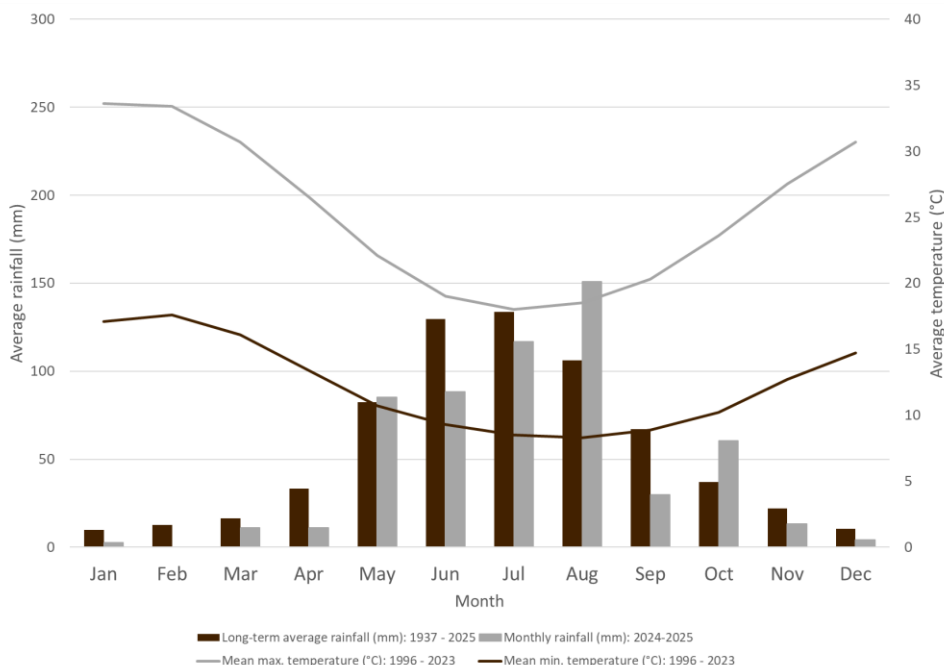
The Survey Area is located within the Swan Coastal Plain (SCP). In 1990, J. S. Beard (Beard, 1990) described the climate of the area as warm Mediterranean, with cool wet winters (May to September) and warm dry summers.

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

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

The long-term (1940-2025) mean minimum temperature was 8.3°C (August) to 17.6 °C (February) and the long-term mean maximum temperature ranges from 17.9 C (July) to 33.6°C (January) as presented below in Graph 1 (BoM, 2024).

The Pearce RAAF WA weather station recorded 574 millimetres (mm) of rainfall in the 12 months prior to the survey (February 2024 to March 2025), which is 87 mm below the long-term average of 660 mm (BoM 2025).



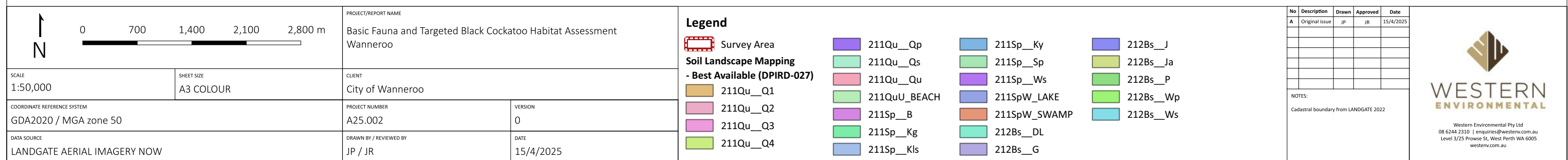
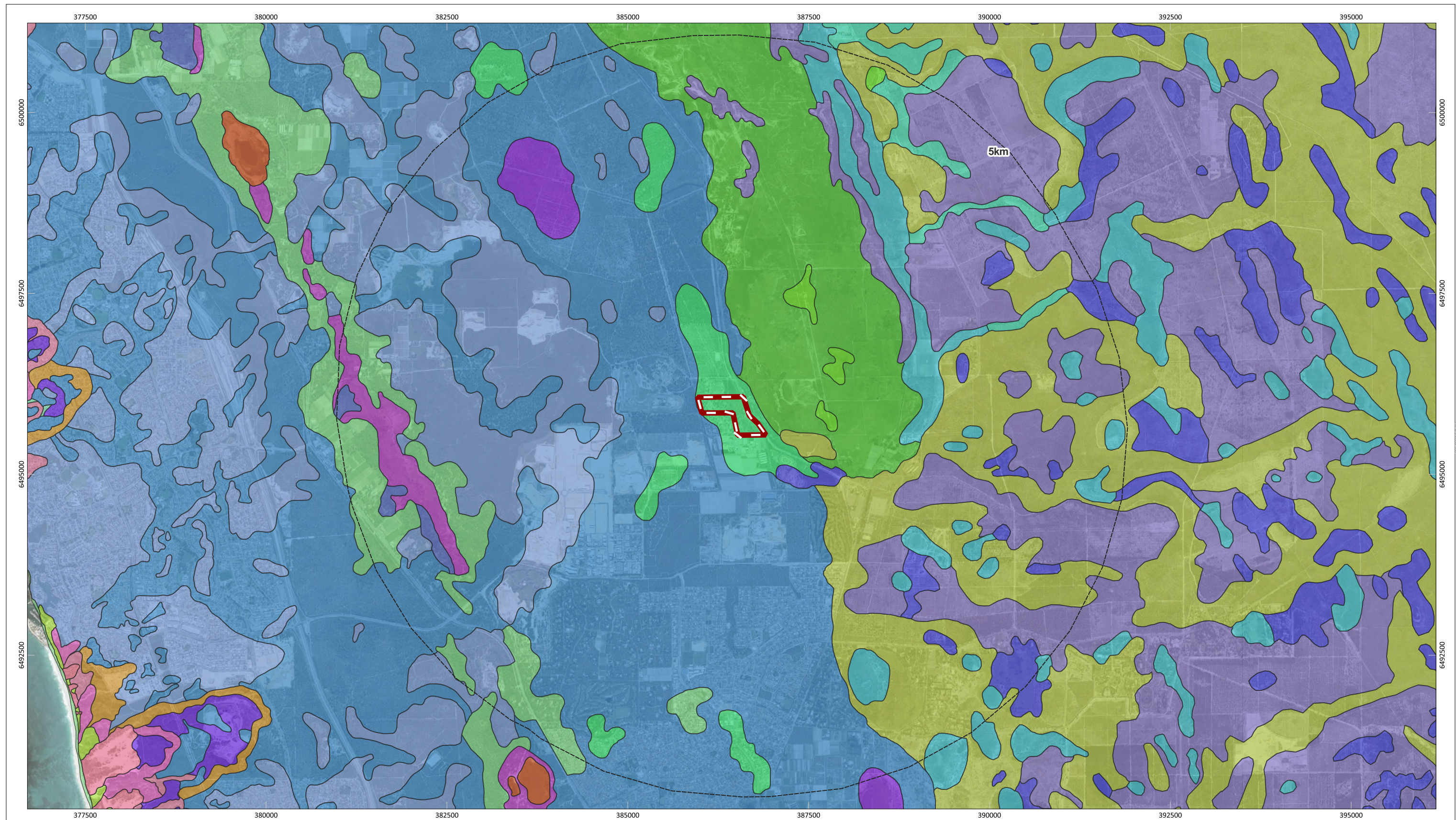
Graph 1: Long Term and Monthly Total Rainfall, Maximum and Minimum Temperatures for Pearce RAAF (Station 0092053) (BoM, 2024)

2.2 Interim Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical, and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (Commonwealth of Australia, 2012). The Survey Area is situated within the Swan Coastal Plain bioregion and the Swan Coastal Plain Perth (SWA02) subregion.

2.3 Geology and Soils

The geology units (DPIRD-027) intersecting the Survey Area as shown in Figure 2. The Survey Area is entirely within the Karrakatta Sand Grey Phase Mapping Unit (211Sp__Kg). The Karrakatta Sand Grey Phase Mapping Unit is described as low hilly to gently undulating terrain with iron podzols. Vegetation associated with the mapping unit is *Banksia spp* woodland with *E. todtiana* and depauperate *E. marginata* with a dense shrub layer.



2.4 Pre-European Vegetation Types

2.4.1 Vegetation Association Mapping

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

Beard's mapping attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps are maintained in digital form by DPIRD (2019). Extents are updated periodically by Department of Biodiversity, Conservation and Attractions (DBCA) (Government of Western Australia [GoWa], 2018).

2.4.2 Vegetation Complex Mapping

The vegetation complexes of the SCP were mapped by Heddle et al. (1980) at a scale of 1:250,000. According to this data, the Survey Area is primarily representative of two vegetation complex (see Figure 3):

- Karrakatta Complex-Central and South: 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.
- Pinjar Complex; Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Banksia* species to a fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca preissiana* (Moonah) and sedgelands.

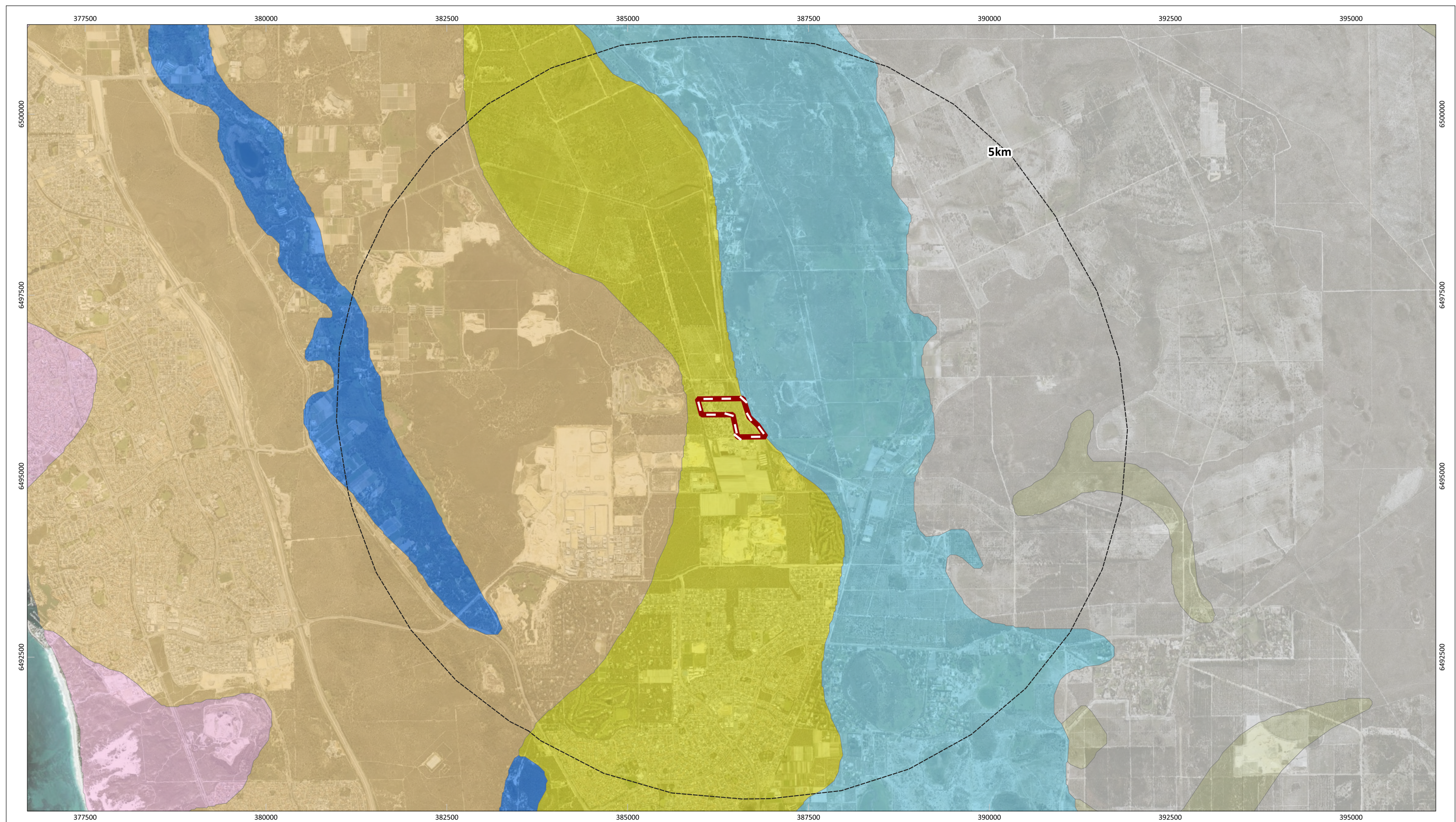


Figure 3: Vegetation Complexes Intersecting the Survey Area (DBCA-046)

| | | | |
|------------------------------------------------------|--|--------------------------------------------------------------------------------------------|-------------------|
| | | PROJECT/REPORT NAME Basic Fauna and Targeted Black Cockatoo Habitat Assessment Wanneroo | |
| SCALE 1:50,000 | | CLIENT City of Wanneroo | |
| COORDINATE REFERENCE SYSTEM GDA2020 / MGA zone 50 | | PROJECT NUMBER A25.002 | VERSION 0 |
| DATA SOURCE LANDGATE AERIAL IMAGERY NOW | | DRAWN BY / REVIEWED BY JP/JR | DATE 15/4/2025 |

Legend

- Survey Area
- Vegetation Complexes - Swan Coastal Plain (DBCA-046)
- Bassendean Complex-North
- Bassendean Complex-North Transition
- Karrakatta Complex-Central and South
- Cottesloe Complex-Central and South
- Herdsman Complex
- Pinjar Complex
- Quindalup Complex

| No | Description | Drawn | Approved | Date |
|----|----------------|-------|----------|-----------|
| A | Original issue | JP | JR | 15/4/2025 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

NOTES:

Cadastral boundary from LANDGATE 2022.
Label corresponds to the vegetation association number.

Western Environmental Pty Ltd
 08 6244 2310 | enquiries@western.com.au
 Level 3/25 Prowse St, West Perth WA 6005
 western.com.au

2.5 Environmentally Sensitive Areas, Conservation Estate and Bush Forever

Environmentally Sensitive Areas (ESAs) are declared by DWER to prevent the degradation of important environmental values such as Threatened Flora, Threatened Ecological Communities (TECs) or significant wetlands.

Conservation Estate are declared by DBCA to manage and protect important conservation values.

Bushland Policy for the Perth Metropolitan Region aims to provide a policy and implementation framework that ensures bushland protection and management issues throughout the Perth Metropolitan Region are adequately addressed and integrated with broader land use planning and decision-making (WAPC 2021). The policy predominantly deals with two distinct subjects, Bush Forever areas and local bushland areas.

The Survey Area intersects one ESA (DWER-046). This ESA is the 50 metre (m) buffer of a conservation listed wetland (DBCA-019) (see Figure 4 below).

The Survey Area does not intersect any Bush Forever Areas (DPLH-019) or other sites in the Conservation Estate, however the Survey Area is immediately adjacent to two Bush Forever Areas (see Table 2).

Table 2 Bush Forever Areas adjacent to the Survey Area

| Bush Forever ID | Bush Forever Name |
|-----------------|------------------------------------------------------------------------------------|
| 428 | State Forest 65 - Pinjar Plantation South Bushland (10) Nowergup/ Yanchep/Neerabup |
| 382 | Lake Pinjar and Adjacent Bushland, Pinjar |

2.6 Wetlands and Hydrology

The Survey Area intersects the very edge of a Conservation listed Sumpland Lake Pinjar (UID 13373) on its eastern edge (DBCA-019), as shown in Figure 5.

No Ramsar Site intersects the Survey Area. The Survey Area does not intersect with any wetlands listed under the Directory of Important Wetlands in Australia (DBCA-045) or any drainage lines (DWER-031).

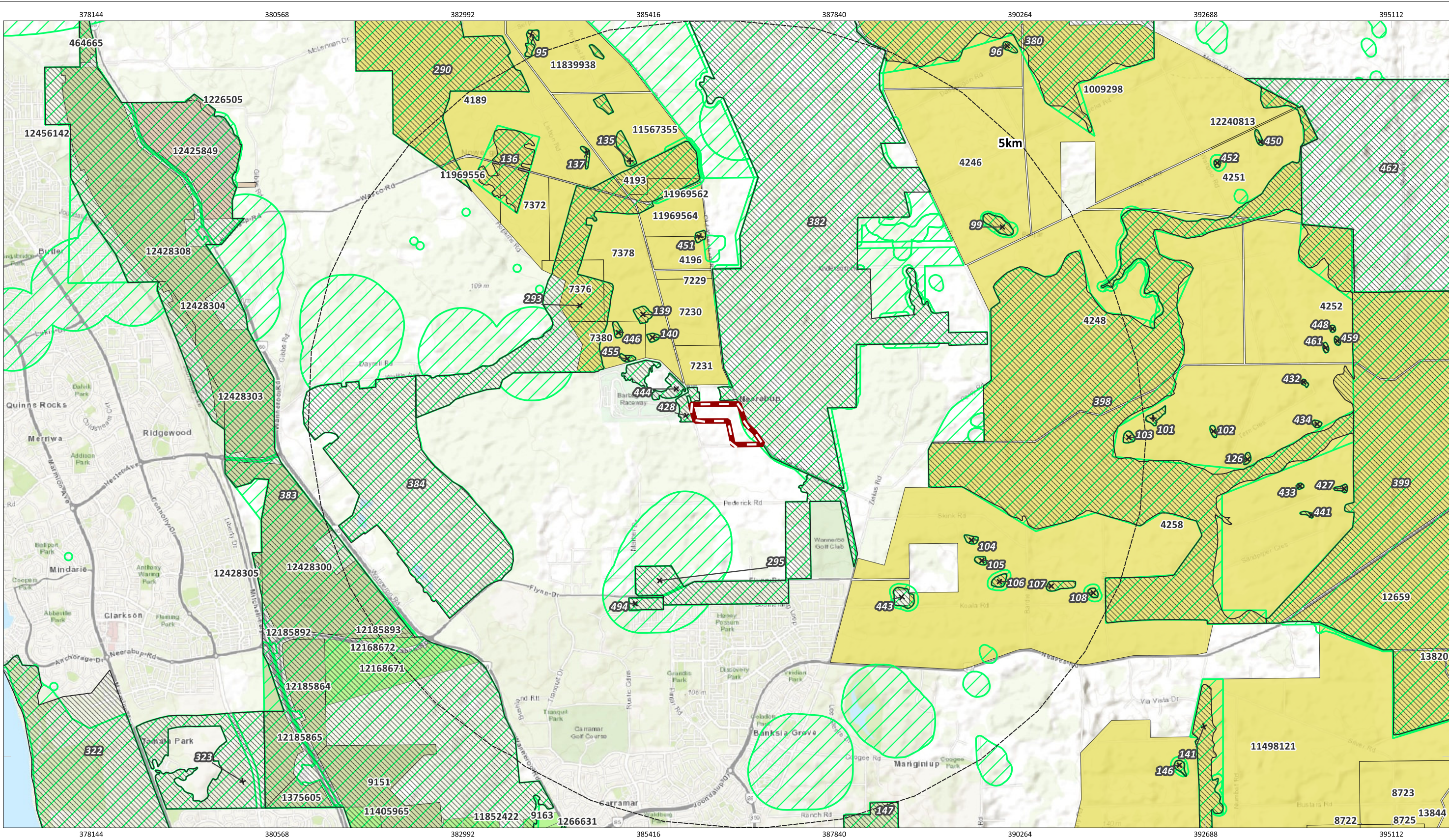


Figure 4: Environmentally Sensitive Areas, Conservation Estate and Bush Forever

0700140021002800

SCALE

1:48,475

SHEET SIZE

A3 COLOUR

COORDINATE REFERENCE SYSTEM

GDA2020 / MGA zone 50

DATA SOURCE

LANDGATE AERIAL IMAGERY NOW

PROJECT/REPORT NAME

Basic Fauna and Targeted Black Cockatoo Habitat Assessment Wanneroo

CLIENT

City of Wanneroo

PROJECT NUMBER

A25.002

VERSION

0

DRAWN BY / REVIEWED BY

JP/JR

DATE

15/4/2025

Legend

Survey Area

Bush Forever Areas - 2000 (DPLH-019)

Clearing Regulations - Environmentally Sensitive Areas (DWER-046)

DBCA - Legislated Lands and Waters (DBCA-011)

National Park

Nature Reserve

State Forest

Crown Freehold - Dept Managed

| No | Description | Drawn | Approved | Date |
|----|----------------|-------|----------|-----------|
| A | Original Issue | JP | JR | 15/4/2025 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

WESTERN ENVIRONMENTAL

Western Environmental Pty Ltd

08 6244 2310 | enquiries@western.com.au

Level 3/25 Prowse St, West Perth WA 6005

western.com.au

G:\GIS\Project Data\A25.002\3. Projects\A25.002\A25.002.qgz

COPYRIGHT: This document is and shall remain the property of The Client. This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement. The Client does not hold any responsibility for the misuse of this document. Designed and Automated by AC

3. Methodology

3.1 Desktop Assessment

3.1.1 Database Searches

Database searches of DBCA records were undertaken to compile a list of potential conservation significant fauna previously recorded within or surrounding the Survey Areas (see Table 3). In addition, an EPBC Protected Matters Search Tool (PMST) search was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Areas (DCCEEW, 2024).

Table 3: Database Searches of the Survey Areas

| Database Name | Date Received and Reference Number | Search Type | Search Area |
|-----------------------------------------------------------------|------------------------------------|---------------------------------------------------------|--------------------------------------|
| DBCA Threatened and Priority Fauna database search (DBCA, 2025) | 13/02/2025 11-0225FA. | Threatened and Priority Fauna | 10 km buffer around the Survey Areas |
| Protected Matters Search Tool (DCCEEW, 2025) | 13/03/2025 . | Commonwealth listed Threatened Flora and fauna and TECs | 10 km buffer around the Survey Areas |

3.1.2 Likelihood of Occurrence

Conservation listed fauna identified from the desktop assessment were assessed to determine their likelihood of their occurrence within the Survey Area. The assessment was completed based on the likelihood of occurrence criteria presented in Table 4.

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

Species listed as Marine (MA) only under the EPBC Act (e.g. sharks, whales, turtles) and pelagic seabirds have been excluded from the likelihood of occurrence list as there is no marine habitat present within the Survey Area.

Table 4: Likelihood of Occurrence Criteria

| Likelihood | Criteria |
|------------|-----------------------------------------------------------------------------------------------------|
| Recorded | Recorded in the Survey Area from database searches, previous survey by others or by current survey. |
| High | Records of fauna species <10 km from the Survey Area. With record <20 years old; or |

| Likelihood | Criteria |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>For species with well understood and specific habitat preference/ requirements, when specific habitat is present in the Survey Area, and records present <10 km from the Survey Area.</p> <p>Species with general habitat preference, which is present in the Survey Area, and records present <5 km from the Survey Area.</p> |
| Medium | <p>There are records <10 km from the Survey Area, however:</p> <p>The species is strongly linked to a specific habitat, which is marginally suitable or small in extent in the Survey Area; or</p> <p>Species has a general habitat preference, but small extent of suitable habitat is present.</p> <p>There is suitable habitat in the Survey Area, but records are >10 km from Survey Area.</p> |
| Low | <p>Records are historical only or are pre mapping procedures (e.g. records assigned to towns or place names).</p> <p>The species has a well understood and specific habitat preference/ requirements, which is absent from the Survey Area; or</p> <p>Suitable habitat is present, however there are no existing records of the species from the region despite reasonable previous search effort; or</p> <p>There is some suitable habitat in the Survey Area, however the species is very infrequently recorded in the locality (e.g. migratory bird species).</p> |

3.2 Basic Fauna Survey

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

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

The fauna survey was undertaken over two consecutive days: the 19th and 20th of March 2025. Details of the field survey team are presented below in Table 5.

Table 5: Survey Team

| Name | Position and years of Experience |
|-------------|----------------------------------|
| Jack Rogers | Environmental Scientist, 3 years |
| Renaë Makin | Environmental Scientist, 5 years |

3.2.1 Fauna Habitat Type Assessment

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

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

- Land systems and landform.
- Vegetation type and condition mapping.
- Soil characteristics.
- Structure such as rockpiles and logs.
- Fauna assemblage information from desktop assessment and field observations.
- Aerial imagery and historic imagery.

3.2.2 Fauna Taxonomy

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

Taxonomy and nomenclature follow the WA Museum checklist 2024 (Western Australian Museum, 2024). Conservation status follows the DBCA Threatened and Priority fauna list (DBCA, 2024). Where required verification of identification of secondary evidence (tracks, scats, diggings) may be undertaken by a relevant species group expert.

3.3 Black cockatoo Habitat Assessment

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

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

In the SCP, Carnaby's are present at any time of year, most commonly from January through to July, some individuals being present all year round. The timing of the survey in November provided good opportunity to record foraging individuals and nesting for Carnaby's black cockatoo. If no individuals are present, searching

for foraging evidence is a reliable alternative as it will generally persist in the landscape (particularly chewed marri nut) (DCCEEW, 2022).

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

3.3.1 Breeding Habitat Assessment

The Commonwealth defines breeding habitat as that which contains known, suitable or potential nesting trees, and which occurs within the range of the species. Terminology used in this report for breeding habitat trees follows that defined in glossary of DCCEEW (2022) as shown in Table 6

Table 6: Breeding Habitat Terminology

| Breeding Habitat Term | Definition (DCCEEW, 2022) |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Known nesting trees | Trees (live or dead but still standing) which contains a hollow where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks or feathers). |
| Suitable nesting trees | Trees with suitable nesting hollows present, although no evidence of use. |
| Suitable nesting hollows | Any hollow with dimensions suitable for use for nesting by black cockatoos. |
| Potential nesting trees | Trees that have a suitable Diameter at Breast Height (DBH) to develop a nest hollow, but do not currently have hollows. For most species of trees, suitable nest hollows are only found in live trees with a DBH of at least 500 mm. |
| Potential future nesting trees | Trees suitable to develop a nest hollow in the future are 300-500 mm DBH. |

In addition to Commonwealth guidelines for assessing breeding habitat trees, a scoring system based on that developed by Dr Mike Bamford (referred to as Bamford Class) was applied to class breeding habitat trees. This system and the Bamford Class alignment with DCCEEW (2022) breeding habitat terminology are shown in Table 7.

Table 7: Black cockatoo Breeding Habitat Trees- Bamford Class

| Bamford Class | Description of Tree and Hollows/Activity | Alignment with DAWE (2022) Breeding Habitat Terminology |
|---------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 1 | Active nest observed; adult (or immature) bird seen entering or emerging from hollow, eggs present. | Known nesting tree |
| 2 | Hollow of suitable size and angle visible with chew marks attributed to black cockatoo nesting activity around entrance. | Known nesting tree |

| Bamford Class | Description of Tree and Hollows/Activity | Alignment with DAWE (2022) Breeding Habitat Terminology |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 3 | Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present if from ground-based assessment only (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10 m with thin rim). | Suitable nesting tree |
| 4 | Tree with hollows or broken branches that might or do contain hollows, but hollows or potential hollows are not of a suitable size, or are aligned or obstructed so as to prevent access | Potential nesting tree |
| 5 | Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown. | Potential nesting tree |
| No Class | No description. Potential future nesting trees were not considered in the Bamford Class scale. | Potential future nesting trees |

All breeding habitat trees were recorded using a mobile GIS field data collector platform. The following was recorded for each tree:

- Species.
- DBH (approximately 1.3 m from the ground).
- Coordinates.
- Presence of hollows (as observable from the ground).
- Bamford Class (see below).

Trees identified as potentially having suitable hollows present were inspected using a pole camera to determine the hollows internal dimensions. Hollow information recorded included:

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

3.3.2 Foraging Habitat Assessment

The Commonwealth defines foraging habitat as areas including plants of species known to support foraging within the range of each black cockatoo species. Marri and jarrah woodlands are particularly important to forest red-tailed black cockatoo, while proteaceous heaths (shrublands dominated by *Banksia*, *Hakea* and *Grevillea* species) are also utilised by Carnaby's black cockatoo (DCCEEW, 2022).

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

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

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

3.3.3 Roosting Habitat Assessment

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

4. Results

4.1 Literature Review

A literature review was undertaken of previous terrestrial fauna studies considered relevant to the current Survey Area, to inform the targeted Black Cockatoo assessment and Basic Fauna Survey. A summary of the key findings relevant to the survey is provided below in Table 8.

Table 8: Review of Previous Studies

| Source- Title | Key Findings |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecoscape (2021) Neerabup Industrial Area - Environmental Assessment Report (Fauna) | <p>The basic fauna survey undertaken in October 2020 of the area adjacent to the Survey Area recorded the following:</p> <ul style="list-style-type: none"> • two fauna habitat types - Woodlands and Degraded Grasslands • 28 species detected during the basic survey • 226 previously recorded fauna species including 12 threatened and priority fauna species • three conservation listed species were recorded during the field survey, Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>), Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>), and Quenda (<i>Isoodon fusciventer</i>). |
| ATA Environmental (2007) Neerabup Industrial Area Flora Vegetation And Vertebrate Fauna Assessment | <p>Flora Vegetation and Vertebrate Fauna (Basi Fauna) Survey of the adjacent Neerabup Industrial Area (NIA)</p> <p>Two species (Carnaby's cockatoo and peregrine falcon) of conservation concern that are listed under the EPBC Act 1999 or the Wildlife Conservation Act 1950 were recorded during the survey. In addition, four other species of conservation concern (western brush wallaby, southern brush-tailed phascogale, black-striped snake, and southern brown bandicoot) have been recorded in the region in previous surveys. A ninth species (Chuditch) was known from the region but had not been recorded by ATA Environmental during this survey or previous surveys in similar habitat in the region.</p> |

4.2 Fauna Desktop Assessment

The database searches identified 31 conservation listed fauna species that potentially occur, or habitat likely occurs within the Survey Area, comprising:

- Twenty-three bird species.
- Five mammal species.
- One reptile species.
- Two invertebrate species.

The results of the DBCA Threatened and Priority Fauna database search are shown in Figure 6. Database searches results and desktop likelihood of occurrence assessment are summarised in Appendix C.

4.2.1 Fauna Likelihood of Occurrence

The likelihood of occurrence for conservation listed fauna species found that:

- One conservation listed fauna species; *Zanda latirostris* (Carnaby's black cockatoo) Endangered (EN) was recorded as present.
- Three species had a high likelihood of occurrence.
- Two species had a medium likelihood of occurrence.
- Twenty-five species had a low likelihood of occurrence.

The results of the likelihood of occurrence assessment are presented in Appendix C.

The three species were assessed as having a high likelihood of occurrence:

- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) EN
- *Isodon fusciventer* (Quenda, southwestern brown bandicoot) Priority 4 (P4)
- *Neelaps calonotos* (Black-striped snake, black-striped burrowing snake) Priority 3 (P3)

The two species were assessed as having a medium likelihood of occurrence:

- *Falco peregrinus* (Peregrine falcon) Other Specially Protected (OS)
- *Synemon gratiosa* (Graceful sun-moth) P4

The species assessed as low likelihood of occurrence are species that are locally extinct, have no recent records or for which no suitable habitat is present (e.g. wading birds). Species recorded or assessed as having a high or medium likelihood of occurrence are discussed in detail in Section 4.3.3.

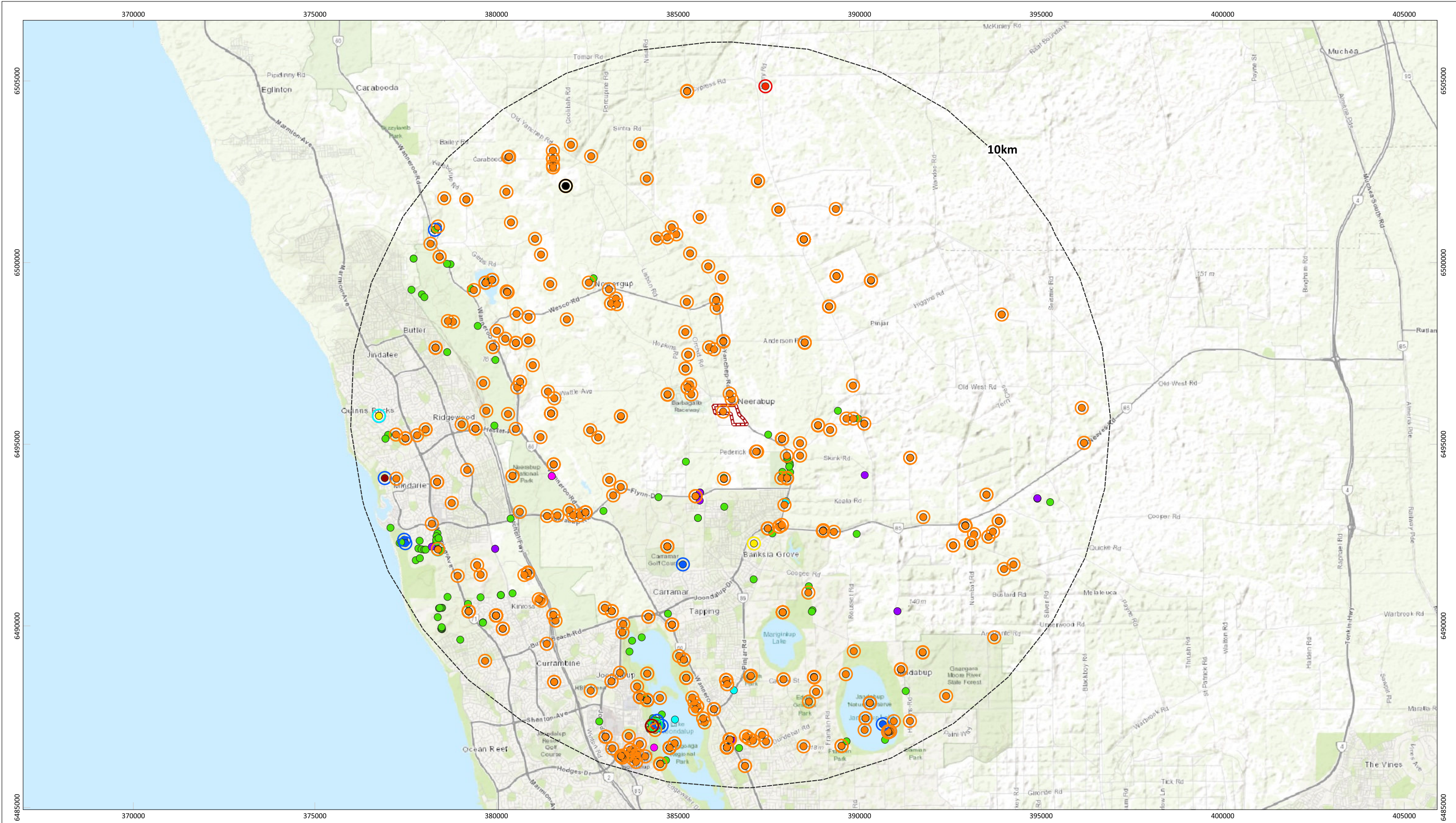


Figure 6: DBCA Database Search Results Fauna

0

1,500

3,000

4,500

6,000 m

SCALE

1:100,000

SHEET SIZE

A3 COLOUR

PROJECT/REPORT NAME

Basic Fauna and Targeted Black Cockatoo Habitat Assessment Wanneroo

CLIENT

City of Wanneroo

PROJECT NUMBER

A25.002

VERSION

0

DRAWN BY / REVIEWED BY

JP/JR

DATE

22/4/2025

Legend

Survey Area

DBCA Threatened and Priority Fauna (WA Status)

Extinct species

Conservation dependent and migratory species

Critically endangered species

Endangered species

Vulnerable species

Priority 2

Priority 3

Priority 4

Migratory species

Other specially protected species

DBCA Threatened and Priority Fauna (EPBC Status)

Extinct species

Critically endangered species

Critically endangered and migratory species

Endangered species

Endangered and migratory species

Vulnerable species

Vulnerable and migratory species

Migratory species

No

Description

Drawn

Approved

Date

A

Original issue

JP

JR

22/4/2025

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

WESTERN ENVIRONMENTAL

Western Environmental Pty Ltd

08 6244 2310 | enquiries@western.com.au

Level 3/25 Prowse St, West Perth WA 6005

western.com.au

G:\GIS\Project Data\A25\A25.002\3. Projects\A25.002\A25.002.qgz

COPYRIGHT: This document is and shall remain the property of The Client. This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement. The Client does not hold any responsibility for the misuse of this document. Designed and Automated by AC

4.3 Basic Fauna Field Survey

4.3.1 Fauna Assemblage


As per the scope of a basic fauna survey under the Technical Guidance the primary objectives are to verify the overall adequacy of the desktop study, and to map and describe habitats, with a focus on habitat for conservation listed fauna.


4.3.2 Fauna Habitat Types


Seven habitat types were described. The fauna habitat types are described below in Table 9 and shown in Figure 7.

For possibly occurring conservation listed fauna species, habitat types are assessed as either core, supporting or non-significant habitat. As per Commonwealth MNES – Significant Impact Guidelines 1.1 “core” habitat is defined as that critical to the survival of the species and considered to contain denning/ breeding sites, primary foraging areas and refuge from drought, fire and other stresses (DotE, 2013). “Supporting” habitat is defined as that which is likely used for foraging and dispersing/ connective purposes but is not essential habitat for the continuation of a local population. “Non-significant” habitat is that which would be used only very infrequently for foraging or dispersing. Discussion of habitat type suitability for species identified as having a high or medium likelihood of occurrence is provided in Table 9 and discussed in Section 4.2.3.


Table 9: Fauna Habitat Type Descriptions within the Survey Area

| Fauna Habitat Type | Habitat Description | Total Area (ha), Proportion of the Survey Area (%) | Representative Photo |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------|
| FHT-01 - Stands of small-fruited eucalyptus | Native SCP species including <i>E. rudis</i> and <i>E. todtiana</i> . non-native planted Eucalyptus, over open paddock of short grassland offering minimal habitat values. | |  |
| | Not core habitat for listed species. | | |
| | Supporting habitat for: Carnaby's black cockatoo Forest red-tailed black cockatoo Quenda Peregrine falcon | 1.52 6.53 % | |
| | Non-significant habitat for: Peregrine falcon Black-striped snake Graceful sun-moth | | |

| Fauna Habitat Type | Habitat Description | Total Area (ha), Proportion of the Survey Area (%) | Representative Photo |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------|
| FHT-02- Individual Banksia | Sparse <i>Banksia spp.</i> over weeds. | |  |
| | Not core habitat for listed species. | | |
| | Supporting habitat for: Carnaby's black cockatoo | 0.06 | |
| | Quenda | | |
| | Black-striped snake | 0.26 % | |
| | Graceful sun-moth | | |
| | Non-significant habitat for: Forest red-tailed black cockatoo | | |
| | Peregrine falcon | | |
| FHT-03- Nuytsia grove | Shrubland of native species (<i>Jacksonia spp</i>) and weeds, dominated by <i>Nuytsia floribunda</i> over weeds. | 0.46 | Not photographed |
| | Not core habitat for listed species. | 1.96 % | |
| | Supporting habitat for: Quenda | | |

| Fauna Habitat Type | Habitat Description | Total Area (ha), Proportion of the Survey Area (%) | Representative Photo |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------|
| | Black-striped snake Graceful sun-moth Non-significant habitat for: Carnaby's black cockatoo Forest red-tailed black cockatoo Peregrine falcon | | |
| FHT-04 - Sheoak grove | Individual <i>Allocasuarina fraseriana</i> over small native shrubs and weeds Not core habitat for listed species. Supporting habitat for: Forest red-tailed black cockatoo Non-significant habitat for: Carnaby's black cockatoo Peregrine falcon Quenda Graceful sun-moth Black-striped snake | 0.02 0.04 % |  |

| Fauna Habitat Type | Habitat Description | Total Area (ha), Proportion of the Survey Area (%) | Representative Photo |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------|
| FHT-05 - individual Jarrah | <p>Individual <i>Eucalyptus marginata</i> with a DBH greater than 30cm, over small native shrubs and weeds.</p> <p>Not core habitat for listed species.</p> <p>Supporting habitat for: Carnaby's black cockatoo Forest red-tailed black cockatoo</p> <p>Non-significant habitat for: Peregrine falcon Quenda Graceful sun-moth Black-striped snake</p> | Negligible | Not photographed |

| Fauna Habitat Type | Habitat Description | Total Area (ha), Proportion of the Survey Area (%) | Representative Photo |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------|
| BG-01- Bare ground, sand with sparse weeds. | Bare sandy ground and unvegetated sand, sparsely vegetated sand with occasional large <i>Melaleuca preissiana</i> , ground dominated by weeds. | |  |
| | Not core habitat for listed species. | | |
| | Supporting habitat for: Black striped burrowing snake | 21.36 | |
| | Non-significant habitat for: Carnaby's black cockatoo Forest red-tailed black cockatoo Peregrine falcon Quenda Graceful sun-moth | 91.20 % | |
| Total | | 23.42 | |

4.3.3 Threatened and Priority Fauna

Fauna species of conservation significance which were recorded as present or assessed as having a high or medium likelihood of occurrence (excluding black cockatoo species) are discussed in detail below.

Black cockatoo species were subject to a specific targeted habitat assessments which is presented in Section 4.3 below.

Black-striped snake, black-striped burrowing snake - P3

Black-striped snake (*Neelaps calonotos*) is listed as a Priority 3 species by DBCA. The species inhabits coastal dunes and sandplains that support heath or banksia woodland.

As a subterranean sand dwelling nocturnal species, the majority of the Survey Area consists of supporting habitat for this species.

There is one DBCA records of this species within the 10 km buffer of the Survey Area within the last 20 years. This species is likely infrequently recorded due to its nocturnal and subterranean habit.

Peregrine falcon - OS

Peregrine falcon (*Falco peregrinus*) is listed as a species in need of Other Specially Protected (OS), a cosmopolitan species that predates other bird species, it can be found in an extremely wide range of habitats. Habitats within the Survey Area have the potential to support a number of potential prey species, as well as perches that the Peregrine Falcon could use to prepare their prey. There is no breeding habitat present within the Survey Area for the Peregrine falcon, which require steep cliffs or built structures that serve as bio-mimics of their preferred cliffside nesting habitat.

There are six DBCA records of Peregrine falcons within 10 km of the Survey Area within the last 20 years. The species is likely to be only infrequently present, FHT-01 provides the only supporting habitat and other habitat types are considered non-significant habitat for the species.

Quenda, southwestern brown bandicoot - P4

Quenda (*Isoodon fusciventer*) is listed as a Priority 4 species by DBCA. Preferred habitat for the species is dense understory such as around swamps or in banksia and jarrah woodlands. The DBCA database search returned 72 records of quenda within a radius of 10 km from the Survey Area within the last 20 years, FHT-01, 02 and 03 provide supporting habitat for this species.

Graceful sun-moth - P4

Graceful sun-moth (*Synemon gratiosa*) is listed as is listed as a Priority 4 species by DBCA. Graceful sun-moth is associated with coastal heath land, dense and numerous vegetation and banksia woodland. The DBCA database search returned 20 records of graceful sun-moth within a radius of 10 km from the Survey Area within the last 20 years, FHT-02 and 03 provide supporting habitat for this species.

Graceful sun-moth require the host plant *Lomandra hermaphrodita* to complete their life cycle. *L. hermaphrodita* was not specifically surveyed for, however is common in banksia woodlands in the Wanneroo area; it was therefore assumed to be likely present. Graceful sun-moth has been given a precautionary Medium likelihood of occurrence

4.4 Black Cockatoo Habitat Assessment

4.4.1 Observations and Previous Records

The Survey Area falls within the modelled distribution and breeding range for Carnaby's black cockatoo and forest red-tailed black cockatoo and outside the modelled breeding and foraging range of Baudin's black cockatoo (DCCEEW, 2022). Carnaby's black cockatoo foraging evidence (chewed banksia cones) was identified as present within the Survey Area. Small flocks of Carnaby's cockatoos were observed commuting over the Survey Area on both days of the survey. No foraging evidence of forest red-tailed-Black cockatoo was observed within the Survey Area. There were no opportunistic sightings of forest red-tailed black cockatoo within the Survey Area.

There is a confirmed Carnaby's black cockatoo breeding location 7.5 km southwest of the Survey Area in the Edith Cowan University Campus at Lake Joondalup (DBCA database search). There are also two confirmed Carnaby's black cockatoo breeding locations approximately 20 km northwest and northeast respectively (DBCA-054) The Survey Area does not overlap with the (12 km) key foraging area buffer of these confirmed breeding locations. Seven mapped black cockatoo roosting sites are present within 6 km of the Survey Area (DBCA-064). All are confirmed Carnaby's black cockatoo roost sites (DBCA-064). See Figure 8.

4.4.2 Breeding Habitat Assessment

Breeding habitat is defined as that which contains known, suitable or potential nesting trees (DCCEEW, 2022). Breeding typically occurs in native eucalypt species particularly marri, karri, wandoo and tuart however many species of eucalypt including non-endemic species may develop suitable nesting hollows (DCCEEW, 2022). A summary of understood suitable nesting hollow characteristics for the three species is provided below in Table 10.

Table 10: Black cockatoo Nesting Hollow Characteristics

| | Carnaby's black cockatoo | Forest red-tailed black cockatoo |
|----------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Tree species and hollow characteristic | Nesting mainly in salmon gum, wandoo, tuart, jarrah, flooded gum, karri and marri. | Nesting mainly in jarrah, marri, karri, wandoo, bullich, blackbutt and tuart |
| | Utilise hollows from 10-65 cm diameter (average 26 cm) and >1 m deep | Utilise hollow from 12-150 cm diameter (average 34 cm) and >1 m depth |
| | | DCCEEW, 2022, Johnstone et al., 2013. |

| | Carnaby's black cockatoo | Forest red-tailed black cockatoo |
|--|---------------------------------------------------------------|----------------------------------|
| | DCCEEW, 2022, Saunders et al., 2014a, Saunders et al., 2014b. | |

Known and Suitable Nesting Trees

None of the 103 trees recorded within the Survey Area were identified as Known or Suitable nesting trees.

Potential Nesting Trees

A total of 59 Potential breeding trees were recorded. See Figure 9 for tree locations and Appendix D for summary of tree locations, species and DBH. Trees within the Survey Area either showed no signs of potential nesting hollow development (Bamford class 5), or were Trees with hollows or broken branches that might or do contain hollows, but hollows or potential hollows are not of a suitable size or are aligned or obstructed so as to prevent access (Bamford class 4). A breakdown of tree results is presented in Table 11.

Table 11 Summary of Black Cockatoo breeding Habitat Trees

| Bamford Class | Class 1 | Class 2 | Class 3 | Class 4 or 5 | | |
|------------------------------------------------------------------------|--------------------|-----------------------|------------------------|--------------------------------|----------------|-----|
| DAWE, 2022 Terminology | Known Nesting Tree | Suitable Nesting Tree | Potential Nesting Tree | Potential future nesting trees | Totals (Trees) | |
| Tree Species | | | | | | |
| Coastal Blackbutt (<i>Eucalyptus tottiana</i>) | - | - | - | 10 | 18 | 28 |
| Small fruited Eucalypt (<i>E. rudis</i> and <i>E. camaldulensis</i>) | - | - | - | 45 | 25 | 70 |
| Dead | - | - | - | 4 | 0 | 4 |
| Jarrah | - | - | - | | 1 | 1 |
| Total (Bamford Class | 0 | 0 | 0 | 59 | 44 | 103 |

Potential Future Nesting Trees

A total of 44 trees had a DBH less than 50 cm and greater than 30 cm and were therefore classified as Potential future nesting trees.

4.4.3 Foraging Habitat Assessment

The habitat within the survey area primarily comprised of large areas of open sand with sparse weeds and occasional native species and occasional large trees.

The eastern half of the Survey Area contains a number of large, poor condition or dead eucalypts which do not comprise important foraging resources for either species of black cockatoo, and large moonah trees (*Melaleuca preissiana*) which is not a foraging species for black cockatoo. Moonah were mapped under BG- 01 and are not represented separately in Figure 7. The western half of the Survey Area mostly comprised sparse groves of coastal blackbutt (*E. tottiana*) and Western Australian Christmas tree (*N. floribunda*), which also do not constitute important foraging resources for black cockatoo. Occasional stands of banksia (*B. attenuata* and *B. ilicifolia*) are present within the Survey Area and constitute good foraging habitat for Carnaby's black cockatoo, which was evidenced by instances of foraged banksia cones. The Survey Area contained occasional small groves of sheoak (*A. fraseriana*) which is a high value foraging species for forest red-tailed black cockatoo.

The Commonwealth referral guideline provides a foraging quality scoring tool to guide referral information (DCCEEW, 2022). The tool advises that if the Survey Area contains native vegetation used for foraging at any time by a black cockatoo species and is >1 ha in size, that it is considered at face value to be of very high quality and assigned a starting score of 10. The tool then allows for subtractions if attributes are present which reduce the functionality of the foraging habitat. The Commonwealth referral guidelines specify that the tool is to be applied once to the entire impact area even if there is more than one type of foraging habitat present. The calculated foraging habitat quality score is shown below in Table 12. Scores of 5-10 are identified as representing high value foraging habitat.

Table 12: Foraging Quality Scoring Tool (DCCEEW, 2022)

| Attribute | Carnaby's black cockatoo | Forest red-tailed black cockatoo |
|------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Starting score | 10 - Foraging habitat more than 1 ha | 10 - Foraging habitat more than 1 ha |
| Foraging potential (-2 if no foraging evidence) | Foraging evidence present | -2 No foraging evidence present |
| Connectivity (-2 if no other foraging habitat in 12 km) | No change, other foraging habitat <12 km away | No change, other foraging habitat <12 km away |
| Proximity to breeding habitat (-2 if no breeding habitat in 12 km) | No change, recorded breeding habitat within 12 km | No change, recorded breeding habitat within 12 km |
| Proximity to roosting (-1 if >20 km from known night roost) | No change, known roosting site <20 km distant | No change, known roosting site <20 km distant |
| Impact from significant plant disease (-1 if >50% impact) | No change, impact from plant disease affecting <50% of foraging plants | No change, impact from plant disease affecting <50% of foraging plants |
| Total score | 10 | 8 |

The Commonwealth referral guidance allows for the inclusion of additional information for foraging habitat which may be considered during an assessment, such as the extent and density of recognised foraging plants within a Survey Area. As an additional source of information, WEPL provides an assessment of foraging habitat quality using a more detailed scoring tool developed by DCCEEW (n.d.) referred to as the Habitat Quality Scoring Tool to produce a numerical foraging habitat score. The Habitat Quality Scoring Tool allows for a score of 0 (none) to 7 (very high) for Site Condition. This is assessed based on density of known foraging species and health of vegetation. The 0-7 Site Condition score is applied to each mapped polygon of fauna habitat. The Habitat Quality Scoring Tool then applies a Site Context score out of three, this is applied only once to the whole Survey Area.

The Site Condition habitat quality score for each species, and the total area of that score present within the Survey Area are listed in Table 13 below and shown in Figure 10 and Figure 11 The score was calculated as per the criteria listed in Appendix E.

Table 13: Habitat Quality Scoring Tool- Site Condition Extent

| Site Condition | Carnaby's black cockatoo (ha) | Forest red-tailed black cockatoo (ha) |
|---------------------|-------------------------------|---------------------------------------|
| 7- Very High | - | -- |
| 6- High | - | -- |
| 5-Moderate-High | 0.06 | - |
| 4-Moderate | - | 0.02 |
| 3-Low-Moderate | - | - |
| 2-Low | 1.5 | 1.5 |
| 1-Negligable to Low | 0.48 | 0.52 |
| 0-None | 21.36 | 21.36 |
| Total | 23.42 | 23.42 |

* shaded cells are classified as not comprising suitable foraging habitat.

The Habitat Quality Scoring Tool then requires the application of a Site Context score out of three (see Table 14) which is added to the Site Condition score for a final x/10 score. See Table 15 for final Habitat Quality Scoring Tool score. Note that habitat with a Site Condition starting score of 2 or less are extremely unlikely to be suitable habitat and do not have a Site Context score added.

Table 14: Habitat Quality Scoring Tool-Site Context

| Site Context | | | | | |
|----------------------------------------------------|---|------------------------------------------------------|----|------------------------------------------------------------------------------------------------|---|
| Proximity of the site in relation to other habitat | 3 | Site is within 6 km of known breeding site. | or | Site is within 12 km of other foraging resources with site condition of at least 3. | 3 |
| | 2 | Site is within 12 km of known breeding site. | | Site is within 15 km of other foraging resources with site condition of at least 4. | 2 |
| | 1 | Site is within 15 km of known breeding site. | | Site is between 15 km and 20 km of other foraging resources with site condition of at least 5. | 1 |
| | 0 | Site is further than 15 km from known breeding site. | | Site is further than 20 km from other foraging resources. | 0 |
| Totals | | | | | 3 |

Table 15: Final Habitat Quality Scoring Tool Score

| Site Condition | Carnaby's black cockatoo (ha) | Forest red-tailed black cockatoo (ha) |
|----------------|-------------------------------|---------------------------------------|
| 10 | - | - |
| 9 | - | - |
| 8 | 0.06 | - |
| 7 | - | 0.02 |
| 6 | - | - |
| 5 | - | - |
| 4 | - | - |
| 3 | - | - |
| 2 | 1.5 | 1.5 |
| 1 | 0.48 | 0.52 |
| 0 | 21.36 | 21.36 |
| Total | 23.42 | 23.42 |

* shaded cells are classified as not comprising suitable foraging habitat.

As per the Habitat Quality Scoring Tool areas with a site condition score of 2 or lower (shaded cells) are "extremely unlikely to be considered as suitable habitat". These areas are therefore classified as not comprising suitable foraging habitat in this assessment.

Regional Foraging Habitat Assessment

Analysis of estimated foraging habitat extent within the local area was also undertaken to provide further context. The estimated extent of foraging habitat is calculated for a buffer of 12 km around and including the

Survey Area. This buffer is selected as recommended in the Commonwealth referral guidelines due to black cockatoos mainly foraging within 12 km of their nest site during the breeding season and their reliance on this proximity of foraging resources to successfully raise chicks (DCCEEW, 2022).

Analysis considers Remnant Native Vegetation Extent mapping (DPIRD-005) and Vegetation Complexes-Swan Coastal Plain and Southwest Forest region (DBCA-046 and DBCA-047). See summary of regional vegetation complexes and extents in Table 16 and displayed in Figure 12.

Analysis indicates there is 19450.5 ha of remnant native vegetation mapped within a 12 km buffer of the Survey Area. It is expected that the majority of this vegetation would contain suitable foraging species at the same or greater rate than that present within the Survey Area. Much of this regional remnant native vegetation occurs within the Gnaragarra State Forest and the Walyunga National Park.

Within the Survey Area there is 2.06 ha of foraging habitat scoring between 1 (negligible to low) and 7 (very high high) on the Habitat Quality Scoring Tool -Site Condition scale. This represents 0.01 % of the estimated regional habitat extent. The habitat quality within the Survey Area is considered likely to be of similar quality than much of the regional foraging habitat, which includes the jarrah and marri forests of the Darling Scarp.

Table 16: Regional Foraging Habitat Extent

| Vegetation Complex | Remnant Extent (ha) |
|-------------------------------------------------|---------------------|
| Bassendean Complex-Central and South | 19.37 |
| Bassendean Complex-Central and South Transition | 547.93 |
| Bassendean Complex-North | 7931.45 |
| Bassendean Complex-North Transition | 852.44 |
| Cottesloe Complex-Central and South | 4583.74 |
| Herdsmen Complex | 569.57 |
| Karrakatta Complex-Central and South | 1041.55 |
| Karrakatta Complex-North | 480.30 |
| Karrakatta Complex-North Transition | 1044.15 |
| Pinjar Complex | 1751.82 |
| Quindalup Complex | 628.18 |
| Bassendean Complex-Central and South | 19.37 |
| Bassendean Complex-Central and South Transition | 547.93 |
| Bassendean Complex-North | 7931.45 |
| Total | 19450.5 |

4.4.4 Roosting Habitat Assessment

Three known roost sites are present <1 km from the Survey Areas (DBCA-064). No evidence of roosting within the Survey Area was recorded. There is a confirmed Carnaby's black cockatoo roosting Site on a residential property immediately south of the Survey Area, eight birds were recorded using the roosting area in 2017.

Night roosting locations are typically in proximity to foraging habitat (black cockatoos mainly foraging within 20 km of night roosts) and with access to water points <2 km from roosting location (DCCEEW, 2022). Any groups of tall trees, particularly large native eucalypts in proximity to water sources may provide night roosting habitat (DCCEEW, 2022). FHT-02 is considered to provide the most suitable roosting habitat. Throughout the Survey Area, isolated stands of tall (> 10 m) *Eucalyptus* are scattered which may provide suitable roosting habitat. Access to permanent water was present from Mariginiup Lake within 3 km.

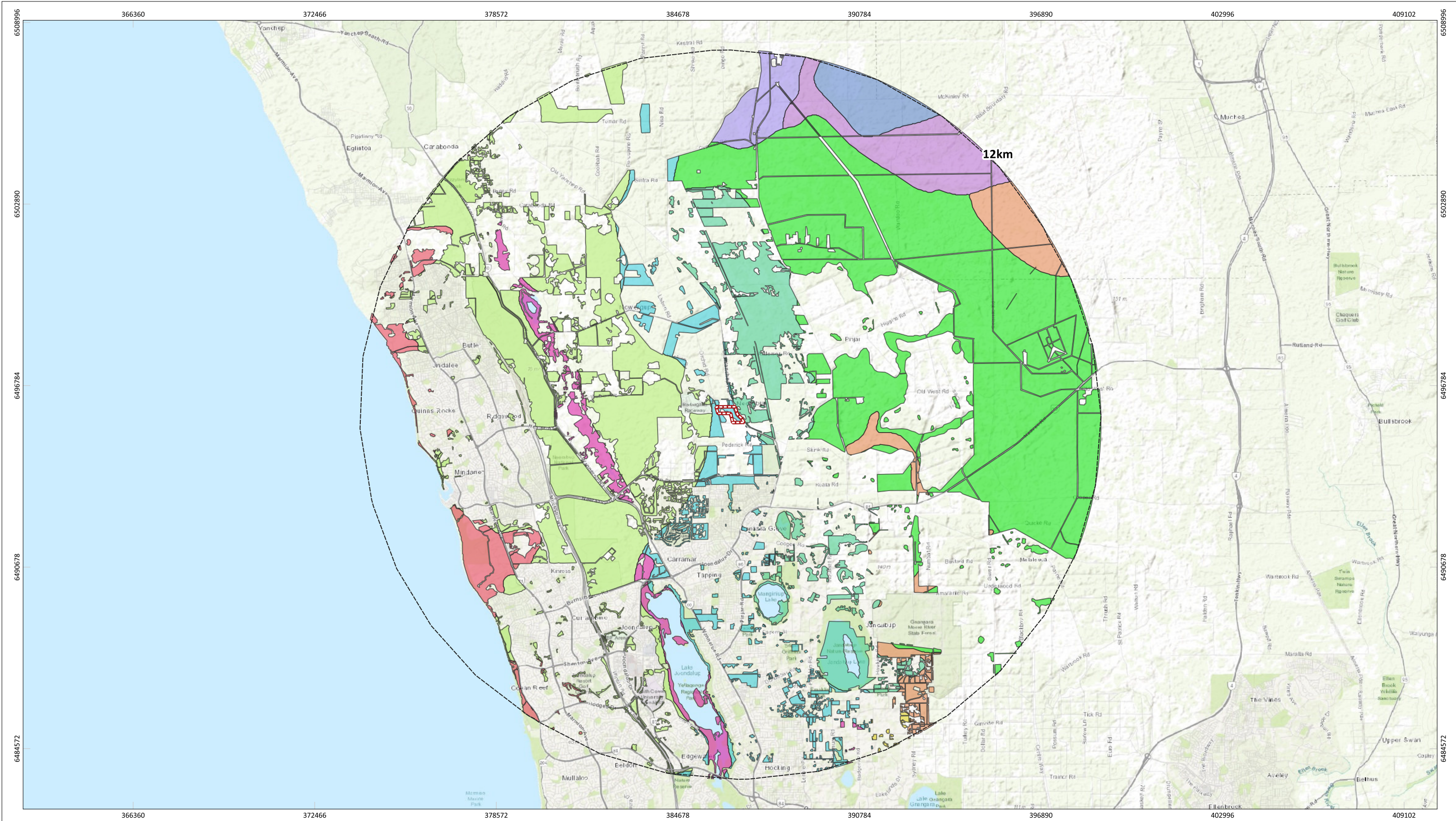


Figure 12: Black Cockatoo Foraging Habitat Extent 12 km Buffer

0

2

4

6 km

N

SCALE

1:122,118

SHEET SIZE

A3 COLOUR

PROJECT/REPORT NAME

Basic Fauna and Targeted Black Cockatoo Habitat Assessment Wanneroo

CLIENT

City of Wanneroo

PROJECT NUMBER

A25.002

VERSION

0

DATA SOURCE

LANDGATE AERIAL IMAGERY NOW

DRAWN BY / REVIEWED BY

JP/JR

DATE

15/4/2025

Legend

Survey Area

Native Vegetation (DPIRD-005)

Intersect with Vegetation Complexes (DBCA-046)

Bassendean Complex-Central and South

Bassendean Complex-Central and South Transition

Bassendean Complex-North

Bassendean Complex-North Transition

Cottesloe Complex-Central and South

Herdsman Complex

Karrakatta Complex-Central and South

Karrakatta Complex-North

Karrakatta Complex-North Transition

Pinjar Complex

Quindalup Complex

| No | Description | Drawn | Approved | Date |
|----|----------------|-------|----------|-----------|
| A | Original issue | JP | JR | 15/4/2025 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

NOTES:

Cadastral boundary from LANDGATE 2022. Label corresponds to the vegetation association number.

WESTERN ENVIRONMENTAL

Western Environmental Pty Ltd

08 6244 2310 | enquiries@westernenv.com.au

Level 3/25 Prowse St, West Perth WA 6005

westernenv.com.au

G:\GIS\Project Data\A25\A25.002\3. Projects\A25.002\A25.002.qgz

COPYRIGHT: This document is and shall remain the property of The Client. This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement. The Client does not hold any responsibility for the misuse of this document
Designed and Automated by AC

5. Discussion

5.1 Basic Fauna Survey

Five fauna habitat types were described. The majority of the Survey Area consisted of sparsely vegetated sand. Occasional stands of *Eucalyptus*, *Banksia* and native shrubland were present within the Survey Area.

One species of Threatened or Priority fauna was recorded as present within the Survey Area was:

- *Zanda latirostris* (Carnaby's black cockatoo) EN

The three species were assessed as having a high likelihood of occurrence:

- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) EN
- *Isodon fusciventer* (Quenda, southwestern brown bandicoot) P4
- *Neelaps calonotos* (Black-striped snake, black-striped burrowing snake) P3

The two species were assessed as having a medium likelihood of occurrence:

- *Falco peregrinus* (Peregrine falcon) OS
- *Synemon gratiosa* (Graceful sun-moth) P4

Extent of core and supporting habitat present within the Survey Area by species is summarised in Table 17.

Table 17: Summary of Habitat Values

| Species | Extent Core Habitat (ha) | Extent Supporting Habitat (ha) |
|-------------------------------------------------------------------------------|--------------------------|--------------------------------|
| <i>Zanda latirostris</i> (Carnaby's black cockatoo) | 0 | 1.58 |
| <i>Calyptorhynchus banksii</i> (forest red-tailed black cockatoo) | 0 | 1.54 |
| <i>Isodon fusciventer</i> (quenda) | 0 | 2.04 |
| <i>Neelaps calonotos</i> (black-striped snake, black-striped burrowing snake) | 0 | 21.88 |
| <i>Falco peregrinus</i> (Peregrine falcon) | 0 | 1.52 |
| <i>Synemon gratiosa</i> (graceful sun-moth) | 0 | 0.52 |

5.2 Black Cockatoo Habitat Assessment

The Survey Area is within the modelled distribution for Carnaby's black cockatoo, and forest red-tailed black cockatoo. The Survey Area is outside of modelled breeding distribution for Baudin's black cockatoo and (DCCEEW, 2022).

No Potential or Known nesting trees were recorded within the Survey Area.

Fifty-nine Potential nesting trees were recorded within the Survey Area. Forty-four Potential future nesting trees were recorded within the Survey Area.

Foraging habitat quality was primarily rated using the Commonwealth Habitat Quality Scoring Tool (DCCEEW, n.d.). As per the Habitat Quality Scoring Tool areas with a site condition score of 2 or lower (low, negligible or none value) are "extremely unlikely to be considered as suitable habitat". These areas are therefore classified as not comprising suitable foraging habitat in this assessment. Foraging habitat was considered for Carnaby's black cockatoo, and forest red-tailed black cockatoo foraging habitat quality extents within the Survey Area out of ten are:

The Survey Area was assessed as containing 0.06 ha of suitable foraging habitat for Carnaby's black cockatoo and 0.02 ha of suitable foraging habitat for forest red-tailed black cockatoo.

Foraging habitat quality was primarily rated using the Commonwealth Habitat Quality Scoring Tool (DCCEEW, n.d.). Foraging habitat quality extents within the Survey Area out of ten are:

- Carnaby's black cockatoo: 0.06 ha (8/10), 1.93 ha (6/10), 1.5 ha (2/10), 0.48 ha (1/10), 21.36 ha (0/10). Total of 0.06 ha of suitable foraging habitat and 23.34 ha of unsuitable foraging habitat.
- Forest red-tailed black cockatoo: 0.02 ha (7/10), 1.5 ha (2/10), 0.52 ha (1/10), 21.36 ha (0/10). Total of 0.02 ha of suitable foraging habitat and 23.4 ha of unsuitable foraging habitat.

No evidence of roosting was recorded. Habitat types FHT-01 contains stands of tall trees which may provide suitable roosting habitat. Access to water is present in the nearby lake Joondalup and Lake Mariginiup.

6. References

Beard, J. S. (1990). *Plant life of Western Australia* / J.S. Beard. Kangaroo Press, Kenthurst, N.S.W.

Bureau of Meteorology. (2007). About Climate Statistics. <http://www.bom.gov.au/climate/cdo/about/about-stats.shtml>.

Bureau of Meteorology. (2024). Monthly Climate Data Statistics. www.bom.gov.au/climate/data.

Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.

Commonwealth of Australia. (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.

Department of Agriculture Water and the Environment. (2022a). Protected Matters Search Tool. Canberra, Australia. Retrieved on 10 March 2025 from <http://www.environment.gov.au/webgisframework/apps/pmst/pmst.jsf>.

Department of Biodiversity Conservation and Attractions (DBCA). (2023a) *Methods for survey and identification of Western Australian threatened ecological communities*.

Department of Biodiversity Conservation and Attractions (DBCA). (2023c). *Threatened and Priority Fauna List*. Retrieved on 10 March 2025 from <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals>.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2022). *Referral Guidelines for 3 Threatened Black Cockatoo Species*.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023) *Species Profile and Threats Database*. Retrieved on 10 March 2025 from <http://www.environment.gov.au/cgi-bin/sprat/public>.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (n.d) *Habitat Scoring System for WA black cockatoo foraging habitat V1.9*

Department of the Environment (DotE). (2013). *Matters of National Environmental Significance: Significant Impact Guidelines 1.1*. Canberra, Australia.

Environmental Protection Authority (EPA). (2020). *Technical Guidance - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.

Environmental Protection Authority (EPA). (2021). *Statement of Environmental Principles, Factors and Objectives*.

Hedde, EM, Loneragan. OW and Havel JJ (1980). *Vegetation Complexes of the Darling System, WA, in Atlas of Natural Resources, Darling System WA, Department of Conservation and Environment*

Landgate. (2022). Map Viewer Plus. Accessed 10 March 2025 from <https://map-viewer-plus.app.landgate.wa.gov.au/index.html>.

Saunders, D. A., R. Dawson, A. Doley, J. Lauri, A. Le Souef, P.R. Mawson, K. Warren, and N. White. (2014a). *Nature conservation on agricultural land: a case study of the endangered Carnaby's Cockatoo *Calyptorhynchus latirostris* breeding at Koobabbie in the northern wheatbelt of Western Australia. Nature Conservation 9: 19-43.*

Saunders, D. A., P.R. Mawson, and P.R. Dawson. (2014b). *Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia 1969- 2013. Biological Conservation 177:185-193*

Western Australian Museum. (2022). Checklist of the Terrestrial Vertebrate Fauna of Western Australia. Retrieved on 10 March 2025 from <http://museum.wa.gov.au/research/departments/terrestrialzoology/checklist-terrestrial-vertebrate-fauna-western-australia>.

Datasets used

Department of Biodiversity Conservation and Attractions (DBCA). (2017). RAMSAR Sites (DBCA-010). Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/ramsar-sites>.

Department of Biodiversity Conservation and Attractions (DBCA). (2018). Vegetation Complexes-Swan Coastal Plain (DBCA-046). Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/vegetation-complexes-swan-coastal-plain>.

Department of Biodiversity, Conservation and Attractions (DBCA). (2018) Vegetation Complexes – South West Forest Region of Western Australia (DBCA-047). Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/vegetation-complexes-swf-50k>.

Department of Biodiversity, Conservation and Attractions (DBCA). (2022). Geomorphic Wetlands, Swan Coastal Plan (DBCA-019). Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/geomorphic-wetlands-swan-coastal-plain>.

Department of Biodiversity, Conservation and Attractions (DBCA), (2018) Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054). Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-confirmed-breeding-areas>

Department of Biodiversity, Conservation and Attractions (DBCA). (2018) Carnaby's Cockatoo Confirmed Roost Sites (DBCA-050). Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered>.

Department of Biodiversity, Conservation and Attractions (DBCA). (2019) Black Cockatoo Roosting Sites - Buffered (DBCA-064). Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered>.

Department of Biodiversity Conservation and Attractions (DBCA). (2023). DBCA - Legislated Lands and Waters (DBCA-011). Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/dbca-legislated-lands-and-waters>.

Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023). Directory of Important Wetlands (DBCA -045). Retrieved on 10/03/2025 from <https://www.environment.gov.au/cgi-bin/wetlands/report.pl>.

Department of Primary Industries and Regional Development (DPIRD), 2020. Native Vegetation Extent (DPIRD-005) Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent>.

Department of Primary Industries and Regional Development (DPIRD). (2018). Soil Landscape Mapping - Systems (DPIRD-064) - GIS Dataset. Perth, Australia. Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems>.

Department of Primary Industries and Regional Development (DPIRD). (2019). Pre-European Vegetation (DPIRD-006). Accessed on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006>

Department of Water and Environmental Regulation (DWER). (2018). Hydrography, Linear (Hierarchy) (DWER-031). Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/hydrography-linear-hierarchy>.

Department of Water and Environmental Regulation (DWER). (2022). Clearing Regulations - Environmentally Sensitive Areas (DWER-046) - GIS Dataset. Retrieved on 10/03/2025 from <https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>

Appendix A

Legislation

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of Climate Change, Energy and the Environment lists Threatened species and communities in categories determined by criteria set out in the EPBC Act.

Projects likely to cause a significant impact on MNES should be referred to the DCCEEW for assessment under the EPBC Act.

Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 aims to conserve and protect biodiversity and biodiversity components within the State and to promote ecologically sustainable use of biodiversity components in the State.

Environmental Protection Act 1986

Declared Rare Flora (DRF) and Threatened Ecological Communities (TECs) are given special consideration in environmental impact assessments and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Exemptions for a clearing permit do not apply in an ESA. In addition, habitat necessary for the maintenance of indigenous fauna is considered in the clearing principles and assessed during consideration of applications for a clearing permit.

Department of Biodiversity, Conservation and Attractions Priority Lists

DBCA lists 'Priority' flora and fauna that have not been assigned statutory protection as "Threatened" under the BC Act and are under consideration for declaration as Threatened. Flora and fauna assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 flora requires monitoring every 5 -10 years.

DBCA maintains a list of Priority Ecological Communities (PECs) which identifies plant communities that require further investigation before possible nomination for TEC status. Once listed, a community becomes a PEC and, when endorsed by the WA Minister for Environment, becomes a TEC and protected as an ESA under Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

Informal Recognition of Flora and Fauna

Certain populations or communities of flora and/or fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of flora and may be locally significant because they are range extensions to the previously known distribution, or are newly discovered taxa (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, and changed fire regimes) and relict populations of such species assume local importance for DBCA. It is not uncommon for DBCA to make comment on these species of interest.

Appendix B

Definitions and Criteria

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 | <p>A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:</p> <p>(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or</p> <p>(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.</p> | N/A. |
| Critically Endangered (CE) | A native species is eligible to be included in the critically endangered 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 critically endangered 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) | <p>A native species is eligible to be included in the endangered category at a particular time if, at that time:</p> <p>(a) it is not critically endangered; and</p> <p>(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.</p> | <p>An ecological community is eligible to be included in the endangered category at a particular time if, at that time:</p> <p>(a) it is not critically endangered; and</p> <p>(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.</p> |
| Vulnerable (VU) | <p>A native species is eligible to be included in the vulnerable category at a particular time if, at that time:</p> <p>(a) it is not critically endangered or endangered; and</p> <p>(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.</p> | <p>An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time:</p> <p>(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.</p> |
| Conservation Dependent | <p>A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:</p> <p>(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</p> <p>(b) the following subparagraphs are satisfied:</p> | N/A. |

| Category | Threatened Species | Threatened Ecological Communities |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| | <p>(i) the species is a species of fish.</p> <p>(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.</p> <p>(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory.</p> <p>(iv) cessation of the plan of management would adversely affect the conservation status of the species.</p> | |

Conservation Codes for Western Australian Flora and Fauna (DBCA)

| Conservation Codes for Western Australian Flora and Fauna | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Threatened, Extinct and Specially Protected fauna or flora 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. The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the Biodiversity Conservation Act 2016.</p> <p>Categories of Threatened, Extinct and Specially Protected fauna and flora are:</p> | |
| 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 Biodiversity Conservation Act 2016 (BC Act). |
| | Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna. |
| | Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora. |
| | The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using International Union for Conservation of Nature (IUCN) Red List categories and criteria as detailed below. |
| CR | <p>Critically endangered species</p> <p>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".</p> <p>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. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p> |
| EN | <p>Endangered species</p> <p>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".</p> |

Conservation Codes for Western Australian Flora and Fauna

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. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

| | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VU | <p>Vulnerable species</p> <p>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”.</p> <p>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. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p> |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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 | <p>Extinct species</p> <p>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).</p> <p>Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.</p> |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EW | <p>Extinct in the wild species</p> <p>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).</p> <p>Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.</p> |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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 | <p>Migratory species</p> <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p> |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Conservation Codes for Western Australian Flora and Fauna

Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

| | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CD | <p>Species of special conservation interest (conservation dependent fauna)</p> <p>Fauna of special conservation need being species 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).</p> <p>Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p> |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS | <p>Other specially protected species</p> <p>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).</p> <p>Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p> |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P | <p>Priority species</p> <p>Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened fauna or flora.</p> <p>Species that are adequately known, are rare but not Threatened, or meet criteria for near Threatened, or that have been recently removed from the Threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.</p> <p>Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.</p> |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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

| | |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | <p>Priority 2: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p> |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | <p>Priority 3: Poorly-known species</p> <p>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</p> |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Conservation Codes for Western Australian Flora and Fauna

requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4

Priority 4: Rare, Near Threatened and other species in need of monitoring

(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.

Appendix C

Desktop Assessment Results and Likelihood of Occurrence Assessment

Fauna Database Search Results (DBCA Database Search using 20 Km Buffer, PMST 20 km buffer), Likelihood and Fauna Survey Records

| Scientific Name | Common Name | Conservation Status | | Database Source | | Likelihood of Occurrence | Justification |
|-------------------------------------|----------------------------------------|---------------------|---------|-----------------|------|--------------------------|--------------------------------------------------------------------------------------------------------|
| | | WA | EPBC | DBCA | PMST | | |
| Aves | | | | | | | |
| <i>Apus pacificus</i> | fork-tailed swift | MI | MI | X | X | Low | Migratory species, no breeding or roosting habitat within Survey Area |
| <i>Botaurus poiciloptilus</i> | Australasian Bittern | EN | EN | X | X | Low | Wetland species, no suitable habitat within Survey Area |
| <i>Calidris acuminata</i> | Sharp-tailed Sandpiper | MI | VU & MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Calidris canutus</i> | Red Knot, Knot | EN | VU & MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Calidris ferruginea</i> | Curlew Sandpiper | CR | CR & MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Calidris ruficollis</i> | red-necked stint | MI | MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Calyptorhynchus banksii naso</i> | forest red-tailed black cockatoo | VU | VU | X | X | High | Potential foraging habitat within and adjacent to Survey Area. 2 records within 10 km within 20 years. |
| <i>Charadrius leschenaultii</i> | greater sand plover, large sand plover | VU | VU & MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Falco peregrinus</i> | peregrine falcon | OS | | X | | Medium | Flyover species, may alight in tall trees to consume avian prey. |
| <i>Leipoa ocellata</i> | Malleefowl | VU | VU | X | X | Low | Locally extinct |

| Scientific Name | Common Name | Conservation Status | | Database Source | | Likelihood of Occurrence | Justification |
|------------------------------------------|-----------------------------------------------------------------|---------------------|---------|-----------------|------|--------------------------|---------------------------------------------------------------------|
| | | WA | EPBC | DBCA | PMST | | |
| <i>Limosa lapponica menzbieri</i> | Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit | CR | EN | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Limosa limosa</i> | black-tailed godwit | MI | MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Numenius madagascariensis</i> | Eastern Curlew, Far Eastern Curlew | CR | CR & MI | X | X | Low | Migratory shorebird, unlikely to occur within Survey Area |
| <i>Oxyura australis</i> | blue-billed duck | P4 | | X | | Low | Wetland species, no suitable habitat within Survey Area |
| <i>Pandion haliaetus</i> | osprey | MI | MI | X | X | Low | Coastal species, no suitable habitat within Survey Area |
| <i>Plegadis falcinellus</i> | glossy ibis | MI | MI | X | X | Low | Wetland species, no suitable habitat within Survey Area |
| <i>Rostratula australis</i> | Australian Painted Snipe | EN | EN | X | X | Low | Wetland species, no suitable habitat within Survey Area |
| <i>Sternula albifrons</i> | Little Tern | MI | MI | X | X | Low | Coastal and wetland species, no suitable habitat within Survey Area |
| <i>Sternula nereis nereis</i> | Australian Fairy Tern | VU | VU | X | X | Low | Coastal and wetland species, no suitable habitat within Survey Area |
| <i>Thalasseus bergii</i> | crested tern | MI | MI | X | X | Low | Coastal and wetland species, no suitable habitat within Survey Area |
| <i>Tringa nebularia</i> | common greenshank | MI | MI | X | X | Low | Wetland species, no suitable habitat within Survey Area |

| Scientific Name | Common Name | Conservation Status | | Database Source | | Likelihood of Occurrence | Justification |
|--------------------------------|----------------------------------------------------|---------------------|------|-----------------|------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| | | WA | EPBC | DBCA | PMST | | |
| Zanda baudinii | Baudin's cockatoo | EN | EN | X | X | Low | Outside of expected presence range for species |
| Zanda latirostris | Carnaby's cockatoo | EN | EN | X | X | Recorded | Observed flying over Survey Area, Recorded in DBCA data. 413 DBCA records within 10 km within 20 years. |
| Mammals | | | | | | | |
| Dasyurus geoffroii | Chuditch, Western Quoll | VU | | | | Low | Locally extinct |
| Hydromys chrysogaster | water-rat, rakali | P4 | | X | | Low | Wetland species, no suitable habitat within or near Survey Area. |
| Isodon fusciventer | quenda, southwestern brown bandicoot | P4 | | X | | High | Suitable vegetated habitats within the Survey Area. 72 records within 10 km within 20 years. |
| Macroderma gigas | Ghost Bat | | VU | X | X | Low | PMST record, very far outside of expected range. |
| Notamacropus irma | western brush wallaby | P4 | | X | | Low | Primary habitat for species not present within Survey Area. 2 records within 10 km within 20 years |
| Reptiles and Amphibians | | | | | | | |
| Neelaps calonotos | black-striped snake, black-striped burrowing snake | P3 | | X | | High | Subterranean sandplain species, which is likely under recorded, one record within 10 km in 20 years. Entire Site constitutes Core habitat |
| Invertebrates | | | | | | | |

| Scientific Name | Common Name | Conservation Status | | Database Source | | Likelihood of Occurrence | Justification |
|---------------------------------|----------------------------|---------------------|------|-----------------|------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| | | WA | EPBC | DBCA | PMST | | |
| Synemon gratiosa | graceful sun-moth | P4 | | X | | Medium | 20 records within 10 km within 20 years. Host species <i>Lomandra hermaphrodita</i> not surveyed for but may be present within Survey Area |
| Hesperocolletes douglasi | Douglas's broad-headed bee | CR | CR | X | | Low | Single record of species from Pinjar area in 2015, very unlikely to occur within Survey Area. |

Appendix D

Black Cockatoo Potential Suitable and Known Breeding Trees

Potential, Suitable and Known Black Cockatoo Nest Trees.

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|-------------------|---------------|-----|-------------|-------------|-------------|
| 1 | Coastal Blackbutt | 5 | 50 | None | 386053.1985 | 6496059.007 |
| 2 | Flooded Gum | 5 | 50 | None | 386625.265 | 6495562.238 |
| 3 | Flooded Gum | 5 | 50 | None | 386696.4189 | 6495695.831 |
| 4 | Flooded Gum | 5 | 50 | None | 386555.5035 | 6495794.064 |
| 5 | Flooded Gum | 5 | 50 | None | 386316.614 | 6496012.451 |
| 6 | Flooded Gum | 5 | 50 | None | 386338.6113 | 6495953.229 |
| 7 | Flooded Gum | 5 | 50 | None | 386285.4798 | 6496030.799 |
| 8 | Coastal Blackbutt | 5 | 55 | None | 386236.5454 | 6495886.135 |
| 9 | Coastal Blackbutt | 5 | 55 | None | 386087.8146 | 6495886.052 |
| 10 | Coastal Blackbutt | 5 | 55 | None | 386079.9016 | 6495865.44 |
| 11 | Coastal Blackbutt | 5 | 55 | None | 386076.8077 | 6495926.224 |
| 12 | Flooded Gum | 5 | 55 | None | 386544.9257 | 6495691.51 |
| 13 | Flooded Gum | 5 | 55 | None | 386532.944 | 6495720.388 |
| 14 | Flooded Gum | 5 | 55 | None | 386479.7549 | 6495837.733 |
| 15 | Flooded Gum | 5 | 55 | None | 386593.5325 | 6495872.685 |
| 16 | Flooded Gum | 5 | 55 | None | 386383.6509 | 6495909.134 |
| 17 | Flooded Gum | 5 | 55 | None | 386272.2642 | 6495995.022 |
| 18 | Flooded Gum | 5 | 55 | None | 386267.1795 | 6495949.649 |
| 19 | Coastal Blackbutt | 5 | 60 | None | 385991.3382 | 6496051.911 |

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|-------------------|---------------|-----|---------------|-------------|-------------|
| 20 | Coastal Blackbutt | 5 | 60 | None | 385999.6907 | 6496037.394 |
| 21 | Coastal Blackbutt | 5 | 60 | None | 386123.6061 | 6496030.05 |
| 22 | Dead | 4 | 60 | Small hollows | 386627.7088 | 6495803.882 |
| 23 | Flooded Gum | 5 | 60 | None | 386598.758 | 6495826.929 |
| 24 | Flooded Gum | 5 | 60 | None | 386598.1864 | 6495860.55 |
| 25 | Flooded Gum | 5 | 60 | None | 386505.7594 | 6496047.577 |
| 26 | Flooded Gum | 5 | 60 | None | 386370.4546 | 6495961.323 |
| 27 | Flooded Gum | 5 | 60 | None | 386389.0981 | 6495868.046 |
| 28 | Flooded Gum | 5 | 60 | None | 386347.2076 | 6495892.603 |
| 29 | Flooded Gum | 5 | 60 | None | 386287.1959 | 6496026.271 |
| 30 | Flooded Gum | 5 | 60 | None | 386244.7829 | 6495928.114 |
| 31 | Flooded Gum | 4 | 60 | None | 386215.4872 | 6495982.694 |
| 32 | Coastal Blackbutt | 5 | 65 | None | 386075.2795 | 6495862.567 |
| 33 | Flooded Gum | 5 | 65 | None | 386525.5167 | 6495593.708 |
| 34 | Flooded Gum | 5 | 65 | None | 386558.3499 | 6495604.068 |
| 35 | Flooded Gum | 5 | 65 | None | 386673.7356 | 6495608.625 |
| 36 | Flooded Gum | 5 | 65 | None | 386723.1969 | 6495587.212 |
| 37 | Flooded Gum | 5 | 65 | None | 386800.452 | 6495596.534 |
| 38 | Flooded Gum | 5 | 65 | None | 386544.1971 | 6495771.582 |
| 39 | Flooded Gum | 5 | 65 | None | 386345.8913 | 6496053.25 |

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|-------------------|---------------|-----|---------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| 40 | River Red Gum | 5 | 65 | None | 386208.3243 | 6495952.2 |
| 41 | River Red Gum | 5 | 65 | None | 386168.8827 | 6496032.194 |
| 42 | Flooded Gum | 5 | 65 | None | 386615.5311 | 6495548.801 |
| 43 | Flooded Gum | 5 | 70 | None | 386538.4892 | 6495620.862 |
| 44 | Dead | 5 | 70 | None | 386632.219 | 6495548.578 |
| 45 | Flooded Gum | 5 | 70 | None | 386530.6288 | 6495722.006 |
| 46 | Flooded Gum | 5 | 70 | None | 386431.3527 | 6495966.474 |
| 47 | Flooded Gum | 5 | 70 | None | 386374.5511 | 6495949.109 |
| 48 | Flooded Gum | 5 | 70 | None | 386248.1154 | 6495989.181 |
| 49 | Flooded Gum | 5 | 75 | None | 386637.4779 | 6495571.296 |
| 50 | Flooded Gum | 5 | 75 | None | 386717.5316 | 6495655.424 |
| 51 | Coastal Blackbutt | 5 | 80 | None | 386073.9395 | 6496003.105 |
| 52 | Flooded Gum | 5 | 80 | None | 386353.1052 | 6495923.446 |
| 53 | Dead | 4 | 80 | Small spout hollow | 386744.7494 | 6495629.386 |
| 54 | River Red Gum | 5 | 85 | None | 386740.6515 | 6495601.279 |
| 55 | Flooded Gum | 5 | 85 | None | 386495.7384 | 6495686.61 |
| 56 | Dead | 4 | 90 | Small knots and some broken branches hollowing not deep enough or large enough | 386372.3335 | 6495959.372 |
| 57 | Flooded Gum | 4 | 105 | Small fissure in branch possibly 10cm deep, side spout on south side branch 6m up, shallow knot hollowing west side 5m up | 386540.845 | 6495918.296 |

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|-------------------|---------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| 58 | Flooded Gum | 4 | 105 | Photo #224- fissure/spout hollow on North side too shallow and bee activity, side fissure small and bee activity, small fissure east side with two openings 10cm diameter | 386430.326 | 6496066.083 |
| 59 | Flooded Gum | 4 | 125 | One fissure in lowest branch 10cm opening- bees entering and exiting, two branches hollowing at ends, 5cm diameter | 386590.8196 | 6495898.168 |
| 60 | Flooded Gum | 4 | 35 | One small opening on low hollowed branch 30cm diameter and 15-20cm deep | 386716.7337 | 6495646.105 |
| 61 | Coastal Blackbutt | 5 | 30 | None | 386089.3263 | 6495848 |
| 62 | Coastal Blackbutt | 5 | 30 | None | 386060.7892 | 6495851.064 |
| 63 | Coastal Blackbutt | 5 | 30 | None | 386057.0546 | 6495865.555 |
| 64 | Coastal Blackbutt | 5 | 30 | None | 386036.1408 | 6495889.157 |
| 65 | Coastal Blackbutt | 5 | 30 | None | 386061.2683 | 6495987.278 |
| 66 | Coastal Blackbutt | 5 | 30 | None | 386080.6361 | 6495993.116 |
| 67 | Coastal Blackbutt | 5 | 30 | None | 386102.4994 | 6495995.924 |
| 68 | Coastal Blackbutt | 5 | 30 | None | 386109.6958 | 6495979.052 |
| 69 | Coastal Blackbutt | 5 | 30 | None | 386093.7652 | 6495975.135 |
| 70 | Coastal Blackbutt | 5 | 30 | None | 386104.3106 | 6496022.875 |
| 71 | Coastal Blackbutt | 5 | 30 | None | 386099.33 | 6496046.194 |
| 72 | Coastal Blackbutt | 5 | 30 | None | 386203.2641 | 6495897.386 |
| 73 | Coastal Blackbutt | 5 | 30 | None | 386187.7251 | 6495889.007 |
| 74 | Coastal Blackbutt | 5 | 30 | None | 386193.341 | 6495860.317 |
| 75 | Coastal Blackbutt | 5 | 30 | None | 386177.1843 | 6495860.444 |

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|-------------------|---------------|-----|-------------|-------------|-------------|
| 76 | Coastal Blackbutt | 5 | 30 | None | 386123.7507 | 6495886.042 |
| 77 | Coastal Blackbutt | 5 | 30 | None | 386115.6799 | 6495856.601 |
| 78 | Coastal Blackbutt | 5 | 30 | None | 386129.882 | 6495900.727 |
| 79 | Flooded Gum | 5 | 40 | None | 386542.0457 | 6495597.776 |
| 80 | Flooded Gum | 5 | 35 | None | 386539.4053 | 6495600.289 |
| 81 | Flooded Gum | 5 | 30 | None | 386540.3621 | 6495605.286 |
| 82 | Flooded Gum | 5 | 40 | None | 386701.2002 | 6495582.352 |
| 83 | Flooded Gum | 5 | 45 | None | 386621.8153 | 6495712.779 |
| 84 | Flooded Gum | 5 | 45 | None | 386614.6487 | 6495719.867 |
| 85 | Flooded Gum | 5 | 40 | None | 386618.3876 | 6495608.227 |
| 86 | Flooded Gum | 5 | 45 | None | 386521.6327 | 6495720.378 |
| 87 | Flooded Gum | 5 | 30 | None | 386603.8363 | 6495762.187 |
| 88 | Flooded Gum | 5 | 30 | None | 386597.5842 | 6495930.884 |
| 89 | Flooded Gum | 5 | 40 | None | 386590.8901 | 6496035.893 |
| 90 | Flooded Gum | 5 | 45 | None | 386511.7928 | 6496065.674 |
| 91 | Flooded Gum | 5 | 45 | None | 386509.6063 | 6496067.472 |
| 92 | Flooded Gum | 5 | 30 | None | 386355.5649 | 6496009.444 |
| 93 | Flooded Gum | 5 | 45 | None | 386323.1811 | 6496012.024 |
| 94 | Flooded Gum | 5 | 45 | None | 386339.3982 | 6495962.678 |
| 95 | Flooded Gum | 5 | 30 | None | 386398.8249 | 6495871.609 |

| Tree Number | Species | Bamford Class | DBH | Hollow Data | Eastings | Northings |
|-------------|---------------|---------------|-----|-------------|-------------|-------------|
| 96 | Flooded Gum | 5 | 45 | None | 386419.3332 | 6495873.638 |
| 97 | Flooded Gum | 5 | 30 | None | 386371.9948 | 6495858.195 |
| 98 | Flooded Gum | 5 | 35 | None | 386279.1754 | 6495999.119 |
| 99 | Flooded Gum | 5 | 45 | None | 386277.9222 | 6495998.785 |
| 100 | River Red Gum | 5 | 40 | None | 386263.7661 | 6495975.002 |
| 101 | River Red Gum | 5 | 40 | None | 386211.8034 | 6495986.992 |
| 102 | River Red Gum | 5 | 40 | None | 386160.9025 | 6496015.974 |
| 103 | Jarra | 5 | 30 | None | 386722.2566 | 6495581.041 |

Appendix E

Black Cockatoo Habitat Quality Scoring Tool (DCCEEW, n.d)

Habitat Scoring System for WA black cockatoo foraging habitat

This habitat scoring system describes elements indicative of suitable foraging habitat¹ for the three WA black cockatoo species (Carnaby's Black Cockatoo, Baudin's Black Cockatoo and the Forest Red-tailed Black Cockatoo) in WA. Its use must be supported by survey information and reporting, undertaken by suitably qualified and experienced ecologists.

Appropriate scores will best fit a description. Where all components of the 'detail' column description are not met, this must be specified, and justification provided for that score to be accepted by the Department.

For an offset site to be considered by the Department, the offset site must have a start score of 1 for each indicator (e.g., there must be a species stocking rate score of at least 1).

| Indicator | Score | Detail | | Impact site | Offset start quality | Without offset | With offset |
|-------------------------------------------------------------|-------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|----------------|-------------|
| Site Condition | | | | | | | |
| | | Foraging value | Details | | | | |
| Vegetation condition and structure. Habitat features | 7 | Very High | Carnaby’s Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland (>30% projected foliage cover), banksia and eucalypt woodlands with >50% projected foliage cover. Low percentage (< 5%) of tree deaths². | | | | |
| | | | Baudin’s Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest and woodlands with >50% projected foliage cover. Low percentage (< 5%) of tree deaths. | | | | |
| | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >50% projected foliage cover. Low percentage (< 5%) of tree deaths. | | | | |
| | 6 | High | Carnaby’s Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland (>25% projected foliage cover), banksia and eucalypt woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths. | | | | |
| | | | Baudin’s Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest and woodlands with >40% projected foliage cover. Low percentage (< 10%) of tree deaths. | | | | |
| | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with >40% projected foliage cover. Low percentage (< 10%) of tree deaths. | | | | |

¹ In some cases, an impact or offset site may contain or require both foraging and breeding habitat for one or more black cockatoos. Breeding habitat is species of trees known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most species of trees, suitable DBH is 500 mm. For salmon gum and wandoo, suitable DBH is 300 mm.

²No tree deaths indicate robustness of habitat, unlikely for the habitat to decline in the medium-term. Tree deaths may be owing to disease, water stress, fire, etc.

| | | | | | | | |
|---------------------------------------------------------|---|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Vegetation condition and structure. Habitat features | 5 | Moderate to high | Carnaby's Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland (>20% projected foliage cover), banksia and eucalypt woodlands with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%). | | | | |
| | | | Baudin's Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest or woodlands with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%). | | | | |
| | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands, with 30-40% projected foliage cover; OR > 60% projected foliage cover but veg. condition reduced due to tree deaths (up to 20%). | | | | |
| | 4 | Moderate | Carnaby's Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland, banksia or eucalypt woodlands with 20-30% projected foliage cover. Moderate percentage of tree deaths (30-40%). | | | | |
| | | | Baudin's Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest or woodlands with 20-30% projected foliage cover; OR Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to tree deaths (up to 30-40%). | | | | |
| | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with: 20-30% projected foliage cover; OR 40-60% projected foliage cover but veg. condition reduced due to tree deaths (up to 30-40%). | | | | |
| | 3 | Low to moderate | Carnaby's Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland, banksia or eucalypt woodlands with 10-20% projected foliage cover. | | | | |
| | | | Baudin's Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest or woodlands with 5-20% projected foliage cover. | | | | |
| | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 5-20% projected foliage cover. | | | | |
| | 2 | Low | Carnaby's Black Cockatoo | | | | |
| | | | Native kwongan heath and shrubland, banksia and eucalypt woodlands with <10% projected foliage cover; OR Paddocks and/or urban areas with scattered foraging trees such as banksias, marri. | | | | |
| | | | Baudin's Black Cockatoo | | | | |
| | | | Marri-Jarrah Forest or woodlands with 1-5% projected foliage cover; OR Paddocks and/or urban areas with scattered foraging trees such as banksia, hakea, dryandra. | | | | |

| | | | | | | | |
|-------------------------------------|---|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Vegetation condition and structure. | | | Forest Red-tailed Black Cockatoo | | | | |
| | | | Marri-Jarrah-Karri Forest, other eucalypt woodlands, or allocasuarina woodlands with 1-5% projected foliage cover; OR Paddocks and/or urban areas with scattered food plants such as Cape Lilac, <i>Eucalyptus caesia</i> and <i>E. erythrocorys</i> . | | | | |
| | 1 | Negligible to low | All species | | | | |
| | | | Scattered specimens of known food plants but projected foliage cover of these is <2%. May include: paddocks or urban areas with scattered foraging trees. | | | | |
| Habitat features | 0 | None | All species | | | | |
| | | | No Proteaceae, eucalypts or other potential sources of food. May include bare ground or developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits). | | | | |
| | | | Totals | | | | |

| Site Context | | | | | | | |
|-----------------------------------------------------|---|-----------------------------------------------------|----|----------------------------------------------------------------------------------------------|--|--|--|
| Proximity of the site in relation to other habitat. | 3 | Site is within 6km of known breeding site. | or | Site is within 12km of other foraging resources with site condition of at least 3. | | | |
| | 2 | Site is within 12km of known breeding site. | or | Site is within 15km of other foraging resources with site condition of at least 4. | | | |
| | 1 | Site is within 15km of known breeding site. | or | Site is between 15km and 20km of other foraging resources with site condition of at least 5. | | | |
| | 0 | Site is further than 15km from known breeding site. | or | Site is further than 20km from other foraging resources. | | | |
| Totals | | | | | | | |

| | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|
| Final Totals | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|

| Indicator | | Species Stocking Rate ³ | Impact Site | | | Offset Site | | |
|--------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----|-----|-------------|-----|-----|
| | | | CBC | BBC | FRT | CBC | BBC | FRT |
| Confirm presence/absence of species. | Yes | Species is seen or reported regularly and/or there is abundant foraging evidence, e.g. chewed nuts can be identified as this species. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. | | | | | | |
| | No | Species is recorded or reported very infrequently and there is little or no foraging evidence. | | | | | | |

³ Species stocking rate is indicated by yes or no to confirm if any of the species is frequently present or not. If yes, the presence must be for the species being impacted by the proposal, not for a species that will not be impacted.

| Legend | |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | If the site scores between 0-2 (low to no value) for site condition, 0 for the site context score, or is No for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site. |

The metrics used to determine Site Condition, Site Context, and Species Stocking Rate were developed by the Department of Climate Change, Energy, the Environment, and Water in consultation with species experts in WA.

A standard habitat quality scoring system for a species allocates scores out of 3 for both site condition and site context, and out of 4 for species stocking rate. However, as black cockatoos are very mobile, this HQS uses a score out of 7 for site condition and a score out of 3 for site context. Site condition is considered the key factor in determining the quality of habitat for these black cockatoo species. Species stocking rate is considered only in terms of presence or absence of the species and does not add to the total score. Note that the species, or strong indicators of the species, must be present, consistent with the presence/usage description above, for an offset to be considered suitable.





Assets | Engineering | Environment | Noise | Spatial | Waste

HEAD OFFICE

604 Newcastle Street,
Leederville, WA 6007

NSW OFFICES

Nowra

76 Bridge Road,
Nowra, NSW 2541

Newcastle

58 Cleary Street,
Hamilton, NSW 2303

QLD OFFICE

Brisbane

35 Boundary Street,
South Brisbane, QLD 4101

P: 1300 251 070 | E: enquiries@talisconsultants.com.au

ABN 85 967 691 321