Ordinary Council Meeting

Tuesday, 9 June 2026

Attachments Under Separate Cover

14.1. Sustainable Development and Safety

14.1.1 Manning Park Trails Rehabilitation Plan

14.4. Community and Place

14.4.2 Proposed Coogee Golf Complex - Heritage and Environmental Investigation Outcomes

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Natural Area
CONSULTING MANAGEMENT SERVICES

City of Cockburn

Manning Park Trails Audit, Categorisation and Mapping

Natural Area Holdings Pty Ltd
Whadjuk Country
57 Boulder Road, Malaga WA 6090
Ph: (08) 9209 2767
info@naturalarea.com.au
www.naturalarea.com.au



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Acknowledgement of Country

Ngala kaaditj Noongar moort keyen kaadak nidja boodja.
Natural Area acknowledges the Traditional Owners of the lands on which we operate, and recognises their continuing connection to lands, waters and communities.

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System Certifications

Environmental management system registered to ISO 14001:2015
Quality management system registered to ISO 9001:2015
Occupational health and safety management system registered to ISO 45001:2018

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Location	City of Cockburn/RFQ Manning Park Trails Audit and Mapping Report/6. Reporting/COCO-R-Manning Park Trails Audit.docx

Draft/Version No.	Date	Changes	Prepared by	Approved by	Status
D1	July 2025	New Document	BD	JW/LI	Draft for Client Comment
V1	Sept 2025	Addressed client comments	BD	JW	Superseded
V2	Oct 2025	Major amendments to trail numbers	BD	JW	Final

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Executive Summary

Natural Area Consulting Management Services (Natural Area) was contracted by the City of Cockburn (the City) to undertake an audit of all trails within Manning Park, located within the suburbs of Hamilton Hill and Spearwood. The audit will inform the future closure plan for trails in Manning Park. Each trail within Manning Park was mapped and assessed against the known flora, fauna, vegetation and heritage values within Manning Park. The condition, frequency and type of use and potential impacts on the environmental and heritage values of the site were assessed against each trail. A recommendation was made to keep open or close each trail based on the outcomes of the evaluation.

The results of the trail audit found:

- A total of 126 trails within Manning Park.
- An assessment using the Strava application found:
  - A total of 119 trails recorded running as the main use type, 4 trails recorded biking as the main use type and 1 trail recorded walking as the main use type.
  - A total of 76 trails had a high frequency of use, 26 trails had a medium frequency of use, and 22 trails had a low frequency of use.
  - Two trails have not been mapped on Strava.
- The on-ground trails audit found:
  - A total of 75 trails recorded walking as the main use type, 31 trails recorded running as the main use type and 20 trails recorded biking as the main use type.
  - A total of 52 trails recorded a high frequency of use, 49 trails had a medium frequency of use and 25 trails had a low frequency of use.
  - A total of 42 trails in good condition, 45 trails in medium condition and 39 trails in poor condition.
  - A total of 15 trails observed to be causing harm, a total of 52 trails could potentially cause harm and 59 trails were recorded as unlikely to cause harm to the environment or heritage.
- An analysis of usage types and frequencies combining both Strava and on ground data found:
  - The most common use type was walking/running (104 trails) followed by mixed use (20 trails) and biking (2 trails).
  - A total of 90 trails were recorded as high frequency, 19 trails were recorded as medium frequency, and 17 trails were recorded low frequency of use.

It was determined a total of 59 trails are recommended to remain open (12.14 km) and 65 trails are recommended to be closed (10.97 km). A total of 2 trails are recommended to be partially closed (0.55 km). Trails recommended to be closed included trails that:

- Have or may cause harm to environmental or heritage values.
- Are in poor to medium condition.
- Are not frequently used.
- Do not add value to connectivity.

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1.0 Introduction

1.1 Background and Purpose

Natural Area Consulting Management Services (Natural Area) was contracted by the City of Cockburn (the City) to undertake an audit of all trails (formal and informal) within Manning Park, located in the suburbs of Hamilton Hill and Spearwood. The audit is required to determine the size, condition, usage and potential impacts on environmental and heritage values of each trail. This data will be used to provide recommendations to the City on whether the status of each trail should remain open or closed, and in turn will be used to inform the preparation of the City's trail closure plan.

1.1 Location

The site is located within Manning Park in the suburbs of Hamilton Hill and Spearwood and shares its western boundary with the suburb of North Coogee (Figures 1 and 2). Manning Park is located within the City of Cockburn Local Government Area and is approximately 17 km from the Perth Central Business District. Manning Park falls within an Environmentally Sensitive Area (Department of Water and Environmental Regulation (DWER), 2021).

1.2 Objectives

The objective of the Manning Park trail audit was to provide recommendations on whether each trail present should remain open or be closed based on the attributes of each trail (trail condition, trail use and frequency and potential harm to environmental and heritage values). The scope of works included a desktop assessment to review relevant documents and obtain background information on environmental and social values of the site. A field survey was conducted to assess the length, width, condition, usage level and type. The potential environmental harm was determined and recommendations to close or leave each trail open was developed from a synthesis of the desktop and field surveys.

1.3 Legislative Context

State and Federal environment-related laws impact how environmental values are governed in Western Australia. The following legislation and policies are relevant to this report.

1.3.1 Relevant Legislation

***Aboriginal Heritage Act 1972* (WA)**

The *Aboriginal Heritage Act 1972* (WA) makes provision for the recognition, protection, conservation, and preservation of Aboriginal heritage in Western Australia.

***Biodiversity Conservation Act 2016* (WA)**

The *Biodiversity Conservation Act 2016* (WA) (BC Act) aims to protect and conserve biodiversity as well as to promote the ecologically sustainable use of biodiversity components in the State. The BC Act provides the statute relating to conservation and legal protection of flora, fauna, and ecological communities. The BC Act follows the principles of ecologically sustainable development, detailing that decision-making processes should effectively integrate long-term and short-term economic, environmental, social, and equity considerations.

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***Environmental Protection Act 1986* (WA)**

The *Environmental Protection Act 1986* (WA) (EP Act) provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement, and management of the environment connected with the foregoing. The Environmental Protection Authority (EPA) is established under this act and provides a structured policy framework that is consistent with the EP A*ct*. The EPA produces the guidelines and procedures associated with conducting environmental assessments in line with the EP Act.

***Environment Protection and Biodiversity Conservation Act 1999* (Cth)**

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) serves to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places. The primary objective of the EPBC Act is to promote the conservation of biodiversity and the sustainable use of natural resources while allowing for ecologically sustainable development. The EPBC Act allows for the creation of conservation agreements between the Australian government and individuals, communities, or organisations to support the conservation of biodiversity.

Heritage Act 2018 (WA)

The *Heritage Act 2018* (WA) recognises the importance of and promotes understanding and appreciation of Western Australia's cultural heritage; and provides for the identification and documentation of places of cultural heritage significance and for the conservation, use, development and adaptation of such places.

***Soil and Land Conservation Act 1945* (WA)**

The *Soil and Land Conservation Act 1945* (WA) serves to conserve soil and land resources, and to mitigate the impacts of erosion, salinity, and flooding. This Act outlines the mitigation and prevention of land degradation, promoting soil conservation and land management and the administration of Land Conservation District Committees (LCDC).

1.3.2 Relevant Planning and Policy

Australian Weeds Strategy 2017-2027

The Australian Weeds Strategy 2017-2027 provides a strategic framework for managing weeds at a national level (Invasive Plants and Animals Committee, 2016). As part of the implementation of the National Weeds Strategy, 32 Weeds of National Significance are identified as nationally agreed priority plant species for control and management based on the criteria of invasiveness and impact characteristics, potential and current area of spread and economic, environmental, and social impacts.

Australia's Biodiversity Conservation Strategy 2010-2030

Australia's Biodiversity Conservation Strategy 2010-2030 aims to protect biological diversity and maintain ecological processes and systems (Natural Resource Management Ministerial Council, 2010).

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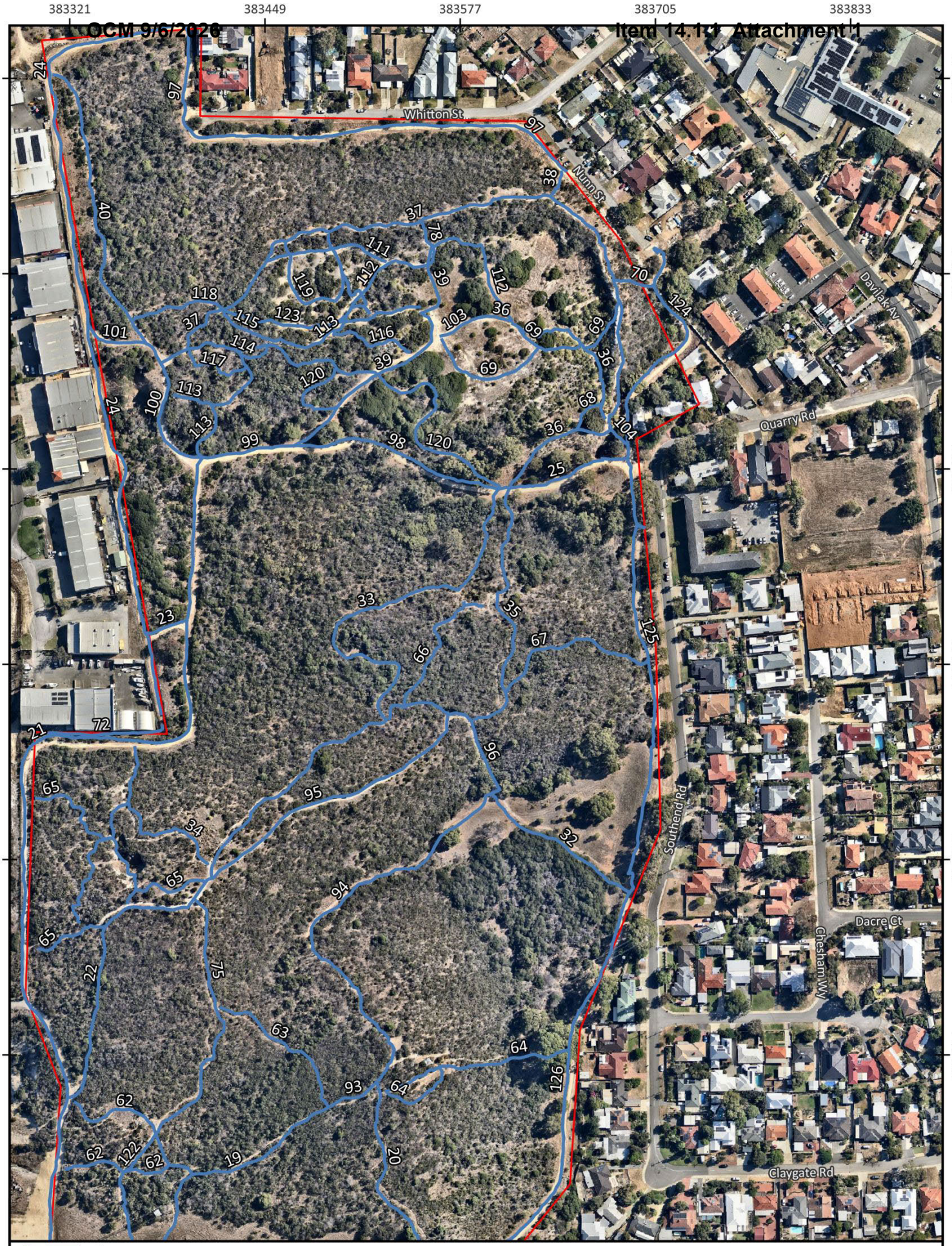


Figure 1:
Site Location
Northern Section

Hamilton Hill and Spearwood, Western Australia

Legend
Trails
Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 3200

0 50 100 m

N

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Figure 2:
Site Location
Southern Section

Legend
Trails
Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 4800

0 50 100 m

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Hamilton Hill and Spearwood, Western Australia

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2.0 Methodology

2.1 Desktop and Literature Review

The desktop survey included reviewing online databases to gather contextual knowledge and determine preliminary site characteristics including:

- Native and non-native flora and fauna species present.
- Current extent and condition of native vegetation.
- Presence of threatened or priority flora and fauna species.
- Presence of any threatened or priority ecological communities.
- Locations of current formal trails.
- Aboriginal and European heritage values.

The following literature and applications were accessed to obtain relevant information:

- Detailed Fauna and Fauna Assemblages Survey of Manning Park - Hamilton Hill (FaunaTrack, 2024).
- Flora and Vegetation Assessment of Manning Park Reserve (Focused Vision Consulting, 2024).
- Report of an Aboriginal and Historic Heritage Assessment of Manning Park, Western Australia (Archae-aus, 2024).
- Strava.
- City of Cockburn Manning Park Trails App (City of Cockburn, 2025).

2.2 On-ground Survey

Natural Area environmental scientists undertook the survey between May 7 and 8, 2025, with key data recorded using QField software on a handheld tablet. Survey activities included:

- Traversing and recording tracklogs along all trails present on site.
- Recording key data including:
  - The average width of each trail.
  - The condition of each trail (good, medium or poor).
  - The level of usage of each trail (low, medium or high) based on evidence of use (footprints, tyre tracks or direct observations).
  - The predominant usage type of each trail (walking, biking, running or other use).

2.3 Data Analysis

Data from the desktop and field surveys were synthesised, with final recommendations derived from a combination of information collected during the desktop and field components. The use and frequency, condition, potential to cause harm to environmental or heritage values, start and end point of each trail and the requirements of the City were all considered when providing final recommendations. Due to the differences between data collection methods using data from a single point in time (field survey) and collated data over an unknown length of time (Strava), combinations of usage categories were developed to better understand the predominant users of the Manning Park trail system. Where usage frequencies differed between the field data and Strava data, the highest frequency was used.

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2.4 Limitations

The limitations associated with the trail audit undertaken at Manning Park are outlined in Table 1 below.

Table 1: Survey limitations identified during the Manning Park trails audit

Potential Limitation	Degree of Limitation	Comments
Availability of contextual information	None	All contextual information required for the surveys were readily available to Natural Area. Previous environmental and heritage reports prepared for Manning Park were provided by the City on contract award. Trail usage information was readily available through public applications.
Competency/ experience of team	None	Survey activities were undertaken by experienced environmental scientists who are capable of undertaking infrastructure assessments in an environmental context within the Swan Coastal Plain.
Survey effort and extent	None	All trails (formal and informal) were able to be traversed and assessed over the two-day survey period.
Access restrictions	None	All trails within Manning Park were accessible to Natural Area on the days of the survey.
Disturbances	None	No recent disturbances which may have had an impact on survey results (e.g. fire, recent clearing or floods) were identified during the survey.
Data collection methods	Moderate	It is highly unlikely that individuals undertaking illicit activities will use a tracking program such as Strava while undertaking such activities. As such, the usage frequency of trails such as the unauthorised mountain biking trails in the north section of Manning Park are not likely to show the actual frequency of use.
	Minor	Data collected in the field was collected at a single point in time, where data collected through Strava is a compilation of data over an unknown period of time. To mitigate this limitation, usage data was further separated into categories showing the most common uses. Where frequencies differed between Strava and on site observations, the highest frequency recorded between the two methods was used to determine the frequency of use of each trail.

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3.0 Survey Results

A desktop assessment identified several Aboriginal and European heritage sites, conservation significant flora and fauna and threatened and priority ecological communities. A total of 126 trails were identified within Manning Park. Trail uses included running, walking and biking at varied frequencies and condition. Details of the results found during the trails audit have been provided in the sections below. A summary of each trail and the use type and frequency, condition, potential to cause harm and recommendations have been provided in Appendix 1.

3.1 Desktop Survey

3.1.1 Heritage

The desktop survey showed several matters of Aboriginal and European heritage within Manning Park ([redacted] all of which are currently intersected by trails (Figure 3). The European heritage site is the Davilak Ruins and is present within the southern portion of the site. The Aboriginal heritage sites are present [redacted]). These consist of:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

3.1.2 Flora and Vegetation

Two priority flora are located within Manning Park, *Pimelea calcicola* (P3) and *Dodonaea hackettiana* (P4) (Focused Vision Consulting, 2024). All populations of *Pimelea calcicola* are located adjacent to trails and are at risk of negative effects should further unauthorised trails be made or weed spread and erosion be exacerbated by the use of unauthorised trails (Figure 4). The population of *Dodonaea hackettiana* is located in the north of Manning Park and is located approximately 30 m from both a formal trail and an unauthorised trail.

Three threatened and priority ecological communities (TEC/PEC) are located within Manning Park (Focused Vision Consulting, 2024):

- SCP 24 Northern Spearwood shrublands and woodlands (P3).
- SCP26a *Melaleuca huegelii - M. systena* shrublands of limestone ridges/Honeymyrtle shrubland on limestone ridges of the SCP ecological community (CR).
- Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain Ecological Community (CR/P3).

Formalised trails were excluded from the TEC and PEC boundaries, with the exception of the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community (Focused Vision Consulting, 2024). Trails both formal and informal intersect with the 30 m buffer for this community. Several unauthorised trails intersect with all three threatened or priority ecological communities (Figure 4).

Vegetation condition within Manning Park ranges from completely degraded to excellent and includes other classifications including other uses (includes cleared, firebreak/tracks, other uses), parkland and revegetated areas (Focused Vision Consulting, 2024). All formal trails are located within the vegetation classification

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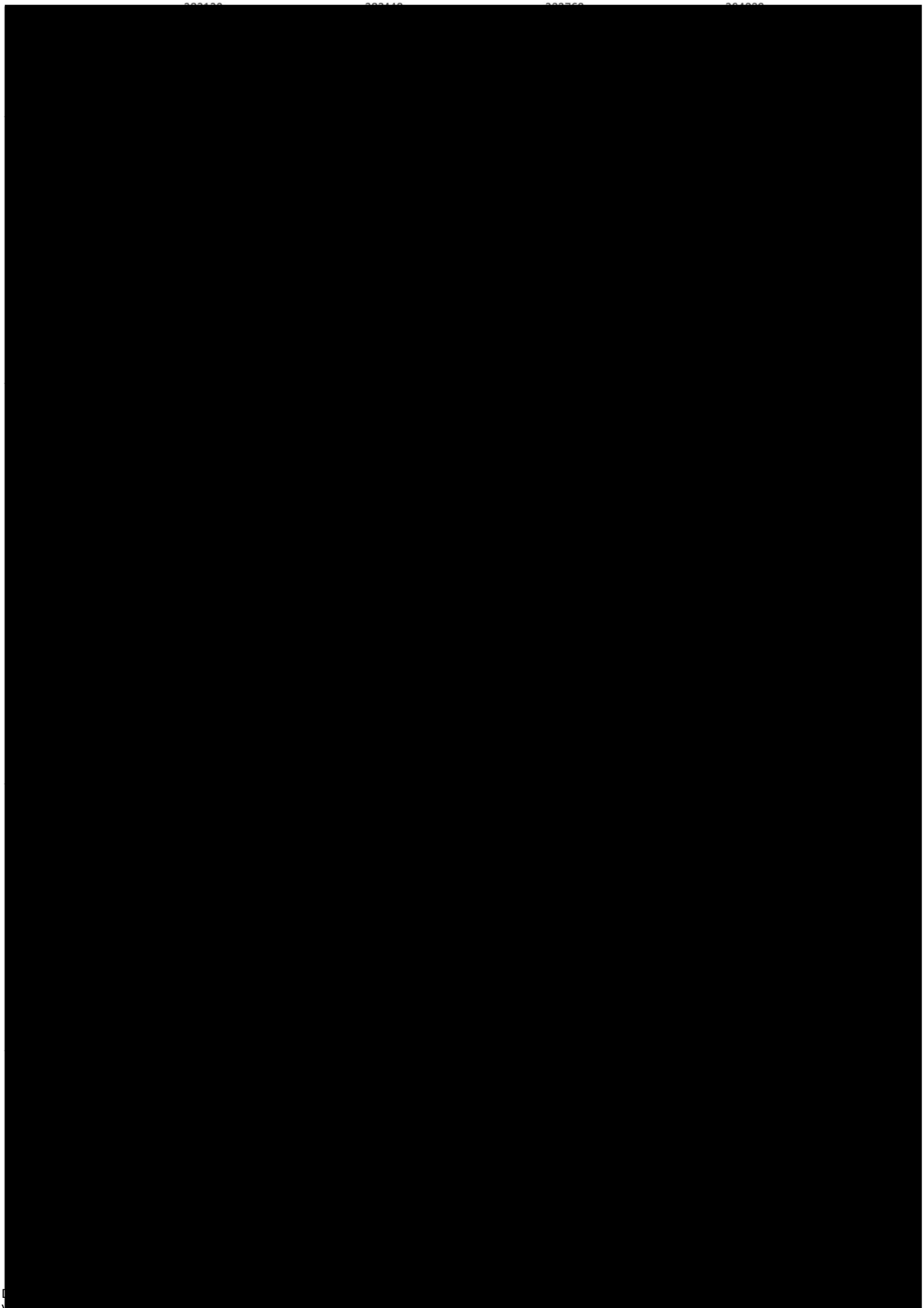
other uses (including cleared, firebreak/tracks, other uses). Most unauthorised trails traverse areas of vegetation classed as good or better and revegetation areas (Figure 5). The unauthorised mountain bike trails in the north of Manning Park are located within vegetation classified as completely degraded. Several trails within the southern section intersect with revegetated areas.

3.1.3 Fauna

Seven conservation significant fauna species have been recently identified during a survey undertaken within Manning Park (FaunaTrack, 2024). These included five birds, one mammal and one reptile (FaunaTrack, 2024). Additionally, fourteen locally significant bird species and one locally significant reptile species was also detected. The site is also an area of black cockatoo foraging, roosting and potential breeding habitat (FaunaTrack, 2024). Several threats to these species have been identified within Manning Park (FaunaTrack, 2024), that may be exacerbated by the creation of trails, either formal or informal:

- weed infestations
- habitat loss and fragmentation
- dieback
- erosion.

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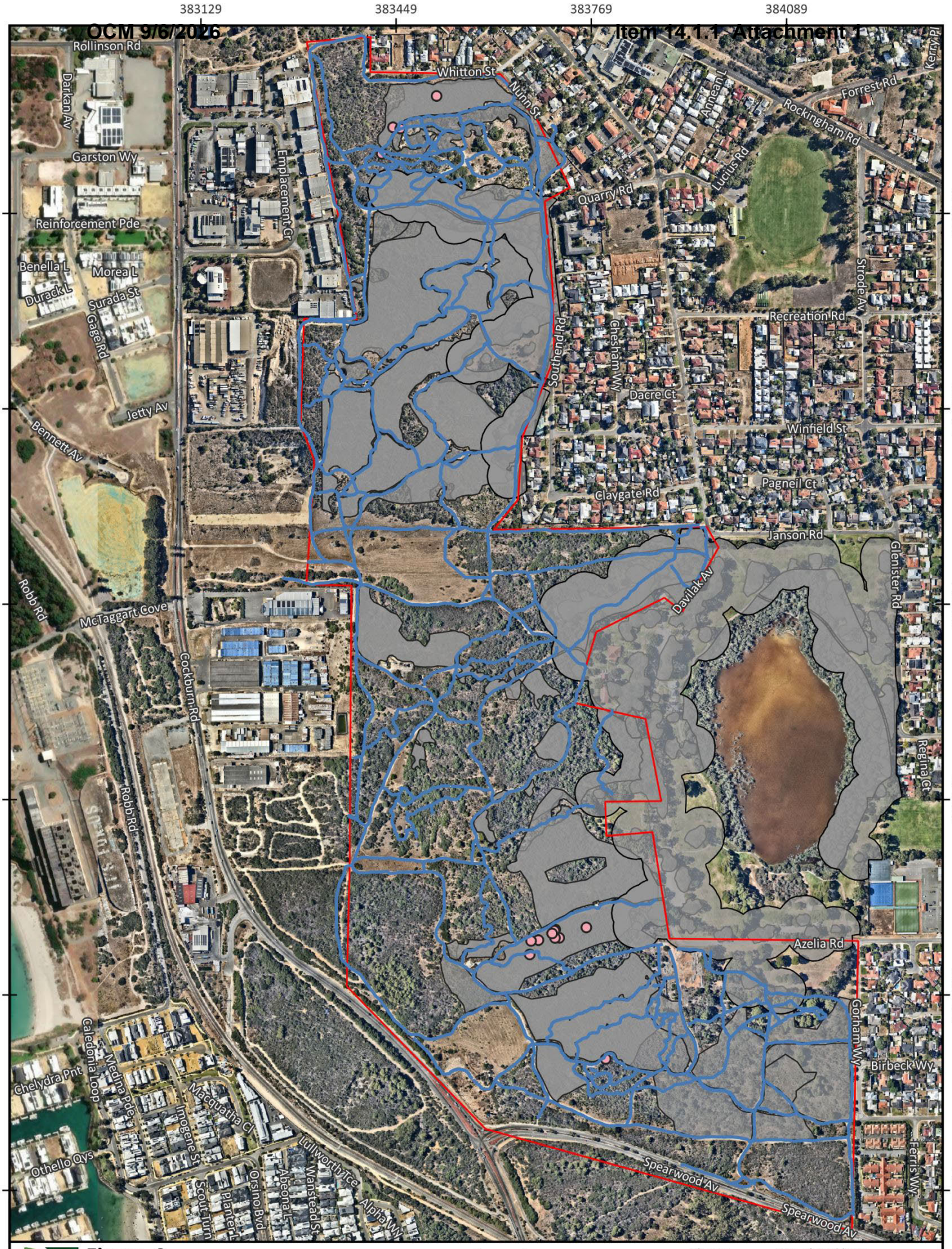


Figure 4:
Significant Flora Values

Legend
- Significant Flora
- Trails
- Ecological Communities
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

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0 150 300 m

Hamilton Hill and Spearwood, Western Australia

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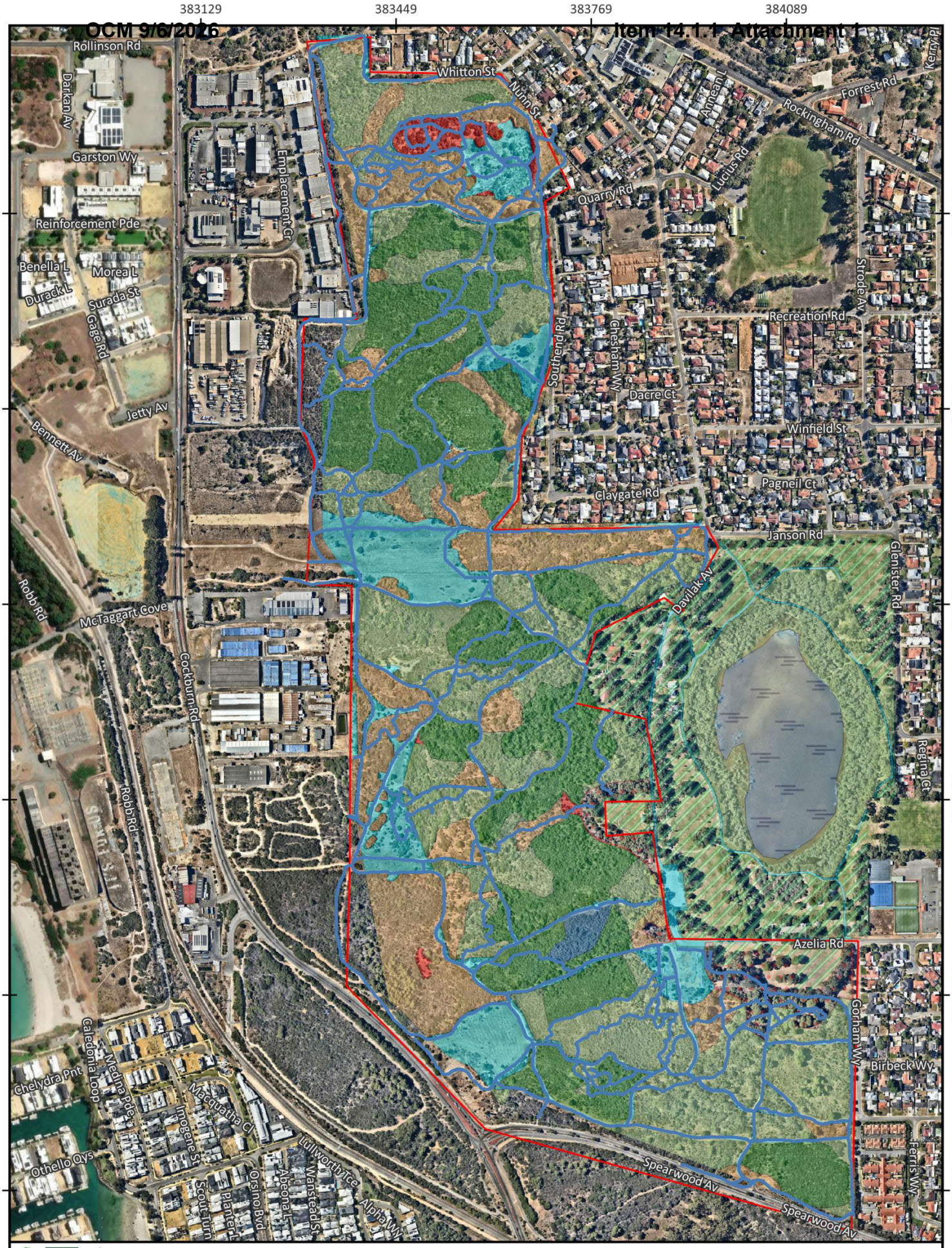


Figure 5:
Vegetation Condition

Legend

- Trails

Vegetation Condition
- Excellent
- Very Good
- Good
- Degraded
- Completely Degraded
- Parkland
- Open Water
- Other Uses
- Revegetated
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

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3.1.4 Strava Trail Use and Frequency

The most common use and frequency of use was derived from the Strava heatmap, where the thicker and darker coloured trails represented a higher frequency and the lighter thinner trails represented a lower frequency of use. Each trail was assigned a frequency of use based on this heatmap, relative to all other trails mapped on Strava at Manning Park. The most common usage type recorded on Strava was running, with 119 trails recording running or trail running as the main use type. A total of 4 trails recorded biking as the main use type and 1 trail recorded walking as the main use type (Figure 6). There was a total of 76 trails with a high use frequency, consisting of biking, running and walking activities. A total of 26 trails recorded a medium frequency of use, consisting of running and biking activities and 22 trails recorded low frequency of use, consisting of running activities only (Table 2). Two trails had no record of any use according to Strava at the time of the survey.

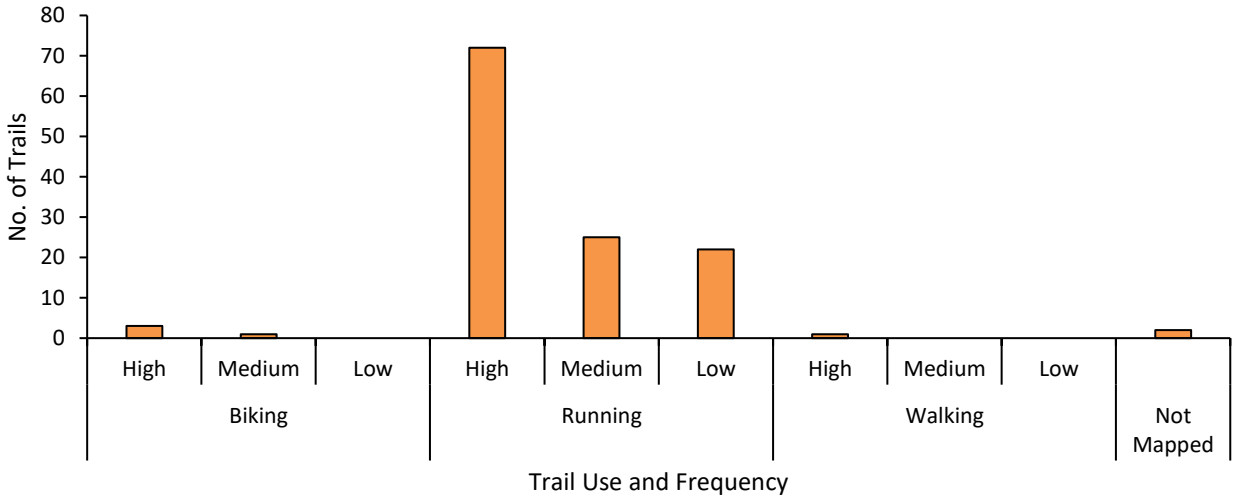


Figure 6: Trail use and frequency determined by Strava.

3.2 Field Survey Results

3.2.1 Trail Condition

Trails were considered in good condition if the trail had good footing (little to no dangerous aspects such as uneven ground, rocks, branches or potholes), clear of encroaching vegetation, and appeared overall well maintained (Figure 7). Trails in medium condition may have some instances of dangerous aspects or encroaching vegetation but appear to be safely traversable. Trails in poor condition consist entirely or almost entirely of poor footing, overgrown vegetation or other dangerous elements, and did not appear maintained. A total of 42 trails were recorded in good condition, 45 trails were recorded in medium condition, and 39 trails were recorded in poor condition (Figure 8).

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Good Medium Poor

Figure 7: Examples of trails in good, medium and poor condition.

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Figure 8:
Trail Condition

Hamilton Hill and Spearwood, Western Australia

Legend

Condition
- Poor
- Medium
- Good
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

N

0 150 300 m

3.2.2 Trail Use and Frequency

The most common usage type seen across site during the field survey was walking, with 75 trails recording walking as the main use. Trail frequency was determined in the field by the number of footprints or tyre tracks present (Figure 9). A total of 31 trails recorded running as the main use and 20 trails recorded biking as the main use (Figure 10). There was a total of 52 trails with a high frequency of use, 49 trails with a medium frequency of use and 25 trails with a low frequency of use during the survey (Table 3).



High Medium Low

Figure 9: Examples of indicators of high, medium and low use observed in the field.

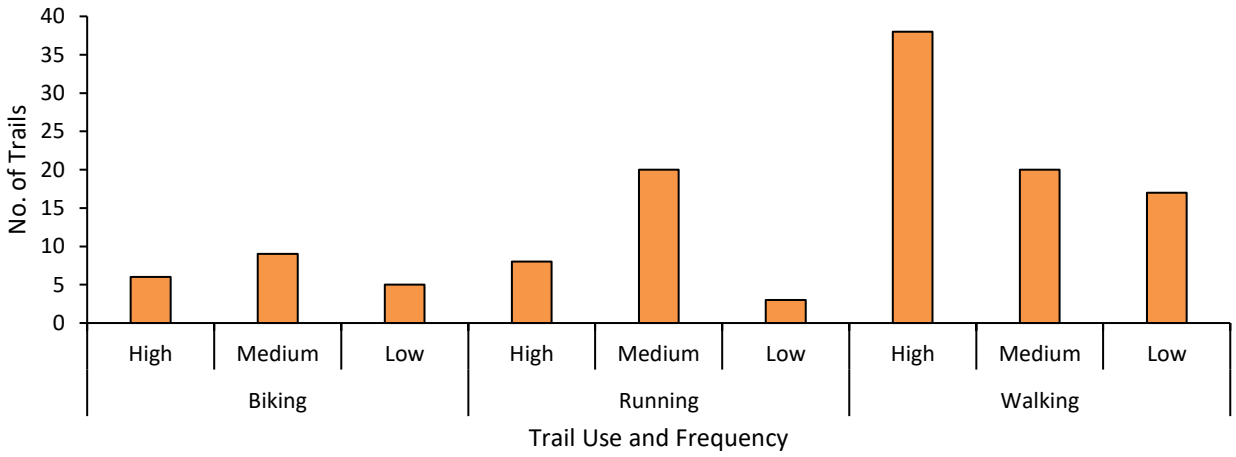


Figure 10: Trail use and frequency observed during the field survey

3.2.3 Potential Impact to Heritage or the Environment

Observed impacts were trails considered to be currently causing harm to the environment or heritage recorded instances of introduction of weeds, erosion or instances of vandalism. Trails with likely impacts included trails in the vicinity of threatened and priority flora and ecological communities, heritage sites, fauna habitat values, trails likely to exacerbate erosion and trails that have the potential to introduce and spread weeds into an area of bushland (overly sandy trails, freshly forged trails). Trails deemed unlikely to cause harm include formalised trails with a compacted base that are not likely to facilitate weed spread or erosion and trails that do not intersect with significant environmental and heritage values identified at Manning Park. A total of 15 trails recorded observations of heritage or environmental harm occurring and 52 trails recorded the potential to cause environmental or heritage harm through continued use. A total of 59 trails were recorded as unlikely to cause harm to the environment or heritage through continued use (Figure 11).

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Figure 11:
Potential to Cause Environmental Harm

Legend

Environmental Harm
- Harm Observed
- Harm Likely
- Harm Unlikely
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

N

0 150 300 m

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3.3 Combined Trail Use Frequency Results (Strava and Field Observations)

A combined trail use and frequency was synthesised from a combination of Strava data and on-site observations. The main use was derived from a combination of Strava and field observations, and the frequency was derived from the highest frequency recorded between Strava and field observations. Trails were assigned a category according to a combination of the most predominant uses and frequencies of use:

- biking
- running/walking
- mixed use.

Mixed use trails included trails that showed differences in the most frequent use between Strava and on-site observations. Detailed use types have been provided in Appendix 1. The most common combined trail use was walking/running, with a total of 104 trails recording this as the predominant use (Figure 12). A total of 20 trails recorded mixed uses as the predominant use and 2 trails recorded biking as the predominant use. A total of 90 trails were recorded as having a high frequency of use, 19 trails were recorded as having a medium frequency of use and 17 trails were recorded as having a low frequency of use (Figures 13 to 15).

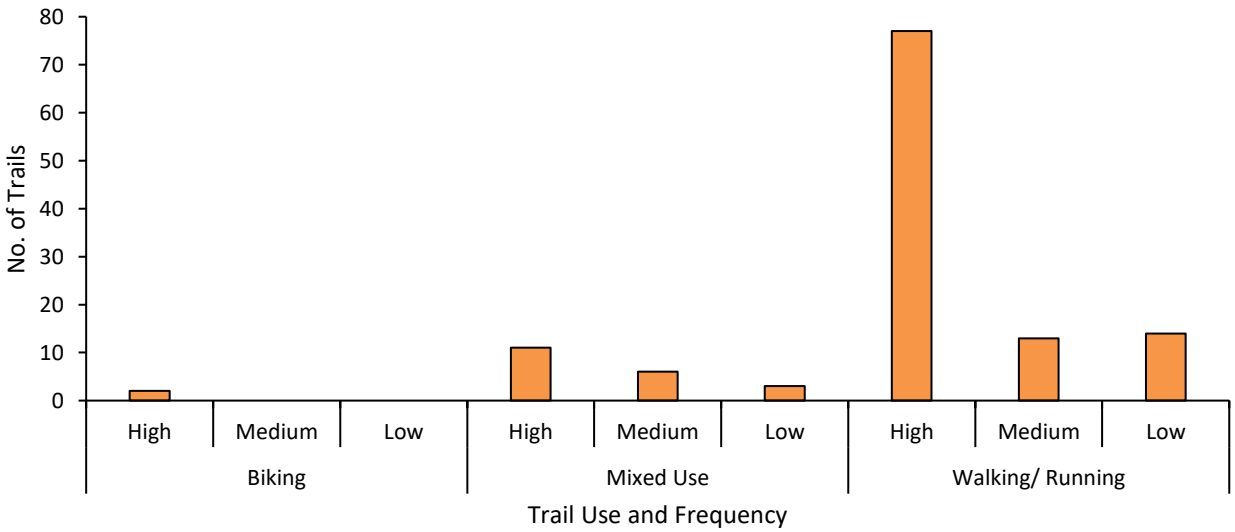


Figure 12: Combined trail use and frequency.

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Figure 13:
Trail Use - Low Frequency

Legend

Use
- Mixed Use
- Running/Walking
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

0 150 300 m

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Figure 14:
Trail Use - Medium Frequency

Legend

Use
- Mixed Use
- Running/Walking
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

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Figure 15:
Trail Use - High Frequency

Legend

Use
- Biking
- Mixed Use
- Running/Walking
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

0 150 300 m

N

Hamilton Hill and Spearwood, Western Australia

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4.0 Discussion and Recommendations

All factors were considered when assessing trails including the condition of the trails, trail use and frequency, the potential to cause harm to the environmental or heritage values, the continuity of the trails, and the City's requirements. It is recommended that a total of 61 trails should remain open, and 65 trails should be closed.

Trails that are recommended to remain open include trails that are required by the City (Figure 16), are not likely to cause harm to environmental or heritage values, and that have a high frequency of use. Additionally, several trails are recommended to remain open to reduce dead ends in trails, allow access into Manning Park, or to provide a better alternative to trails that are currently causing harm to environmental and heritage values. Typically, trails recommended to remain open were in good condition however, if a trail was considered to have value for use but was in poor -medium condition that trail was recommended to remain open with maintenance or formalisation. Detailed diversion and maintenance recommendations have been provided in Figures 17 and 18, and trails that are recommended to remain open are provided in Figures 19 and 20.

Several trails that are recommended to remain open will require maintenance (track pruning) to ensure safe access down these trails. A higher frequency of maintenance is recommended for high frequency of use trails due to increased likelihood of damage and degradation. These trails are typically wide enough to be considered formal however may be overgrown with vegetation. Several trails recommended to remain open are in poor condition currently and are recommended to undergo formalisation to mitigate potential effects to environmental and heritage values. Trails requiring formalisation are typically sandy trails that may have been created through unauthorised access; however, may allow continuity of a formal trail or may divert access away from environmental and heritage values.

Several trails classed as required to be kept intersect with a known heritage area or priority flora or ecological communities. It is understood the City is required to keep these trails through operational, passive recreational or statutory requirements and therefore, it is recommended that the majority of the length of these trails are kept open. However, the City may wish to consider diverting these trails to avoid negative impacts such as vandalism to heritage values. If trails are required to remain open and diversion is not favourable due to the risk of increased environmental and heritage degradation, it is recommended deterrents such as fencing and signage are installed to discourage foot traffic within high value areas. If negative impacts are observed as a result of the nearby trails, these trails should be diverted to minimise impacts. Additional recommendations that may reduce potential impacts to Manning Park include increased signage and wayfinding improvements. Users are less likely forge unauthorised tracks if they are properly informed of the direction, length, difficulty and location of a trail.

Trails that are recommended to be closed are trails that may potentially cause harm or are causing harm to environmental or heritage values, are not required for continuity of the trails, are unnecessary shortcuts, may have dangerous footing or may require excessive maintenance to remain open (Figures 21 and 22). These include the unauthorised mountain biking trails in the northern section of the site, which are recommended to be closed to discourage further trail clearing and littering in the form of creating bike jumps.

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Figure 16:
City of Cockburn Required Trails to Keep Open

Legend
- Keep Open
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 8000

N

0 150 300 m

Hamilton Hill and Spearwood, Western Australia

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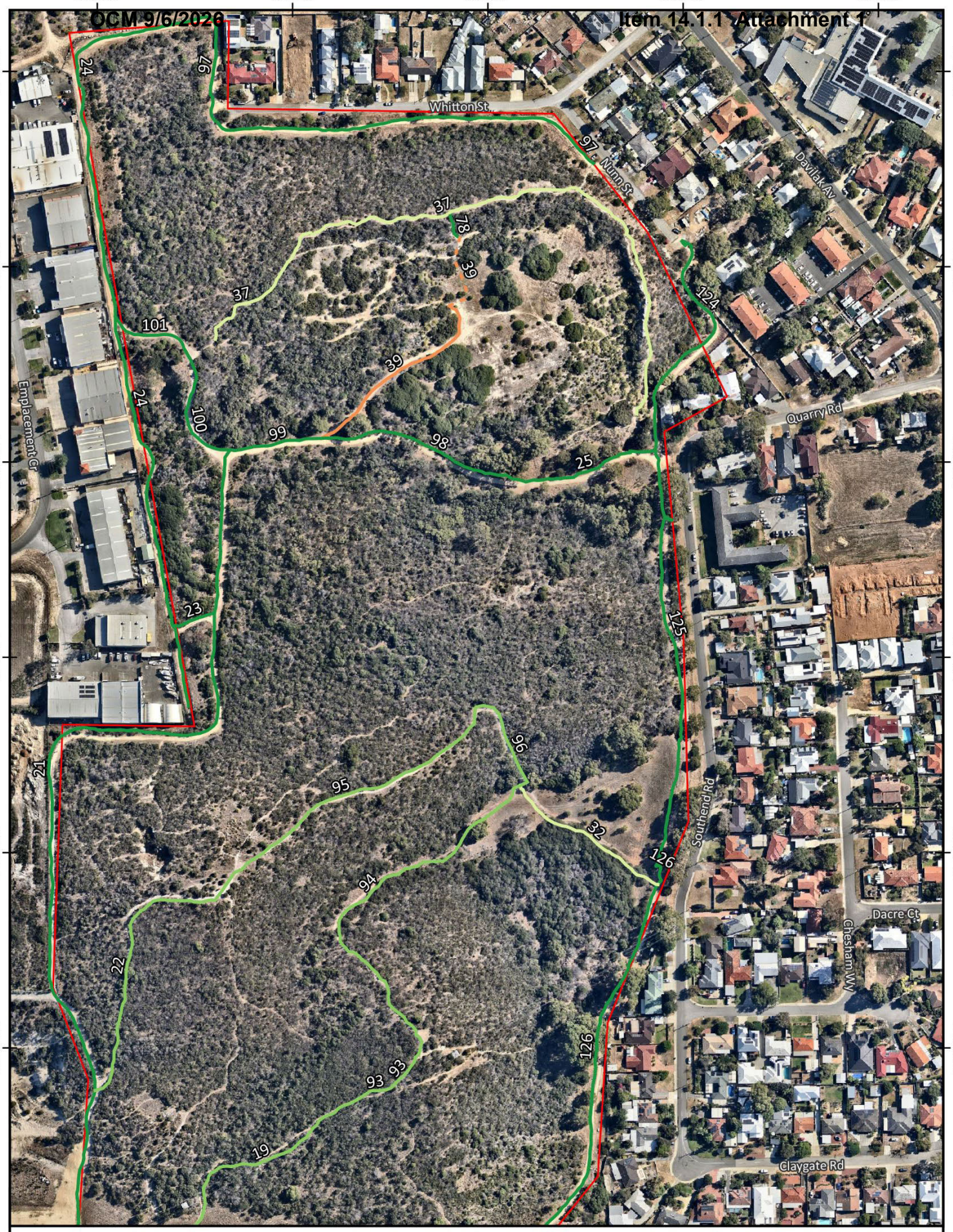


Figure 17:
Detailed Recommendations for Open Trails Northern Section

Hamilton Hill and Spearwood, Western Australia

Legend

Recommendations
- Potential Diversion
- Divert Trail
- Formalise Trail
- Undertake Maintenance
- No Modification

Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 3200

0 50 100 m

N

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Figure 18:
Detailed Recommendations for Open Trails Southern Section

Hamilton Hill and Spearwood, Western Australia

Legend

Recommendations
- Potential Diversion
- Divert Trail
- Formalise Trail
- Undertake Maintenance
- No Modification

Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 4800

0 50 100 m

N

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Figure 19:
Recommended Trails to Keep Open
Northern Section

Hamilton Hill and Spearwood, Western Australia

Legend

Recommendations
- Potential Diversion
- Keep Open
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 3200

0 50 100 m

N

Document Set ID: 12562297
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Figure 20:
Recommended Trails to Keep Open
Southern Section

Hamilton Hill and Spearwood, Western Australia

Legend

Recommendations
- Potential Diversion
- Keep Open
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 4800

0 50 100 m

N

Document Set ID: 12562297
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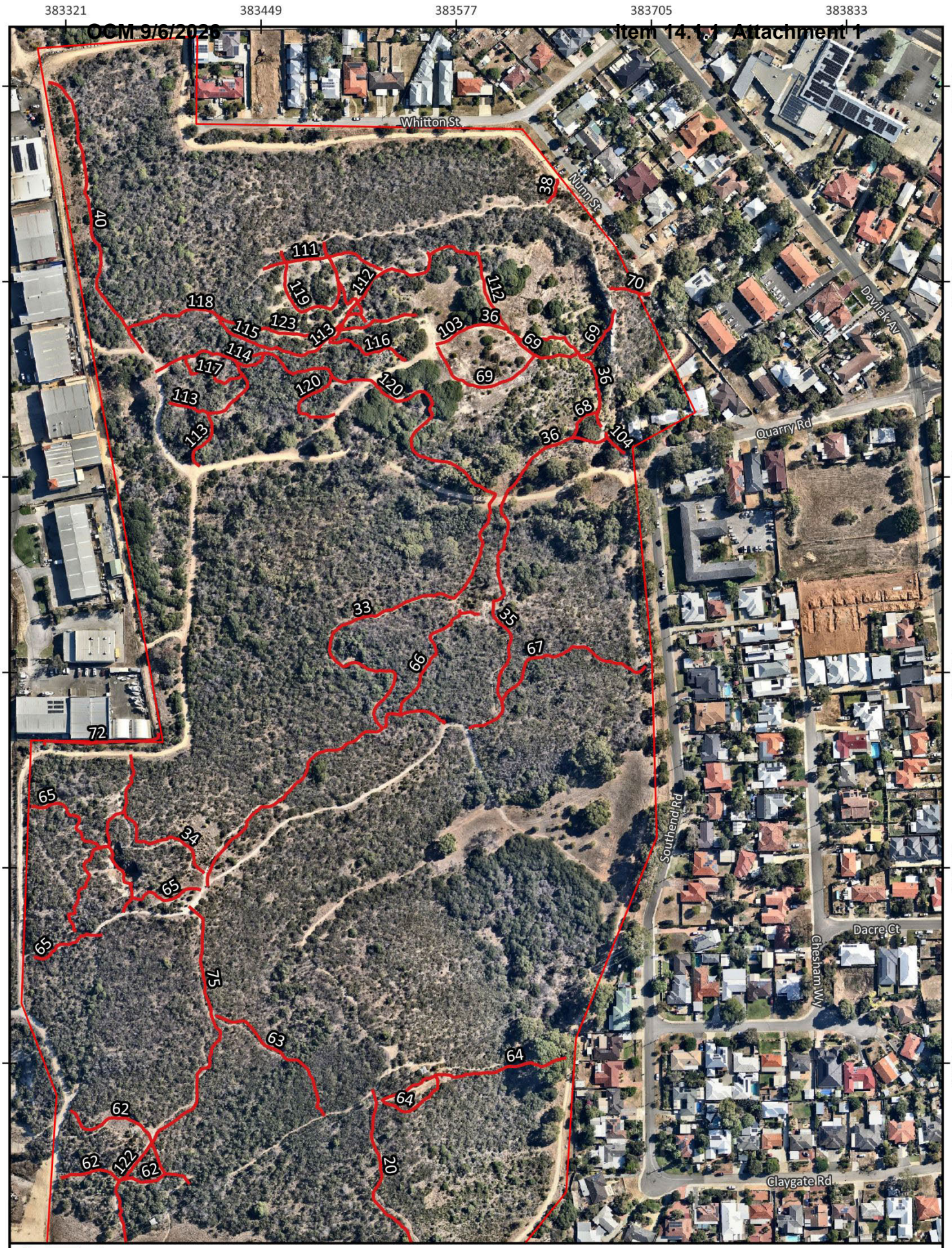


Figure 21:
Recommended Trails to Close
Northern Section

Legend

Recommendations
- Close
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 3200

0 50 100 m

N

Hamilton Hill and Spearwood, Western Australia

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Figure 22:
Recommended Trails to Close
Southern Section

Hamilton Hill and Spearwood, Western Australia

Legend

Recommendations
- Close
- Site Boundary

Client:	City of Cockburn
Date:	27/10/2025
Created by:	B. Daniels
Image Source:	Nearmap, 2025
Datum:	GDA2020 / MGA zone 50
Scale:	1: 4800

0 50 100 m

N

Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

5.0 References

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Appendix 1: Trail Attributes

Name:	Footway 1
Reference No.:	1
Length (m):	193.95
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Footway 2
Reference No.:	2
Length (m):	173.2
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South-West
Reference No.:	3
Length (m):	102.77
Average Width (m):	3
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Additional Trail 1
Reference No.:	4
Length (m):	334.99
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep open.



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Name:	South-West
Reference No.:	5
Length (m):	353.26
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
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Name:	South-West
Reference No.:	6
Length (m):	130.88
Average Width (m):	5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Track
Reference No.:	7
Length (m):	378.28
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm Unlikely
Required by City:	Yes
Recommendation:	Partial keep open - divert. Potentially divert away from heritage values.



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Name:	Footway
Reference No.:	8
Length (m):	239.29
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Footpath- South
Reference No.:	9
Length (m):	36.45
Average Width (m):	3
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South
Reference No.:	10
Length (m):	789.46
Average Width (m):	5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South- West
Reference No.:	11
Length (m):	149.25
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendations:	Keep open.



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Name:	Additional Trail 2
Reference No.:	12
Length (m):	509.78
Average Width (m):	2
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep open.



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Name:	South- West
Reference No.:	13
Length (m):	586.93
Average Width (m):	4.5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Additional Trail 3
Reference No.:	14
Length (m):	334.83
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep open.



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Name:	South 1
Reference No.:	15
Length (m):	408.02
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South- West
Reference No.:	16
Length (m):	109.86
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South- West
Reference No.:	17
Length (m):	49.91
Average Width (m):	4
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South 4
Reference No.:	18
Length (m):	94.13
Average Width (m):	3
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep - divert. Recommended to divert this trail, potentially through the open field to connect trails 15, 121 and 88, and to discourage use of trail 127. Track pruning of shrubs are recommended.



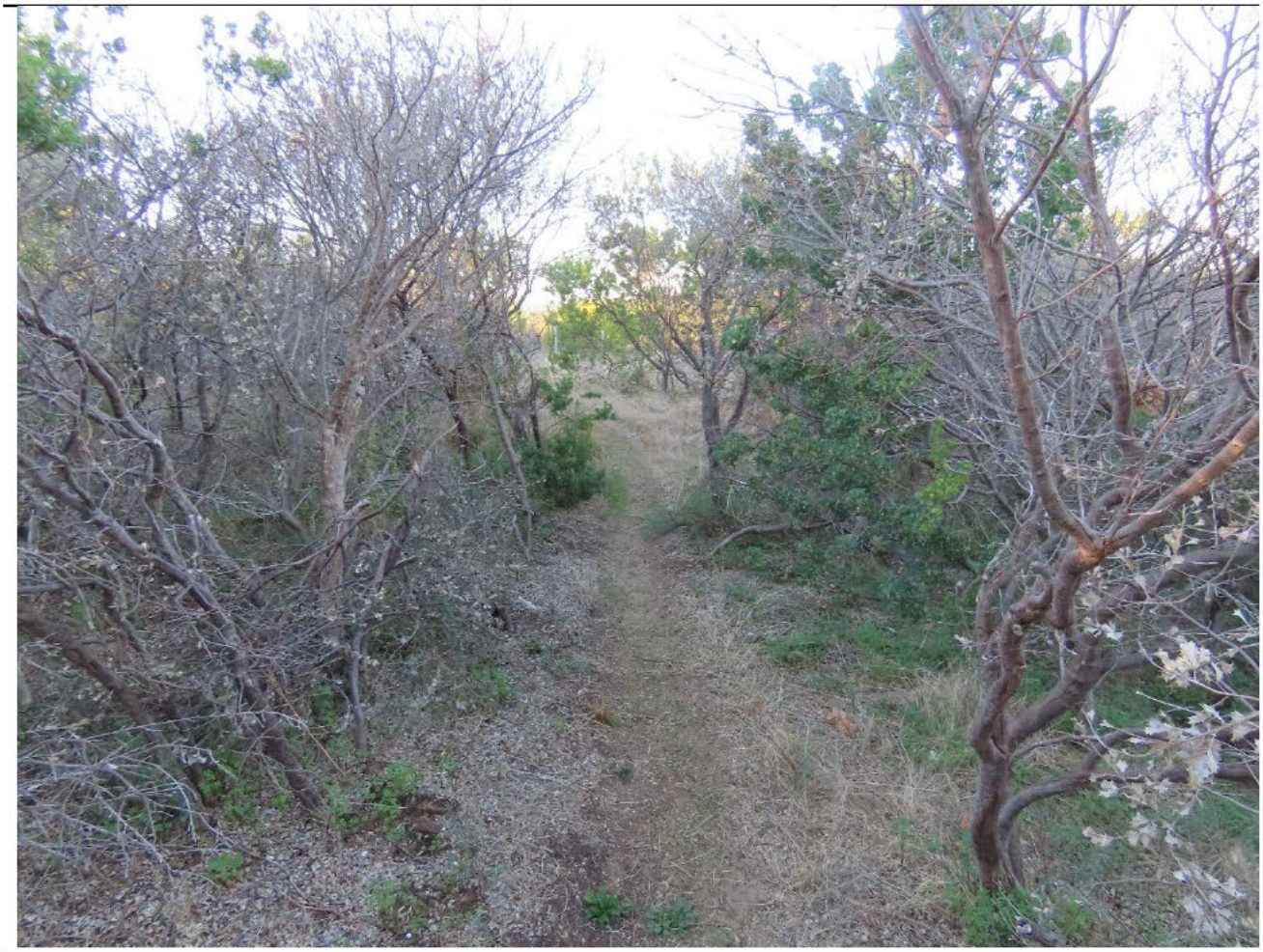
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Name:	Centre 2
Reference No.:	19
Length (m):	166.53
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendations:	Keep open. Undertake track maintenance.



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Name:	Mid 2
Reference No.:	20
Length (m):	130.54
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely. [redacted] Cuts through Honeymyrtle Shrublands TEC.
Required by City:	No
Recommendation:	Close. Risk of harm to heritage and environmental values.



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Name:	South- West
Reference No.:	21
Length (m):	652.54
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South- West 2
Reference No.:	22
Length (m):	183.16
Average Width (m):	2
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open - maintenance. Some track pruning should be undertaken if the City wishes to keep this trail open.





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Name:	West 1
Reference No.:	23
Length (m):	28.11
Average Width (m):	3
Condition:	Good
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	West 1
Reference No.:	24
Length (m):	449.99
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Central Track
Reference No.:	25
Length (m):	85.29
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Additional Trail 6
Reference No.:	26
Length (m):	180.29
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep - formalise. Useful for access between gates 12 and 13. Formalise to reduce the risk of weed spread.



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Name:	Cassandra's Trail
Reference No.:	27
Length (m):	65.21
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendation:	Close. Risk of harm to Rainbow Bee Eater habitat. Unnecessary shortcut between tracks 1 and 2. Risk of facilitating weed spread.



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Name:	Additional Trail 7
Reference No.:	28
Length (m):	174.01
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Partial closure - divert. Trail is not a formal trail however, spans between two access gates off the parkland area on Azelia Avenue and Gate 1. There is potential harm to Davilak ruins. Keep trail between the gates off the parkland but divert the portion away from Davilak ruins/ Gate 1 to the gate on Azelia Avenue.





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Name:	Firebreak 3
Reference No.:	29
Length (m):	155.20
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. High weed load and overgrown trail. Risk of weed incursion into Honeymyrtle shrubland TEC patch. Would require significant inputs to formalise and reduce weed load, not required by the City.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

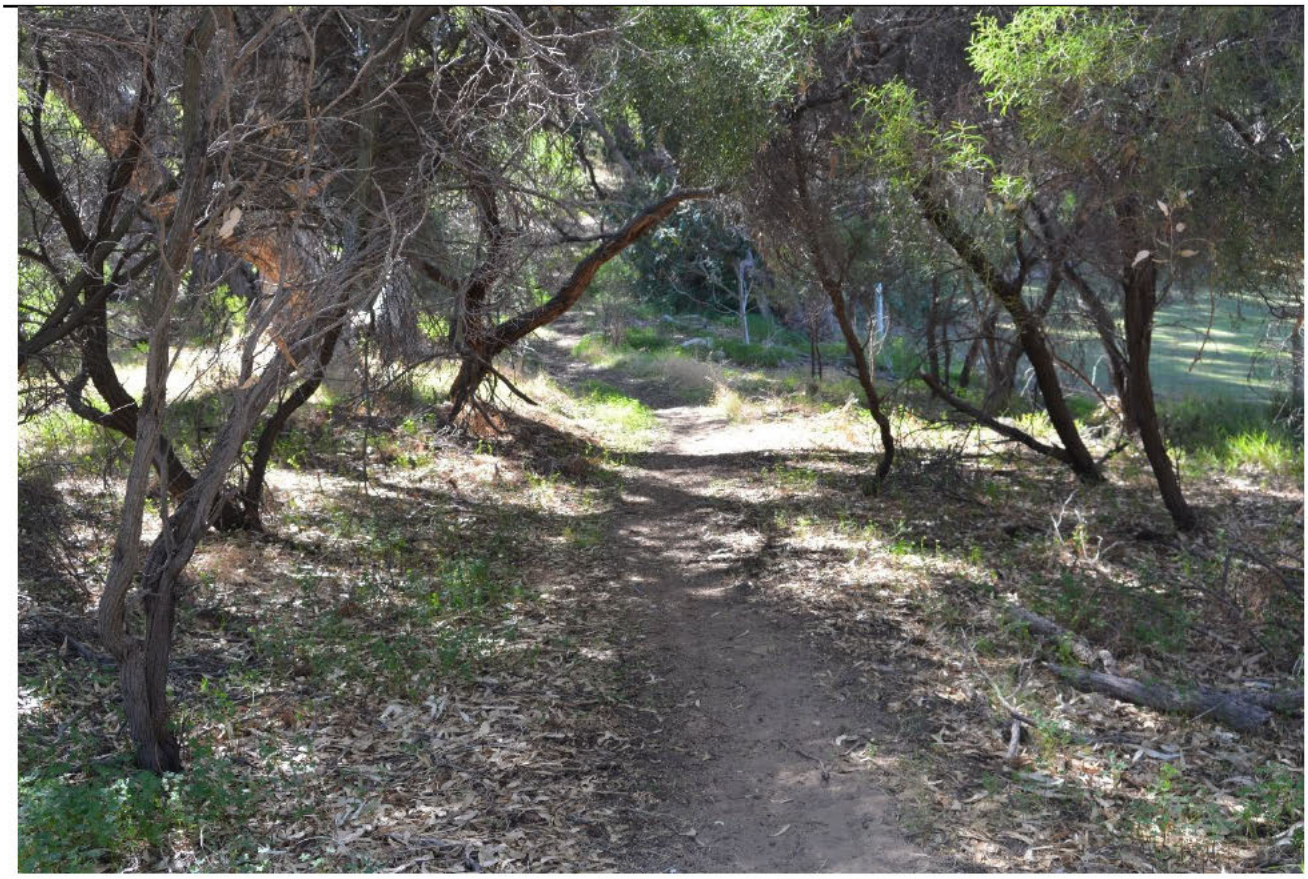
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Reference No.:	30
Length (m):	191.42
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Partially cuts through Tuart woodlands TEC. Not required by City and does not add connectivity to the trail network.





Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mike's Trail
Reference No.:	31
Length (m):	259.73
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Risk of weed incursion into Tuart woodlands TEC patch. Not required by the City.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	East
Reference No.:	32
Length (m):	115.7
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendation:	Keep open - formalise. Recommended to formalise and widen the trail to ensure the trail is in good condition for use and does not facilitate weed spread throughout the park.



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Name:	Rock Razoor
Reference No.:	33
Length (m):	435.26
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Heavy bike traffic. High risk of damage to Honeymrytle shrubland TEC and Tuart woodlands TEC patches. Recommended to use strong deterrents against bike traffic as it is highly likely efforts will be made by mountain bikers to continue to use this trail. If trail is unable to be closed, formalisation should occur to mitigate weed spread and erosion through the TEC patches.





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Name:	Loose Goose
Reference No.:	34
Length (m):	120.47
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Risk of weed spread and erosion into adjacent to Honeymyrtle shrubland TEC. Provides a shortcut between trails 21 and 22.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid
Reference No.:	35
Length (m):	187.14
Average Width (m):	0.8
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Cuts through Tuart woodland TEC patch. High risk of weed spread. Currently a well-used shortcut between trails 25/ 98 and 95/ 96. Strong deterrent measures are recommended. If the trail is unable to be closed, formalisation should occur to reduce the risk of weed spread.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Track 1
Reference No.:	36
Length (m):	212.38
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Risk of weed spread and erosion into Tuart woodland and Honeymyrtle shrubland TECs high. Provides access to unauthorised mountain biking trails in the north.



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Name:	Bright Angel
Reference No.:	37
Length (m):	462.07
Average Width (m):	0.75
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendation:	Keep open - formalise. There is a current risk of weed incursion and erosion into the surrounding bushland. It is recommended this trail is formalised to mitigate erosion and weed risks, as well as making the trail safer and improving trail condition. Currently also used by mountain bikers to access mountain biking trails in the north.





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Name:	Additional Trail 8
Reference No.:	38
Length (m):	17.42
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed.
Required by City:	-
Recommendation:	Close. Not required. Erosion present. Dangerous footing. Will require significant inputs from the City to formalise if the City wishes to keep this trail open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid 4
Reference No.:	39
Length (m):	137.55
Average Width (m):	2
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	Yes
Recommendation:	Keep - Divert. Currently erosion and bike jumps present. Risk of erosion to adjacent Honeymyrtle shrubland TEC. Recommended to keep only the southern section open, and to divert the trail to connect with trail 78 through the cleared area to the north of trail 39. Recommended maintenance to remove bike jumps and mitigate erosion effects.



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Name:	Track North
Reference No.:	40
Length (m):	198.62
Average Width (m):	1
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	No
Recommendation:	Close. Risk of weed spread to the surrounding bushland. Recommended to close as trail runs parallel to trail 24 and does not add to trail connectivity.



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Name:	Additional Trail 9
Reference No.:	41
Length (m):	17.79
Average Width (m):	0.4
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Keep open - Formalise. Potential for erosion to occur. Gate 12 is inaccessible by bicycles, with no other suitable access point along the western portion of Spearwood Avenue. Recommendations include formalisation to allow bicycles access off Spearwood Avenue, and to mitigate erosion risk. If the City wishes to close this trail it is recommended to modify gate 12 to allow bicycle access into Manning Park from Spearwood Avenue.





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Name:	Additional Trail 10
Reference No.:	42
Length (m):	21.32
Average Width (m):	0.4
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. Second point of access for bicycles off Spearwood Avenue. Not required if trail 41 remains open, or gate 12 is modified. Potential for erosion to occur.



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Name:	Additional Trail 11
Reference No.:	43
Length (m):	155.58
Average Width (m):	2
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely.
Required by City:	-
Recommendation:	Close. Potential to cause weed spread through Tuart woodlands TEC, Northern Spearwood shrublands PEC and revegetated areas. Is not required for trail connectivity.



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Name:	Azelia Hustle
Reference No.:	44
Length (m):	212.28
Average Width (m):	1
Condition:	Medium
Level of Usage:	Medium
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Is not required for trail connectivity, forms a loop off trail 3. Intersects with revegetation area, Northern Spearwood shrublands PEC and Tuart woodlands TEC. Potential to spread weeds into revegetated area, Tuart woodlands TEC and Northern Spearwood shrublands PEC.



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Name:	Get Schwifty
Reference No.:	45
Length (m):	185.69
Average Width (m):	1
Condition:	Medium
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with Tuart woodlands TEC, Northern Spearwood shrublands PEC and revegetation area. Potential to spread weeds into all three areas. Connect trails 3 and 7. Not required for connectivity as trails 6 also connects trails 3 and 7. Not a frequently used trail.



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Name:	Azelia Hustle
Reference No.:	46
Length (m):	43.47
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Biking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Not required, leads to other trails to be closed. Close to avoid dead ends. Intersects with revegetation area and Northern Spearwood shrublands PEC and has the potential to introduce weeds.



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Name:	Alt Route
Reference No.:	47
Length (m):	555.31
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Currently spreading weeds into adjacent vegetation. Risk of erosion. Intersects with Honeymyrtle shrubland TEC and Northern Spearwood shrubland PEC. Intersects with Davilak Ruins.



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Name:	Get Schwifty
Reference No.:	48
Length (m):	175.93
Average Width (m):	0.3
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Poor condition trail not frequently used. Vegetation trampling occurring.



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Name:	Get Schwifty
Reference No.:	49
Length (m):	410.7
Average Width (m):	1
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unnecessary shortcuts. Intersect with the Northern Spearwood shrublands PEC. Risk of erosion moving into surrounding vegetation. Leads to Davilak Ruins.





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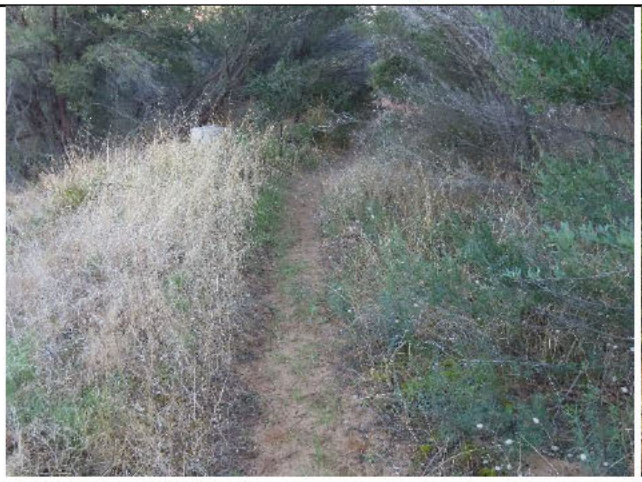
Name:	Castle Face
Reference No.:	50
Length (m):	295.25
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Rubbish along the trail. Leads to Davilak Ruins. Trail is not necessary as it is parallel to trail 10. Not a high frequency use trail.





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Name:	Additional Trail 12
Reference No.:	51
Length (m):	403.85
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	-
Recommendation:	Close. Erosion present. Trail not necessary, links trails 5, 9 and 12. Trails 5, 9 and 12 are already linked. Poor condition trail would require significant inputs from the City to formalise.





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Name:	Jack the Ripper
Reference No.:	52
Length (m):	171.91
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Unnecessary shortcut through trail 10. Has the potential to negatively affect nearby priority flora. Poor condition trail.





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Name:	Switchback Singletrack
Reference No.:	53
Length (m):	220.56
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm Likely
Required by City:	No
Recommendation:	Close. Unnecessary shortcut between trails 10 and 11. Potential to introduce weeds and erosion effects into the adjacent Honeymyrtle shrublands TEC.





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Name:	Additional Trail 13
Reference No.:	54
Length (m):	13.62
Average Width (m):	0.3
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. Unauthorised shortcut trail connecting trails 10 and 82. Potential to facilitate weed spread throughout the park. Poor condition trail and not highly frequented.



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Version: 1, Version Date: 23/12/2025

Name:	Duck
Reference No.:	55
Length (m):	219.45
Average Width (m):	1
Condition:	Medium
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Potential to facilitate weed spread through Honeymyrtle shrublands TEC, Tuart woodlands TEC and revegetation areas. Not frequently used.



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Name:	Additional Trail 14
Reference No.:	56
Length (m):	39.84
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Close. Unnecessary shortcut between trail 82 and 85. Poor condition trail, not frequently used.



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Name:	Additional Trail 15
Reference No.:	57
Length (m):	179.41
Average Width (m):	0.3
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	-
Recommendation:	Close. Intersects with Tuart woodland TEC and revegetation area. Trampling effects present. Poor condition trail not frequently used. Does not connect with the existing Manning Park trails network.



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Name:	Firebreak 1
Reference No.:	58
Length (m):	701.67
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Trail is currently facilitating weed spread. Trampling effects present on existing vegetation. Meandering trail off trail 13. Connects to a trail recommended for closure (29).





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Name:	South 2
Reference No.:	59
Length (m):	126.90
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with the Tuart woodland TEC and adjacent to the Honeymrytle shrublands TEC. Medium condition trail with the potential to facilitate weed spread and erosion effects into environmental and heritage areas.



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Name:	Payment Advice (South)
Reference No.:	60
Length (m):	162.88
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. [redacted] Honeymyrtle shrublands TEC. Potential to spread weeds and erosion effects to nearby features. Connects two trails recommended to close (30 and 107). Poor condition trail that is not well used.





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Name:	Additional Trail 17
Reference No.:	61
Length (m):	276.40
Average Width (m):	1
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	-
Recommendation:	Close. Unauthorised entryways to trails 77 and 74. Entryway to trail 74 is close by so these trails are unnecessary. Erosion present and weeds spreading throughout the Tuart woodlands TEC.



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Name:	Transmission Hill Ridgeline
Reference No.:	62
Length (m):	210.68
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/ Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. [redacted] Honeymyrtle shrublands TEC. Potential to facilitate weed spread into the surrounding environmental and heritage features. Poor condition trail not well used.





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Name:	Mid 2
Reference No.:	63
Length (m):	107.49
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Unnecessary shortcut between trails 75 and 93. Intersects with Honeymyrtle shrublands TEC. Potential to facilitate weed spread and trampling effects into the surrounding TEC.



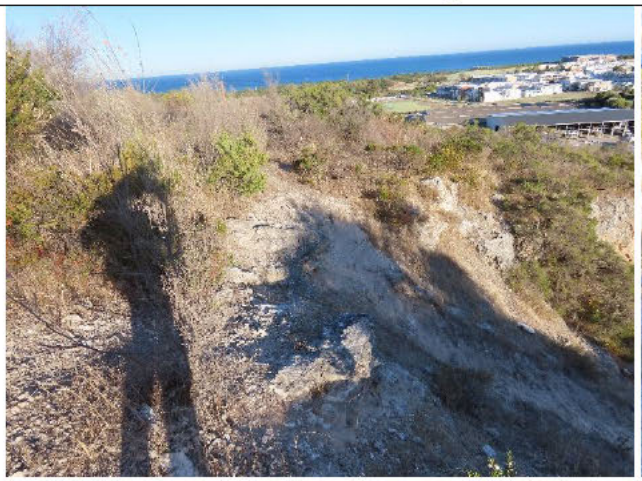
Document Set ID: 12562297
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Name:	Snakecharmer
Reference No.:	64
Length (m):	181.69
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Intersects with Tuart woodlands TEC, Honeymyrtle shrublands TEC [redacted] Currently facilitating weed spread and erosion to nearby environmental and heritage values. Poor condition trail.



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Name:	Additional Trail 18
Reference No.:	65
Length (m):	344.63
Average Width (m):	1
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	-
Recommendation:	Close. Unnecessary meandering trails connecting trails 21, 22, 95 and 34. Intersects with the Honeymyrtle shrublands TEC. Erosion and vegetation trampling effects currently present. Poor condition, potentially dangerous trail.





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Name:	Additional Trail 19
Reference No.:	66
Length (m):	175.34
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. Unnecessary shortcut connecting trails 95, 33 and 35. Intersects with the Honeymyrtle shrubland TEC. Potential to facilitate weed spread into the surrounding TEC. Poor condition trail, overgrown with vegetation.



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Name:	Road to Nowhere
Reference No.:	67
Length (m):	119.54
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with Honeymyrtle shrubland TEC and Tuart woodland TEC. Potential to introduce weeds into the surrounding TEC patches. Poor condition trail, very overgrown. With native vegetation.



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Name:	Mid
Reference No.:	68
Length (m):	26.75
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Unnecessary shortcut. Intersects with the Tuart woodlands TEC. Potential to introduce weeds into the surrounding TEC.



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Name:	Quarry Track
Reference No.:	69
Length (m):	166.54
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	Additional Trail 20
Reference No.:	70
Length (m):	26.1
Average Width (m):	0.5
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	-
Recommendation:	Close. Unnecessary shortcut connecting trails 124 and 37. Overgrown, trampling of native vegetation present. Potential to spread weeds into the adjacent Honeymyrtle shrubland TEC. Poor condition trail, not frequently used.



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Name:	Additional Trail 21
Reference No.:	71
Length (m):	99.82
Average Width (m):	0.75
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. Intersects with Northern Spearwood shrublands PEC, Tuart woodlands TEC and revegetation area. Potential to spread weeds into the surrounding environmental features. Unnecessary trail connecting trails 28,45 and 105. Poor condition trail not frequently used.





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Name:	Additional Trail 22
Reference No.:	72
Length (m):	79.08
Average Width (m):	3
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Close. Unnecessary trail parallel to trail 21. High weed load along trail and erosion present.





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Name:	Additional Trail 23
Reference No.:	73
Length (m):	105.89
Average Width (m):	2
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Biking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep open - formalise. Trail used as bicycle access between Spearwood Avenue and trail 1.



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Name:	Firebreak 4
Reference No.:	74
Length (m):	254.78
Average Width (m):	3
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open - maintenance. Trail overgrown in sections, may require minor vegetation trimming. Formalisation recommended in trampled sections.



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Name:	Putins Fetish
Reference No.:	75
Length (m):	186.13
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	No
Recommendation:	Close. High risk of harm to the environment through continued use of the trail.



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Name:	South 3
Reference No.:	76
Length (m):	67.26
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendations:	Keep open. Trail 76 is required to be kept open by the City, however [redacted] Fencing [redacted] should be installed to mitigate negative effects of foot traffic on this site by users of this section of trail 76.



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Name:	Firebreak 4
Reference No.:	77
Length (m):	52.67
Average Width (m):	1
Condition:	Poor
Level of Usage:	Medium
Predominant Usage Type:	Running/ Walking
Potential to Harm Heritage or Environmental Features:	Harm Observed
Required by City:	Yes
Recommendation:	Keep open. Maintenance should be undertaken to ensure track remains useable.



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Name:	North Link
Reference No.:	78
Length (m):	16.65
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Keep open. Track 78 is required to be included as part of the proposed quarry loop, and will link to track 39.



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Name:	Footway 3
Reference No.:	79
Length (m):	199.1
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Firebreak
Reference No.:	80
Length (m):	206.40
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Footway
Reference No.:	81
Length (m):	152.65
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South- West
Reference No.:	82
Length (m):	219.47
Average Width (m):	5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Manning Stairs
Reference No.:	83
Length (m):	106.63
Average Width (m):	5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Manning Stairs - 1
Reference No.:	84
Length (m):	150.99
Average Width (m):	5
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	East 2
Reference No.:	85
Length (m):	435.63
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	East 2
Reference No.:	86
Length (m):	165.85
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	South 2
Reference No.:	87
Length (m):	75.63
Average Width (m):	3
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. [redacted]



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Name:	Centre 1
Reference No.:	88
Length (m):	177.26
Average Width (m):	4
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Mid 2
Reference No.:	89
Length (m):	45.94
Average Width (m):	4
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Backyard Track
Reference No.:	90
Length (m):	347.38
Average Width (m):	4
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	Additional Trail 4
Reference No.:	91
Length (m):	89.71
Average Width (m):	4
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	-
Recommendation:	Keep open.



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Name:	Centre 3
Reference No.:	92
Length (m):	70.2
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendations:	Keep open. Undertake track maintenance.



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Name:	Mid 2
Reference No.:	93
Length (m):	36.28
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendations:	Keep open. Undertake track maintenance.



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Name:	Mid 3
Reference No.:	94
Length (m):	291.26
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendations:	Keep open. Undertake track maintenance.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid
Reference No.:	95
Length (m):	235.81
Average Width (m):	2
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open - maintenance. Some track pruning should be undertaken if the City wishes to keep this trail open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid 5
Reference No.:	96
Length (m):	50.25
Average Width (m):	2
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open - maintenance. Some track pruning should be undertaken if the City wishes to keep this trail open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Northern Most Firebreak
Reference No.:	97
Length (m):	417.22
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid 4
Reference No.:	98
Length (m):	147.41
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid 6
Reference No.:	99
Length (m):	64
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	South- West
Reference No.:	100
Length (m):	82
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	North 3
Reference No.:	101
Length (m):	62.29
Average Width (m):	4
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Firebreak 2
Reference No.:	102
Length (m):	86.81
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. High weed load and overgrown trail. Risk of weed incursion into Honeymyrtle shrubland TEC patch. Would require significant inputs to formalise and reduce weed load, not required by the City.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Mid 7
Reference No.:	103
Length (m):	29.43
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendation:	Close. Risk of weed spread and erosion into Tuart woodland and Honeymyrtle shrubland TECs high. Provides access to unauthorised mountain biking trails.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	East
Reference No.:	104
Length (m):	17.77
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	Yes
Recommendation:	Close. Risk of weed spread and erosion into Tuart woodland and Honeymyrtle shrubland TECs high. Provides access to unauthorised mountain biking trails.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Dan's Trail
Reference No.:	105
Length (m):	182.47
Average Width (m):	1
Condition:	Poor
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Currently spreading weeds into adjacent vegetation. Risk of erosion. Intersects with Honeymyrtle shrubland TEC and Northern Spearwood shrubland PEC.



Document Set ID: 12562297
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Name:	Bellbottoms
Reference No.:	106
Length (m):	80.87
Average Width (m):	0.3
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Poor condition trail not frequently used. Vegetation trampling occurring.



Document Set ID: 12562297
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Name:	South 3
Reference No.:	107
Length (m):	146.40
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with the Tuart woodland TEC and adjacent to the Honeymrytle shrublands TEC. Medium condition trail with the potential to facilitate weed spread and erosion effects into environmental and heritage areas.



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Name:	Brown and Sticky
Reference No.:	108
Length (m):	296.55
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with the Tuart woodland TEC and adjacent to the Honeymrytle shrublands TEC. Medium condition trail with the potential to facilitate weed spread and erosion effects into environmental and heritage areas.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	Payment Advice (North)
Reference No.:	109
Length (m):	184.01
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	No
Recommendation:	Close. Intersects with the Tuart woodland TEC and adjacent to the Honeymrytle shrublands TEC. Medium condition trail with the potential to facilitate weed spread and erosion effects into environmental and heritage areas.



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Name:	Additional Trail 16
Reference No.:	110
Length (m):	67.84
Average Width (m):	1
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. Intersects with the Tuart woodland TEC and adjacent to the Honeymrytle shrublands TEC. Medium condition trail with the potential to facilitate weed spread and erosion effects into environmental and heritage areas.



Document Set ID: 12562297
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Name:	Quarry Track 2
Reference No.:	111
Length (m):	81.58
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



Document Set ID: 12562297
Version: 1, Version Date: 23/12/2025

Name:	North
Reference No.:	112
Length (m):	184.34
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Version: 1, Version Date: 23/12/2025

Name:	North 2
Reference No.:	113
Length (m):	175.11
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Version: 1, Version Date: 23/12/2025

Name:	North 3
Reference No.:	114
Length (m):	123.35
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	North 4
Reference No.:	115
Length (m):	36.38
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	Track 2
Reference No.:	116
Length (m):	58.42
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	Quarry Ascender
Reference No.:	117
Length (m):	51.19
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	West Out
Reference No.:	118
Length (m):	63.41
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	Additional Trail 25
Reference No.:	119
Length (m):	196.55
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	Additional Trail 26
Reference No.:	120
Length (m):	293.23
Average Width (m):	1
Condition:	Poor
Level of Usage:	Low
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Unauthorised mountain bike circuit including bike jumps. Erosion, trampling and weeds present. Intersects with Honeymyrtle shrublands TEC and Tuart woodlands TEC. Overgrown vegetation in sections. Poor condition trail. Not well used. Dangerous rocky sections of trail.



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Name:	South 2
Reference No.:	121
Length (m):	63.13
Average Width (m):	3
Condition:	Good
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open - maintenance. Trail overgrown in sections, may require minor vegetation trimming. Formalisation recommended in trampled sections.



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Name:	Additional Trail 5
Reference No.:	122
Length (m):	118.57
Average Width (m):	2.5
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm likely
Required by City:	-
Recommendation:	Close. High risk of harm to the environment through continued use of the trail.



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Name:	Track 1
Reference No.:	123
Length (m):	149.4
Average Width (m):	2
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Mixed Use
Potential to Harm Heritage or Environmental Features:	Harm observed
Required by City:	No
Recommendation:	Close. Currently erosion and bike jumps present. Risk of erosion to adjacent Honeymyrtle shrubland TEC.



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Name:	North Entry
Reference No.:	124
Length (m):	134.63
Average Width (m):	3
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	No. Required by DFES.
Recommendation:	Keep open.



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Name:	East
Reference No.:	125
Length (m):	329.35
Average Width (m):	3
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Name:	East 1
Reference No.:	126
Length (m):	288.38
Average Width (m):	3
Condition:	Medium
Level of Usage:	High
Predominant Usage Type:	Running/Walking
Potential to Harm Heritage or Environmental Features:	Harm unlikely
Required by City:	Yes
Recommendation:	Keep open.



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Manning Park Trails Rehabilitation Plan
2027–2031



www.cockburn.wa.gov.au

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Cockburn Nyungar moort Beeliar boodja-k kaadadjiny. Koora, yeyi, benang baalap nidja boodja-k kaaradjiny.

Ngalak kaditj boodjar kep wer kaadidjiny kalyakool yoodaniny, wer koora wer yeyi ngalak Birdiya koota-djinanginy.

The City of Cockburn acknowledges the Nyungar people of Beeliar Boodjar. Long ago, now and in the future they care for Country.

We acknowledge a continuing connection to Land, Waters and Culture and pay our respects to Elders, past and present.

Executive Summary

Manning Park is a significant natural area, valued by the community for its recreation opportunities, environmental features and cultural heritage. However, the creation and ongoing use of informal trails in the Manning Ridge area has resulted in vegetation loss, erosion, habitat fragmentation and increased risk to heritage sites.

The Manning Park Trails Rehabilitation Plan provides a coordinated five-year program to protect the park's natural and cultural values while maintaining safe, high quality recreational access. The plan has been informed by a comprehensive trails audit, and recent flora, vegetation, fauna and heritage assessments, which together provide a detailed understanding of current trail impacts and actions required to manage and remediate those impacts.

The plan recommends the closure of 66 informal trails and the partial closure of four others. These closures are prioritised to protect Threatened Ecological Communities, high condition vegetation, and heritage sites. Closure works will be supported through a combination of revegetation, signage, and physical barriers, supported by surveillance, community education and ongoing monitoring.

56 trails, representing 76% of the network by area, will remain open, with targeted maintenance to ensure they remain safe and accessible. Strengthening these formal trails will encourage visitors to use designated trails.

The plan does not seek to introduce any new restrictions on specific recreational activities in Manning Park, besides the creation of new trails, which is already prohibited. Bikers and runners will still be permitted within formal trails.

Through staged implementation, the plan aims to reduce environmental degradation, reduce creation of further informal trails, improve visitor safety, protect cultural values, and support the long-term ecological resilience of Manning Park.

Introduction

The City of Cockburn is responsible for the management of Manning Park. The park comprises lake and wetland environments, limestone ridge systems and areas of remnant bushland, and is well used by walkers, trail runners, mountain bike riders and orienteers. Over time, a network of informal, user created trails has developed across the ridge.

The need for improved trail management has been recognised for some time. The City's Trails Master Plan (2013) identified the importance of managing trail networks across Cockburn, and subsequent management plans highlighted similar issues within Manning Park.

During the preparation of the Manning Park Mountain Bike Concept Plan in 2020, community concerns were raised about the extent of informal trails and their environmental impacts. Increasing visitation and the listing of a Threatened Ecological Community known to occur in Manning Park further reinforced the need to better manage access and protect sensitive areas.

To inform this, the City undertook a series of environmental and cultural assessments between 2023 and 2025, including flora, vegetation and fauna surveys and Aboriginal and European heritage assessments. The assessments confirmed that Manning Park contains important environmental and heritage values, including areas protected under Commonwealth legislation.

Based on the extent and sensitivity of these values, the City determined it is not viable to develop a mountain bike trail network at Manning Park. In October 2024, Council resolved to focus on trail reconciliation and directed the City to prepare a Trails Audit and Trails Closure Plan.

A comprehensive audit and mapping of all formal and informal trails was completed in 2025. The audit considered trail condition, how trails are used and the environmental and heritage impacts associated with trail use, drawing on the earlier environmental assessments.

The findings from the Trails Audit provide the basis for this Manning Park Trails Rehabilitation Plan. It outlines actions to rehabilitate selected informal trails, maintain the formal network, and support responsible use of the park.

Links to the Strategic Community Plan 2020-2030

The Strategic Community Plan contains two strategic objectives closely aligned with the Manning Park Trails Rehabilitation Plan:

<u>Our Environment</u>

- Protect and enhance our natural areas and streetscapes.

Our Community

- Strengthen and facilitate a safe and secure Cockburn
- Promote and support active, healthy lifestyles through recreation and wellness.

Objectives / Plan

The Manning Park Trails Rehabilitation Plan has been developed to achieve the following objectives:

1. Provide a safe, defined and sustainable trail network for a range of recreational activities
    - Maintain a clear and functional network of formal trails that supports a range of low-impact recreational activities
    - Direct visitors onto appropriate, well-maintained trails to reduce reliance on informal tracks.

2. Protect environmental and cultural values
    - Reduce vegetation loss, erosion and habitat fragmentation caused by informal trails
    - Protect areas of high conservation value, including threatened ecological communities, priority flora and fauna habitat
    - Safeguard heritage sites.

3. Reduce safety risks
    - Address hazards created by unplanned, unmaintained or poorly aligned tracks
    - Improve visitor safety by consolidating access onto safe, appropriate trails.

4. Educate the community
    - Increase community awareness of environmental and cultural values within Manning Park
    - Encourage responsible recreation through education, signage and ongoing engagement.

Background

Location

Manning Park is located within the City of Cockburn in the suburbs of Spearwood and Hamilton Hill, approximately 16 km southwest of the Perth Central Business District (CBD) and less than one kilometer from the coast.

The park covers an area of approximately 107 hectares and includes Manning Lake, Manning Ridge, and surrounding woodland and parkland. Manning Park forms part of the Beeliar Regional Park and is connected to a chain of wetlands that extend across the Swan Coastal Plain.

The trails subject to this Plan are primarily located within Manning Ridge, west of the lake, and in the area south of the lake. It is noted that some trails extend outside Manning Park into land not managed by the City of Cockburn; these trails are not included in this Plan.

Manning Park is part of Whadjuk Boodjar (Country) and sits within the boundaries of the Whadjuk People Indigenous Land Use Agreement.

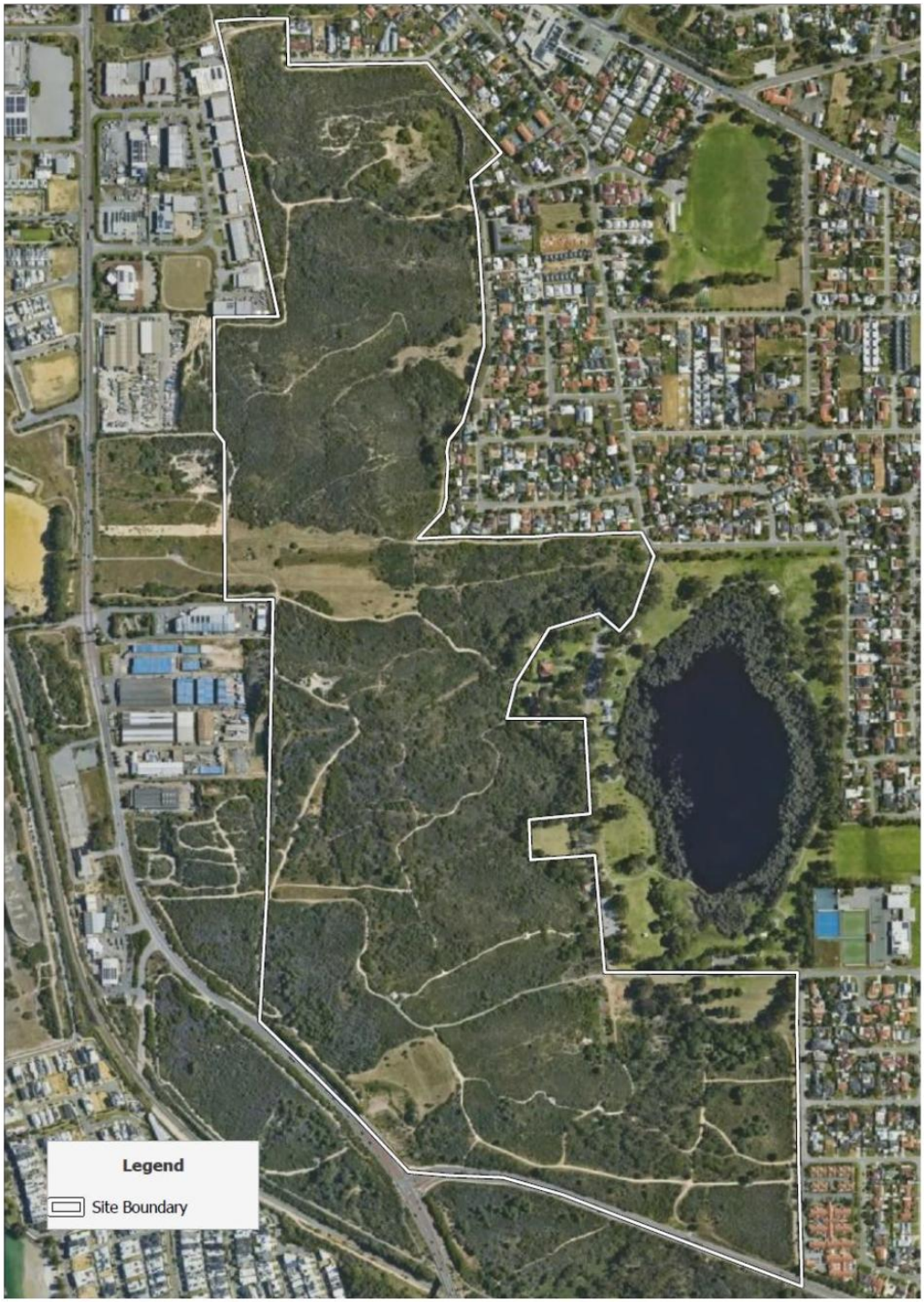


Figure 1: Manning Park

Existing Environment

Vegetation

Manning Park has been subject to a long history of disturbance, particularly extensive vegetation clearing and quarrying associated with 19th-century farming practices. As a result, approximately 33% of the park now consists of modified landscapes, including parkland grassed areas, cleared zones, revegetated areas, firebreaks, and trails.

The remaining 67% of the park supports remnant vegetation, primarily comprising *Melaleuca huegelii* shrublands, along with acacia shrublands and woodlands featuring tuarts (*Eucalyptus gomphocephala*), swamp paperbark (*Melaleuca rhaphiophylla*), and redheart trees (*Eucalyptus decipiens*). Vegetation condition varies across the site, ranging from high-quality patches to heavily disturbed sections. Most of the remnant vegetation is in Good condition, especially along the central ridge.

The Flora and Vegetation Assessment of Manning Park Reserve (Focused Vision Consulting, 2024) confirmed that Manning Park supports two nationally listed Threatened Ecological Communities (TECs) and one state-listed community. Together, these cover more than half the park:

- Tuart Woodlands and Forests of the Swan Coastal Plain — Critically Endangered (Commonwealth TEC)
- Honeymyrtle Shrublands on Limestone Ridges of the Swan Coastal Plain — Critically Endangered (Commonwealth TEC)
- SCP 26a: *Melaleuca huegelii – M. systena* Shrublands on Limestone Ridges (FCT 26a) — Critically Endangered (State-listed TEC).

Flora

The Flora and Vegetation Assessment of Manning Park Reserve (Focused Vision Consulting, 2024) identified that the site supports 156 flora species from 118 genera and 56 families. Of these, 80 species (51%) are native.

No species listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act) were recorded.

Two priority species occur within the site:

- *Dodonaea hackettiana* (Priority 4)
- *Pimelea calcicola* (Priority 3).

Fauna

Manning Park supports a diverse fauna assemblage, with over 100 vertebrate species recorded during a detailed survey undertaken in 2023 (FaunaTrack, 2023). This includes 69 bird species, 23 reptiles, 12 mammals (including five microbat species), and four amphibians. Six conservation-significant species were recorded during the survey or are known to occur on site include:

- Carnaby's cockatoo (*Zanda latirostris*) – Endangered (EPBC Act)
- Forest red-tailed black-cockatoo (*Calyptorhynchus banksia naso)* – Vulnerable (EPBC Act)
- Rainbow Bee-eater (*Merops ornatus*) – Marine (EPBC Act)
- White-bellied sea-eagle (*Haliaeetus leucogaster*) - Marine (EPBC Act)
- Quenda (*Isoodon fusciventer*) - Priority species (BC Act)
- Perth-lined Slider (*Lerista lineata*) – Priority species (BC Act)

Other locally significant species include the Painted Button-quail, Western Bluetongue and several microbat species.

The park contains a variety of fauna habitats that support these species. The limestone ridge provides proteaceous shrublands important for black-cockatoo foraging, while tuart woodlands offer hollow-bearing trees for potential nesting and roosting. Dense shrublands and leaf litter along the ridge also provide shelter for Quenda, the Perth-lined Slider, and other ground-dwelling fauna.

Heritage

Aboriginal cultural heritage

Recent Aboriginal archaeological and ethnographic surveys undertaken by Archae-aus (2024) confirm the presence of multiple Aboriginal heritage places within Manning Park. These include places associated with traditional use of water, tool production/use and culturally restricted areas. These places are being progressed for protection under the

Aboriginal Cultural Heritage Act 2021 and must be avoided and protected. No Aboriginal site names, coordinates, or descriptive details are being published in this Management Plan to uphold cultural safety and privacy.

Manning Park sits within Whadjuk Boodjar (Country), and the park's cultural values are interconnected, encompassing the lake, ridge and remnant bushland as part of a living cultural landscape. Management actions will be guided by Whadjuk Knowledge Holders and recommendations in the 2024 heritage assessment report.

Historic (European) heritage

Manning Park contains significant historic features, notably the Azelia Ley Homestead and the Davilak Ruins, which together form part of the State Register of Heritage Places (Manning Park, Place No. 10184).

Threatening Processes

Manning Park is subject to threatening processes that negatively impact ecological and heritage values. The main threats include unsanctioned recreational use (such as informal trail creation), the introduction and spread of weeds, and consequent land degradation and erosion.

Management of these processes is guided by the Natural Area Management Strategy. This Plan supplements the existing approach by providing recommendations for managing such threatening processes when created or exacerbated by informal trails.

These processes are often interconnected, for example, informal tracks create disturbed edges that facilitate weed establishment and accelerate erosion. Coordinated management is essential to prevent further declines.

Recreational Use and Informal Trails

The creation and use of informal trails pose a significant threat to Manning Park's natural and cultural values. These activities result in:

- Vegetation clearing and fragmentation through informal trail creation and widening
- Reduced habitat connectivity across ridge and wetland habitats
- Soil compaction and erosion on steep slopes and sandy soils
- Disturbance to fauna by trampling of vegetation and habitat disruption
- Spread of weeds via disturbed soils and seed movement on footwear, tyres and pets
- Damage to Aboriginal and historic heritage sites from physical disturbance, increased access and unauthorised removal, displacement or loss of artefacts
- Creation of safety hazards for park users due to unplanned, unmarked and poorly maintained routes
- Increased management burden for closure, rehabilitation, monitoring and enforcement.

Land Degradation and Erosion

Land degradation and erosion are driven by vegetation loss, soil exposure and compaction, particularly where informal tracks occur on steep limestone and sandy slopes. This can have the following impacts:

- Loss of soil structure and stability on ridge and slope environments
- Accelerated runoff and rilling/gullying on compacted or unvegetated surfaces
- Sedimentation into Manning Lake and adjacent wetlands, degrading aquatic habitat
- Undermining of track surfaces, creating hazardous conditions for park users
- Increased maintenance liabilities and repeated repair needs.

In addition, rainfall and erosion processes can result in colluvial build-up around the Davilak Ruins, accelerating degradation of the limestone heritage structure. This is exacerbated by the creation and use of informal trails.

Honeymyrtle shrublands Conservation Advice

The Department of Climate Change, Energy, the Environment and Water (DCCEEEW) has published Conservation Advice on the Honeymyrtle Shrublands on Limestone Ridges of the Swan Coastal Plain TEC ('Honeymyrtle shrubland'). This Conservation Advice has effect under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and provides guidance that land managers are expected to take into account when managing activities that may affect the ecological community.

Due to the restricted distribution of Honeymyrtle shrublands, the Conservation Advice specifically considers known threats at Manning Park and provides detailed guidance on how these threats should be managed. This includes the following excerpt, which directly references Manning Park:

> *'Both authorised and unauthorised mountain bike trails have also impacted Honeymyrtle shrubland. The limestone ridges on which Honeymyrtle shrubland occurs, are a prime target for mountain biking because of their elevation.*
>
> *For example, Manning Park in the City of Cockburn has substantial impacts attributed to mountain bike trails. Rehabilitation of informal trails is seen as a benefit to be gained by formalising and expanding the current unsanctioned mountain bike trail network. However professionally built trails, to provide the most challenging trails for the riders (and surfaces that will be durable over time) in limestone karst environments, increase fragmentation, reinforce degradation processes, increase the totally degraded area and reduce biodiversity.'*

The Conservation advice includes a specific action to prevent the construction of new trails and to rehabilitate informal trails that go through the ecological community. All Priority Conservation and Research actions relevant to Manning Park, as set out in the Conservation Advice, are listed below:

1. Prevent further clearance or destruction of patches of this ecological community (i.e. retain and protect all patches because losses cannot be offset).
2. Prevent construction of new trails and rehabilitate existing informal trails that go through this ecological community (e.g. for mountain biking, four wheel driving or walking). If any trails are formalised/proposed, they should be designed to fully protect this ecological community, without any negative impacts.
3. The recommended minimum buffer zone for Honeymyrtle shrubland is at least 200m from the outer edge of a patch if the zone is native vegetation or 100m for other adjacent areas. The appropriate size depends on the nature of the buffer and

local context (e.g. slope). Apply larger buffer zones to protect patches from broader landscape threats.

4. Maintain the extent and condition of patches; and maintain existing landscape scale connections between areas of native vegetation (of both this ecological community and of other vegetation types).
5. Retain other native vegetation, near patches of this ecological community, particularly where they are important for connectivity and diversity of habitat, or where they act as buffer zones between this ecological community and any threats or development zones.
6. Where this ecological community is regenerating, support its regeneration to full maturity. For example, provide fencing to minimise damage risk if appropriate, and ensure fire response and management plan are aligned with regeneration needs.
7. Install signs to discourage damaging activities in Honeymyrtle shrubland – such as creating paths and tracks (e.g. for walking and mountain biking); and discourage off-road vehicles.

This Manning Park Trails Rehabilitation Plan has been prepared to address the actions above and to support the long-term protection and gradual improvement in condition of Honeymyrtle shrubland within Manning Park.

Trails Audit Report Findings

Natural Area Management Consulting Management Services were engaged by the City in 2025 to conduct an audit of all formal and informal tracks within Manning Park. The audit involved mapping each trail and assessing its condition, usage type and frequency, and observed and potential impacts on environmental and heritage values.

Prior to commissioning the audit, the City undertook an internal review of all known formal trails to identify those required to remain open for operational purposes, including routine maintenance and emergency and fire access. These operational requirements informed the scope of which trails could be reasonably recommended for closure.

The audit identified 126 trails within Manning Park. Combined analysis of Strava data and field observations showed that walking and running were the predominant uses, with 104 trails used primarily for these activities, 20 trails for mixed use, and two trails for biking. Although only two trails were classified as predominantly used for biking, cycling activity still occurs on many other trails. Ninety trails were recorded as high frequency of use, 19 as medium, and 17 as low frequency. Trail condition varied, with 42 trails in good condition, 45 in medium condition, and 39 in poor condition.

Based on these assessments, the audit recommended that 57 trails remain open, 65 trails be closed, and four trails be partially closed or diverted.

An internal review of the audit resulted in an additional two trails being recommended for closure. Both trails are adjacent to Spearwood Avenue. Trail 73 runs parallel to Spearwood Avenue behind the road safety barrier and lies outside the mapped boundary of Manning Park; this trail is not considered safe for recreational use. Trail 41 provides access to Trail 73 and is therefore redundant and a formal access route exists immediately to the east.

In addition, Trail 87, which was recommended for closure, must remain open to maintain access to Western Power infrastructure and will therefore not be closed. Consequently, the proposed diversion of Trail 18 to maintain north–south access is no longer required and will not be implemented.

Taking account of this internal review, this Plan recommends that 56 trails remain open (44.4%), 66 trails are recommended for closure (52.4%), and four trails for partial closure (3.2%).

As trail length and width varies significantly across the park, the number of trails does not accurately reflect the effort required to implement the recommendations or the impact of closures on recreational use. Area provides a better measure of this. Based on the approximate area of the 126 trails audited, 19.8% is recommended for closure, 76% for retention, and 3.4% require partial closure.

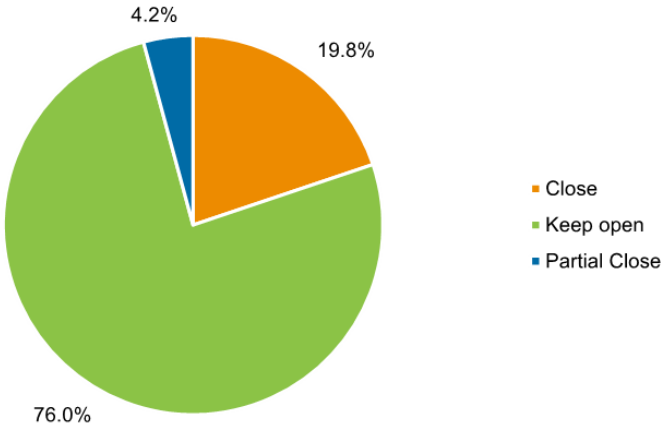


Figure 2: Proportion of trail actions based on approximate trail area

Trail Maintenance

Of the 56 trails identified for retention, 13 have been identified as requiring maintenance in the short-term to ensure safe access and reduce environmental impacts. A map of trails remaining open is presented in Figure 3.

Partial Closures and Diversions

Four trails are recommended for partial closure, with a combined length of 780 m. These trails were identified because sections intersect sensitive environmental or heritage areas, while other portions provide important connectivity or safe access. Diversions are recommended where applicable to redirect access between two existing tracks and

prevent degradation of adjacent areas. Trails recommended to be partially closed or diverted are shown in Figure 3.



Figure 3: Trails remaining open and trail diversions

Trail Closures

66 trails are recommended for closure, representing 11 km of informal tracks within Manning Park. These trails vary in width from 0.3 m to 1.0 m and equate to approximately 1.06 hectares of land.

Closures have been prioritised for trails that intersect areas of high conservation value and heritage sites, as well as those in poor condition or providing little connectivity benefit. This approach aims to reduce erosion, weed spread and habitat fragmentation while protecting significant environmental and cultural features. It also aims to maintain a connected and accessible reserve for community and first responders.

A map of the trail closures is shown in Figure 4.



Figure 4: Trail closures

Recommendations and Implementation

This section outlines the key activities required to deliver the Manning Park Trails Rehabilitation Plan over a five-year period. This includes trail maintenance, installation of signage, and the proposed methodology of closing trails using a combination of physical barriers, revegetation and signage, as well as surveillance, education and monitoring.

Trail maintenance

The Trail Audit identified 13 trails as requiring maintenance in the short-term, however, for the Plan to be effective, it is important that all trails remaining open receive ongoing maintenance to encourage use (rather than use of closed trails) and to maintain safe access.

Maintenance will involve pruning back encroaching vegetation to maintain a safe and usable width. Works will use the lowest impact method suitable for the location, in line with existing business as usual practice.

Trail closures

Revegetation

The intent of this plan is not to revegetate every closed trail. Due to the prevalence of limestone outcrops, shallow soils and narrow trail footprints, many sections cannot support planting. For these reasons, full length revegetation is not recommended. Instead, planting will be focused in locations where they will be most effective in reinforcing closures.

Revegetation will be focused at trail ends and intersections where dense vegetation will serve as a clear visual and physical deterrent to unauthorised access. Planting will extend a minimum distance of three meters from the trail end to the point where the closed section is no longer visible (the sightline), whichever is greater. Sightline length varies from 1-15 m depending on the location.

These areas will be planted with hardy, fast-establishing and/or prickly local species at an approximate density of three plants per square metre (See Table 1). All species presented

in Table 1 have been previously recorded at Manning Park as part of the Flora and Vegetation Assessment (Focused Vision Consulting, 2024). Table 1 serves as a general guide only; final species selection will be informed by site conditions and plant availability and will be undertaken with specific consideration of areas mapped as TECs.

Table 1: Recommended plant species

Scientific Name	Common Name
Acacia pulchella[PC]	Prickly Moses
Acacia rostellifera[C]	Summer Scented Wattle
Acacia truncata[P]	
Acacia cyclops[C]	Red-eye Wattle
Alyogyne huegelii	Lilac Hibiscus
Austrastipa elagantissima[C]	Elegant Speargrass
Banksia Sessilis[PC]	Parrot Bush
Calothamnus quadrifidus[P]	One-sided Bottlebrush
Dodonaea hackettiana	Hacket's Hopbush
Grevillea preissii	Spider-net Grevillea
Melaleuca huegelii	Chenille Honeymyrtle
Melaleuca systena	Coastal Honeymyrtle
Olearia axilaruis[C]	Coastal Daisybush
Rhagodia baccata	Berry saltbush
Spyridium globulosum	Basket Bush

[P] Denotes plants that are considered prickly species
[C] Denotes plants that are considered colonizer species

Templetonia retusa	Cockie's tongues

Tree guards will be used as a visual cue that rehabilitation is underway and to help reinforce the trail closure. In some rocky areas, tree guards will need to be drilled into the ground.

Desktop assessment of the trail mapping indicates that approximately 125 planting points are required at trail ends and intersections. Based on an average sightline of 10 metres and a trail width of 2 metres, the total revegetation area is estimated at 0.26 hectares.

Although the total revegetation area is relatively small, the requirement for small, scattered planting points across steep and rocky terrain, presents a logistical challenge. To manage this, planting will be staged over a two-year period and delivered in clusters based on location to maximise efficiencies and align with closure priorities. Areas containing vegetation mapped as Good, Very Good or Excellent condition has been prioritised over those mapped as Degraded or Completely Degraded. Planting will occur alongside the rollout of barriers, detailed further in the subsequent section. The trail cluster breakdown is shown in Table 2, below.

Table 2: Trail cluster breakdown

Year	Cluster Name	Priority	No. of Planting Points	Area of Planting Points (ha)	No. of Plants
1	North Central	High	33	0.069	2100
1	South Central	Medium-High	39	0.081	2400
Year 1 Total			**72**	**0.15**	**4500**
2	South East	Medium	34	0.071	2000
2	North West	Medium	13	0.027	800
2	North East	Low	6	0.012	400

Year 2 Total	**53**	**0.11**	**3200**
Years 1 + 2 Total	**125**	**0.26**	**7700**

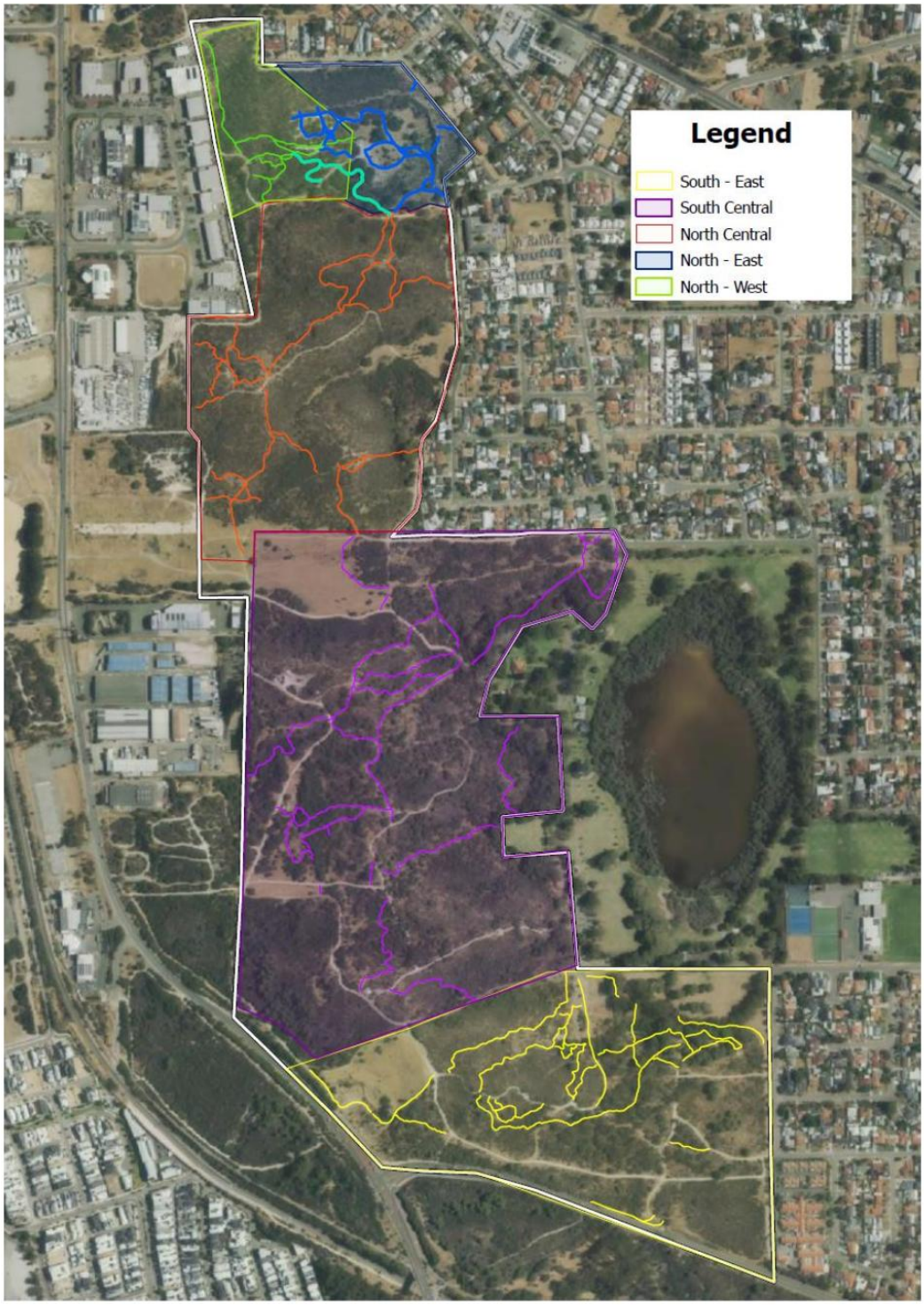


Figure 5: Trail closure clusters

Following installation, planting points will require ongoing maintenance. This will not be subject to the same maintenance standard as the City's revegetation projects as species have been selected to reduce maintenance requirements. Plants will be installed with water crystals to improve survival over summer, and where access allows, the City will undertake watering to support establishment. Infill planting will be undertaken only in instances of mass mortality caused by extreme weather or if the trail is reopened during the five-year period, rather than as a routine annual activity.

In some locations, where cap rock or potential for sub-surface heritage material prevents digging, brush will be used in place of plants to reinforce trail closures and deter access without ground disturbance.

Direct seeding

Direct seeding may also be used in some locations as a cost effective alternative to planting. While planting provides an immediate visual cue that a trail is closed, direct seeding requires far less resources and may be suitable for areas with softer soils. In places where soil depth is limited, seeds can also be applied using clay balls, which help them adhere to harder substrates. Seed should be sourced from the site or from local provenance where practicable

Direct seeding will not be relied on for primary closure points, but it may be used selectively to supplement plantings and encourage natural regeneration, or in areas where digging is not appropriate due to heritage constraints.

Signage

Signage will be installed at each trail closure point (including trail ends and intersections) to inform trail users that the trail is closed for rehabilitation. It is recommended that trail closure signage be installed in Year 1 to inform trail users of the broader rehabilitation works while more robust deterrent measures are implemented in stages. Although some users may continue to access closed trails or may relocate or damage signage, early installation is an important interim measure to reduce recreational pressure and manage impacts to the environment and heritage. This may also allow opportunities for natural rehabilitation to occur.

As rehabilitation works will occur over multiple years, durable metal signage is recommended. Metal signs are more resistant to weathering, avoid the risk of corflute degradation entering the environment and can be reused by the City at other reserves in future.

In addition, it is recommended that new wayfinding and educational signage be developed and installed at key meeting points, such as carparks and lookouts to advise park users of which trails can be used for recreation and educate them on the importance of staying on formal tracks. This will also be used to educate users on the significance of the Honeymyrtle shrublands in accordance with the Approved Conservation Advice.

Physical barriers

Previous efforts at Manning Park have shown that lightweight barriers are easily moved and do not effectively prevent unauthorised access. To ensure closures are effective, robust and well-designed deterrents are required. Suitable options include:

- Logs and brush.
- Limestone boulders
- Bollards
- Fencing

The type of barrier used will depend on the location, topography, and what materials are available on site. Wherever possible, natural materials such as logs, boulders and brush will be used as they blend with the surrounding bushland, have lower visual impact and can remain in place once rehabilitation is complete, reducing long-term removal and maintenance costs.

The City will prioritise re-using logs sourced from City-managed tree removals. These logs are typically stockpiled until they can be chipped and disposed of, which incurs significant costs and generates waste. In addition, a large fallen Tuart tree, located east of the Davilak Ruin site, can be beneficially re-used. This will require the engagement of a suitably qualified tree crew to cut the tree into manageable lengths in-situ.

Due to the weight of logs and limestone boulders, the City is unable to install these barriers internally using standard operational vehicles or manual handling methods. The City will engage a civil contractor to put barriers in place, using a small mobile plant such as a mini excavator. Depending on the access points, traffic management may be necessary.

In some areas, stronger measures, such as fencing or bollards, will be necessary. This includes areas of heritage significance and in sections that are highly degraded or lack natural barriers, where longer stretches of deterrents are required. Fencing and bollards will be conservation-style, designed to remain in-situ.

Existing fencing

A network of fencing is already in place at Manning Park, primarily to delimit the boundary between the parkland areas and the upland sections that contain remnant vegetation. These fences include vehicle access gates that enable entry for service vehicles and first responders. Pedestrian hop-overs are also located adjacent to some gates to facilitate public movement between areas.

As a result of the trail closures, a small number of internal hop-overs which currently provide pedestrian access into bushland areas will become redundant. Retaining these hop-overs may inadvertently encourage continued access into areas designated for rehabilitation.

To maintain clear and consistent messaging, and to prevent ongoing informal use, it is recommended that redundant hop-overs be removed and replaced with continuous fencing that matches the existing style. Temporary signage directing users to the nearest appropriate access point will be installed as part of this action.

Protecting Aboriginal Heritage

A small number of planned trail closures intersect Aboriginal heritage places. These closures are intended to reduce the risk of unauthorised access and inadvertent damage to culturally sensitive sites.

All works associated with trail closures, such as planting and installation of physical barriers (e.g. fencing or bollards), will be carefully managed to avoid impacts to subsurface Aboriginal heritage materials. Soil disturbance will be limited in these areas.

Special Area Management

Davilak Ruins

Davilak Ruins is experiencing ongoing damage from unauthorised access. The recent heritage assessment found that people walking, riding bikes and driving through the site are breaking down the fragile limestone walls, disturbing the ground, and increasing erosion (Archae-aus, 2024).

To address this, it is recommended that the north-south trail (Trail 7), which currently passes through the centre of the ruins, is diverted away. The same applies to Trail 28, which provides access to the ruins from the east.



Figure 6: Trail management at the Davilak Ruin site

In line with the Davilak Ruins Archaeological Management Strategy (Bush, 2014), bollards should be installed at both the northern and southern entrances to the ruin site along Trail 7 to deter entry. At the northern entry point, bollards should be positioned behind the existing educational signage. The existing vehicle access gate is to remain in place to allow the City continued access for management.

The eastern gate and associated pedestrian access point should be removed and replaced with fencing consistent with the existing fencing around the site. The large educational sign at this location should also be relocated outside the fenced area to allow visitors to appreciate the ruins from further back.

These actions align with the recommendations of the Davilak Ruins Archaeological Management Strategy (Fiona Bush, 2014) and aim to reduce ongoing damage while providing better protection for the site into the future. Other recommendations outlined in the heritage survey and Strategy fall outside the scope of this plan.

Northern former-Quarry site

The north-eastern portion of Manning Park was historically cleared to operate as a limestone quarry, which is understood to have provided building material for the Davilak Homestead. Today, the rocky terrain has made the area popular for mountain-bike use, resulting in the creation of multiple informal trails and rider-installed infrastructure, including jumps and ramps.

This activity has caused trampling of vegetation and contributed to erosion issues and weed spread. It is recommended that several informal trails are closed, while key higher-quality trails are retained to form a usable circuit. Trails identified for closure are generally less than 1 m wide and were assigned low usage in the Trails Audit.

It is also recommended that Trail 39 be diverted to connect with Trail 78 to provide a north–south link within the circuit. Establishing this diversion will require minor formalisation works, as the current alignment passes through dense vegetation. This will involve selective pruning of vegetation to achieve a trail width of approximately 1 m and the application of loose limestone to create a stable surface.

Due to the open and sparsely vegetated nature of this area, planting, used as a closure measure for other trails, will not be effective. Instead, it is recommended that conservation fencing be installed along open boundary sections to prevent access and discourage the creation of new informal trails.

Surveillance

Surveillance is required to improve compliance with trail closures. Given the large size of Manning Park, which has multiple entry points, permanent surveillance of the entire reserve is not possible, particularly in the Manning Ridge.

There are currently seven CCTV locations totalling 19 cameras in Manning Park, all located along Azelia Road in the parkland area. These units were originally installed to discourage and monitor anti-social behaviour.

To reduce the likelihood of closed trails being reopened or new informal trails being created, it is recommended that an additional CCTV unit be installed at the eastern entrance to the northern quarry site off Quarry Road.

In addition to CCTV, it is recommended that the City undertake ranger patrols in the upland areas to reinforce compliance and provide a visible management presence.

Even with an active security presence, enforcing breaches of compliance will be challenging and seldom successful. Identifying people on CCTV footage is difficult and Local Government officers are not authorised to make arrests. It is therefore anticipated that investing in surveillance will only serve to reduce instances of unauthorised trail construction, rather than to rule them out altogether.

Education

Educating the public on the environmental and social impacts of creating informal trails is needed to complement increased surveillance. This can be achieved by conducting community workshops and mailing flyers to local residents on a periodic basis, with additional educational material displayed in City facilities at Manning Park, such as the toilets and museum.

Monitoring

Monitoring is essential to assess the effectiveness of the actions in this plan and to detect new informal trails.

An annual drone survey is recommended. This will provide clear aerial photos of the ridge and surrounding areas, making it easy to see if any new trails have appeared or if closed trails are being used again.

In addition to these scheduled checks, the City’s bush crew is on site regularly and can identify and quickly fix minor issues, such as a fallen sign or small areas of trail damage.

Implementation Table

Action No.	Action	Frequency	Year/s	Priority	Total cost
1. Communication & Education					
Objective: To deliver a coordinated communication, education and signage approach that improves community understanding of trail closures, promotes use of designated trails and discourages the creation and use of informal trails.					
1.1	Promote stewardship and responsible recreation via City communication channels	Ongoing	2026-31	Low	In-house
1.2	Install project and wayfinding signage about designated trails at carparks and lookouts	Once	2027-28	High	$15,000
1.3	Install educational signage about the Honeymyrtle shrublands	Once	2027-28	Medium	$5,000
2. Trail Maintenance					
Objective: To maintain safe, accessible formal trails and encourage use of designated tracks rather than closed trails.					
2.1	Routine maintenance of open trails	Ongoing	2027-31	Medium	In-house
2.2	Stockpile brush for use in trail closures	Ongoing	2027-31	Medium	In-house
2.3	Vegetation pruning	Annually	2027-31	Medium	$25,000
3. Trail Closures					

Objective: To implement effective trail closures using vegetation, signage, and physical barriers					
3.1	Install trail closure signage at trail ends and intersections	Once	2027	High	$10,000
3.2	Replace or reinstate damaged/moved signage	As required	2027-31	Medium	In-house
3.3	Pre-planting weed control	Autumn	2028	Medium	$1,000
		Autumn	2029	Medium	$1,000
3.4	Planting at trail ends/intersections	May-June	2028	High	$30,000
			2029	Medium	$20,000
3.5	Contingency infill planting	May-June	2029-30 (as required)	Low	$10,000
3.6	Direct seeding	May- June	2029-2030	Low	$10,000
3.7	Engage tree crew to cut fallen tuart tree into lengths	Once	2027	Medium	$5,000
3.8	Install trail closure barriers (logs and boulders)	Once per closure point	2027-29	High	$35,000
3.9	Inspect and maintain physical barriers (repair/replace as required)	Quarterly	2027-31	Medium	In-house
4. Special Area Management - Davilak Ruins					
Objective: To prevent further degradation of the Davilak Ruins heritage site					
4.1	Divert Trail 7 and Trail 28 away from Davilak Ruins	Once	2027-28	High	$4,000

4.2	Install bollards at the north and south points of the Davilak Ruins	Once	2027-28	High	$1000
4.3	Remove western vehicle access gate and hop-over and replace with fencing	Once	2027-28	Medium	$7,500
4.4	Remove western educational signage shelter outside the protectable area	Once	2027-28	Medium	
5. Special Area Management - Northern Quarry					
Objective: Protect and stabilise the Northern Quarry area by managing informal trail use, reducing environmental degradation, and maintaining a safe, sustainable mountain-bike trail network.					
5.1	Remove unauthorised infrastructure on closed trails	As required	2028-2031	Low	N/A In-house
5.2	Divert Trail 39 to connect with Trail 78 and formalise track	Once	2029	Low	$13,500
5.3	Install conservation fencing to restrict access to open areas	Once	2029	Low	$5,000
6. Surveillance					
Objective: To improve compliance with trail closures through monitoring and enforcement					
6.1	Install additional CCTV unit on Quarry Road entrance	Once	2029-30	Medium	$30,000
6.2	Maintain CCTV units and ensure footage is	Ongoing	2029-31	Medium	N/A

	reviewed when incidents occur				
6.3	Respond to reports of reopened or new informal trails	As required	2027-31	Medium	TBD
7. Monitoring & Evaluation					
Objective: To assess effectiveness of trail closures and detect new informal trails					
7.1	Undertake routine inspections by bush crew during regular site work	Ongoing	2026-31	High	N/A
7.2	Conduct annual drone survey of Manning Ridge	Annual	2028-31	Low	$30,000
7.3	Evaluate Plan success and determine if further action is required	Once	2031	Medium	TBD

References

- Archae-aus (2024) *Report on an Aboriginal and Historic Heritage Assessment of Manning Park, Western Australia*; Prepared for City of Cockburn by Archae-aus Pty Ltd, North Fremantle, July 2024.
- Bush (2014) Davilak Ruins Archaeological Management Strategy Manning Estate, Hamilton Hill. Prepared by Fiona Bush. January 2014.
- FaunaTrack (2023) *Detailed Fauna and Fauna Assemblages Survey of Manning Park – Hamilton Hill*; Prepared for City of Cocburn by FaunaTrack by FaunaTrack, Denmark WA , November 2023.
- Focused Vision Consulting (2024) *Flora and Vegetation Assessment of Manning Park Reserve;* Prepared for City of Cockburn by Focused Vision Consulting Pty Ltd, Spearwood WA, May 2024.
- Natural Area Consulting Management Services (2025) *Manning Park Trails Audit, Categorisation and Mapping*; Prepared for City of Cockburn by Natural Area Consulting Management Services Pty Ltd, Malaga WA, October 2025.

Appendix A - Trail Audit Report

City of Cockburn, Whadjuk Boodjar
PO Box 1215, Bibra Lake DC WA 6965
9 Coleville Crescent, Spearwood WA 6163
T 08 9411 3444 | **E** customer@cockburn.wa.gov.au

www.cockburn.wa.gov.au

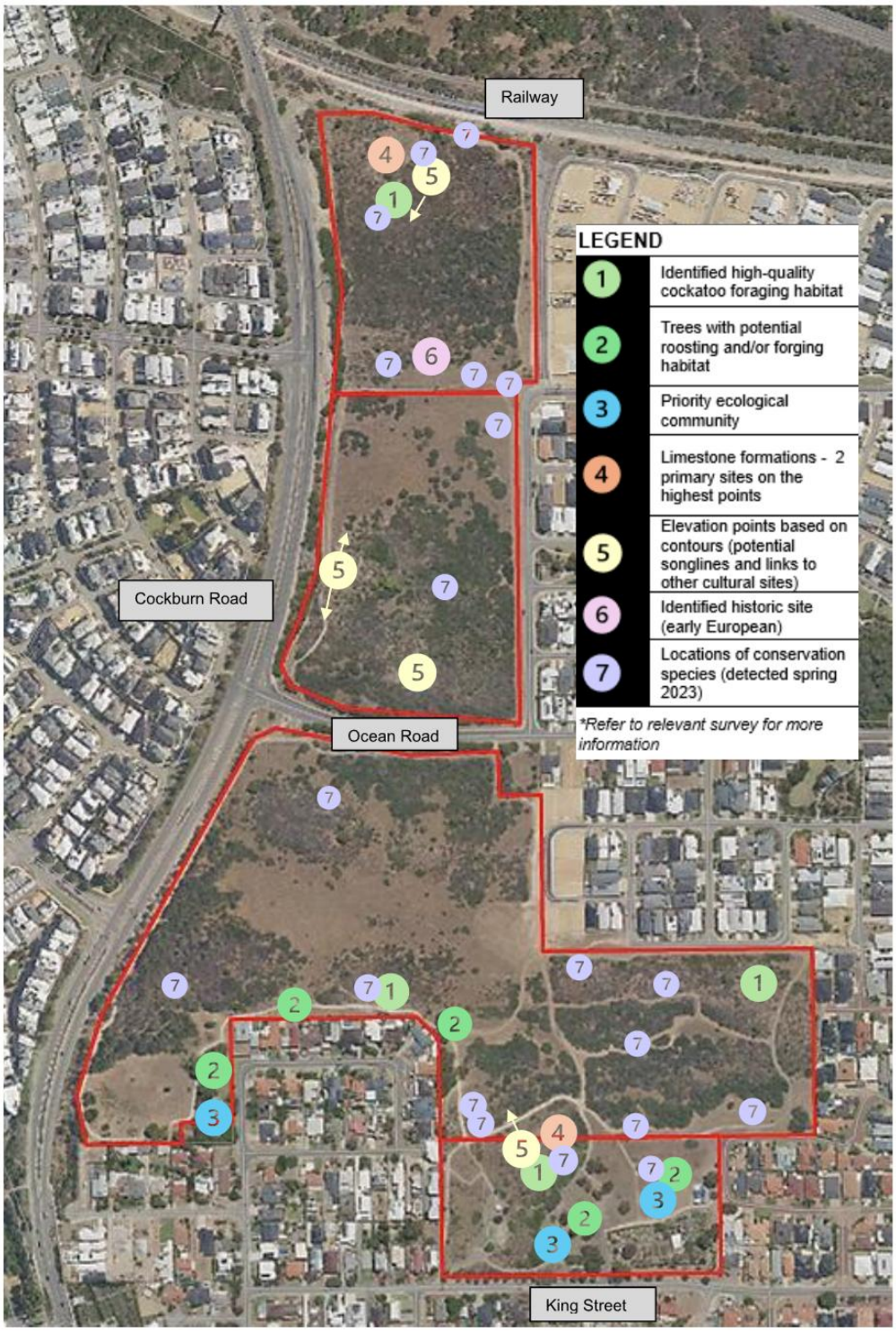
This information is available in alternative formats upon request.

Paper from responsible sources.

www.cockburn.wa.gov.au


Legend
TEC: Honeymyrtle
Closed Trails that intersect TECs

Proposed Coogee Golf Complex – Heritage and Environmental Investigation Map, Coogee Regional Open Space



Basic Fauna Survey

Proposed Coogee Golf Complex

Lot 38 King Street, and Lots 9902, 9903 and 9905 Cockburn Road, Coogee

Spring 2023



Prepared for the City of Cockburn by

FAUNATRACK

February 2024

Disclaimer
While the information contained in this report has been prepared with all reasonable care from sources which FaunaTrack believes are reliable, the information is general in nature and there is no guarantee that the information is accurate or complete. Any opinions, forecasts or recommendations reflects the judgment and assumptions of FaunaTrack as at the date of this publication and may change without notice.

Cover Photo: Perth lined slider (*Lerista lineata*) © Ray Lloyd / FaunaTrack

Executive Summary

FaunaTrack was engaged by the City of Cockburn to undertake a Basic Fauna and Fauna Assemblages Survey of Lot 38 King Street and Lots 9902, 9903 and 9905 Cockburn Road, Coogee for the potential development of a public golf course (Coogee Golf Complex).

The objectives of the survey were to:

- Compile a list of all vertebrate fauna occurring or likely to occur within the study area (desktop assessment).
- Identify species of conservation significance likely to occur within the study area.
- Undertake a site reconnaissance survey / site inspection.
- Document any fauna recorded during targeted searches or opportunistically carried out during the site visit.
- Determine fauna habitats present within the study area.
- Report on the likelihood of occurrence of terrestrial vertebrate fauna, particularly those of conservation significance, based on location, habitats present and vegetation condition, and
- Obtain baseline data to determine whether a Golf Complex is viable given the environmental constraints and if future management plans (or other work) are required should the proposed Golf Complex come to realisation.

Surveys were undertaken during October and November 2023 and consisted of the following methods:

- Targeted searches for vertebrate fauna, particularly those of conservation significance, including a visual assessment of Black cockatoo habitat (nesting, foraging and roosting potential)
- Motion sensor camera deployment
- Opportunistic observations, and
- Fauna habitat assessment

The overall survey period incorporated seven motion camera nights, and 12 person hours of bird surveys and targeted searches. This resulted in the detection of seven species of reptile, six species of mammal (including five introduced species) and 28 species of bird (including four introduced species), with the surveys yielding a single bird, mammal, and reptile species of conservation significance:

- The EPBC Marine listed Rainbow bee-eater (*Merops ornatus*)
- The Priority 4 listed Quenda (*Isoodon fusciventer*), and
- The Priority 3 listed Perth-lined Slider (*Lerista lineata*)
- While the EPBC Endangered Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) was also recorded nearby to the study area.

Additionally, a single reptile and six bird species of local significance were also detected:

- Western bluetongue (*Tiliqua occipitalis*), and
- White-browed scrub-wren, New-holland honeyeater, White-cheeked honeyeater, Brown goshawk, Splendid fairy-wren, and Western wattlebird.

The survey area is also known to support a further two species of conservation and/or local significance:

- The EPBC listed Endangered Carnaby's cockatoo (*Zanda latirostris*), and Variegated fairy-wren.

Significant areas of high-quality foraging habitat for Carnaby's cockatoo exist with Lot 9902 and parts of Lot 38 and 9905. Disturbed habitats within the remaining lots also contain some foraging habitat but are generally of much lower quality. Numerous large trees occur within the parkland habitats of Lot 38 and Lot 9905, providing potential roosting habitat for black cockatoo species and important foraging resources for Carnaby's and Forest red-tailed black cockatoos, while open sandy areas and track edges may potentially provide nesting habitat for the Rainbow bee-eater.

The study indicated that the survey area is unlikely to provide nesting habitat for Baudin's or Carnaby's cockatoo, however the scattered Eucalypt species within the parkland environments may provide potential future nesting for Forest red-tailed black cockatoos if they were to develop suitable hollows. If the development of the site impacts on any potential future nesting trees or more than 1ha of feeding habitat for Black cockatoo species, proposals should be referred to the Federal Government for formal assessment under the Commonwealth EPBC Act 1999.

The study area also forms a key part of a regional ecological linkage, connecting nearby bushland areas such as Manning Park and Coogee Beach, while the higher quality native shrubland habitats, as well as areas of significant woody weed infestations currently provide, or potentially provide important cover and habitat connectivity for Quenda, Perth lined slider and a range of locally significant reptile and bird species, as well as semi-connected habitat corridors throughout the study area.

In protecting, managing, and enhancing existing habitats within the study area, as well as reducing impacts during development, several conservation and management actions may be considered, these include:

- Retaining Priority conservation areas.
- Revegetating and landscaping degraded areas.
- Minimal and strategic clearing of fauna habitats.
- Reduction of impacts caused through increased human activity and noise/lighting issues associated with the development.
- Traffic/road management to reduce road mortalities.
- Creation of additional habitats and habitat connectivity.
- Reduce the need for large barriers and fences.
- Feral animal management, and
- Additional ongoing fauna surveys and monitoring programs.

The current design of the Golf Complex presented in the revised concept plan may also require further revision. The following comments may help in the reduction of potential impacts on fauna:

- Holes 2, 3, 5 and 6 should be repositioned to avoid impacting vegetation of higher quality.
- The design of the driving range could be adjusted to protect vegetation of higher quality.
- The necessity of tennis court facilities could be reviewed, and
- Ensuring that higher activity areas (clubhouse, parking, tennis facilities etc.) remain a significant distance from high value fauna habitats.

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1. Introduction

1.1 Site location and overview

FaunaTrack was engaged by the City of Cockburn to undertake a Basic Fauna and Fauna Assemblages Survey of Lot 38 King Street and Lots 9902, 9903 and 9905 Cockburn Road, Coogee for the potential development of a public golf course (Coogee Golf Complex).

The Coogee Golf Complex was initially proposed in 2006, with various investigations, concept designs and feasibility reviews being undertaken to date, including Level 1 flora and fauna surveys in 2012 and 2017. Given the time period since these previous surveys, the City required updated survey information to determine whether a Golf Complex is viable given the environmental constraints and if any future management plans (or other work) are required should the proposed Golf Complex come to realisation.

This report builds on results of the previous surveys undertaken at the site in 2012 and 2017 with a revised concept plan of the proposed golf course design. The current concept plain includes:

- A nine-hole golf course
- 40-bay driving range
- Putting practice greens
- Clubhouse/function facilities
- Mini golf facilities
- Tennis courts
- Playground
- Car-parking, and
- Related infrastructure such as a maintenance compound.

The study area comprises of four parcels of land Lot 38 King Street and Lots 9902, 9903 and 9905 Cockburn Road in the locality of Coogee. Covering an area of 32.14 hectares, the site is bounded by Cockburn Road in the west, the Fremantle railway line to the north, with current and future residential developments bordering the south and east. The study area is divided into two by Ocean Road, with Lots 9902 and 9903 Cockburn Road to the north and Lot 9905 Cockburn Road and Lot 38 King Street to the south. Although separated by the train line and Spearwood Road, some detached habitat connectivity exists to the north of the site to the bushland on Lot 9909 Cockburn Road and the large bushland area of Manning Park (Bush Forever site 247). Broken connectivity also exists to the south-west across Cockburn Road to Coogee Beach Reserve and further southwards to Woodman Point Regional Park (Bush Forever site 341).

The area is located within the Swan Coastal Plain 2 subregion (SWA2) of Swan Coastal Plain Bioregion, the area experiences a Mediterranean climate and rainfall range of 600-1000mm (Mitchell et. al. 2002). It is bordered in the east by the Darling Scarp and the west by the Indian Ocean and is characterised by a series of parallel dune systems from west to east, known as the Quindalup, Spearwood, and Bassendean dune systems, with the Pinjarra Plain separating the dunes from the scarp. The region (1,333,901ha in total) comprises of predominantly Tuart woodlands and/or heath on limestone, Jarrah and/or *Banksia* woodlands on dunes, Marri on colluvial and alluvial sands, as well as a series of seasonal wetlands and offshore islands (Mitchell et. al. 2002). The dominant land uses in the region consist of agriculture, horticulture and plantations, conservation and crown land reserves (including unallocated), urban and rural-residential, road infrastructure and easements, pasture improvement/grazing, as well as small areas of mining and defence (Mitchell et. al. 2002).

The study area lies within the Spearwood Dune System. The Spearwood dunes are comprised of sand dunes and plains with deep yellow and pale sands and shallower yellow to brown sands supporting woodland, open forest and closed heath. The vegetation (Cottesloe Complex – Central and South) consists of a mosaic of woodland Tuart (*Eucalyptus gomphocephala*) woodland and open forest with Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) and closed heath on the limestone outcrops.

The study area consists predominantly of vegetated uplands and limestone ridge supporting mixed low shrublands, scrubs and heaths. Much of the study area however has been replaced by introduced species with large areas of tea-tree scrub and open, weed infested grassy clearings. The area has also undergone major improvements in the south, which incorporates several large playground/parkland areas, a scenic lookout and a community garden. These areas also support the only large, native tree species remaining in the study area.

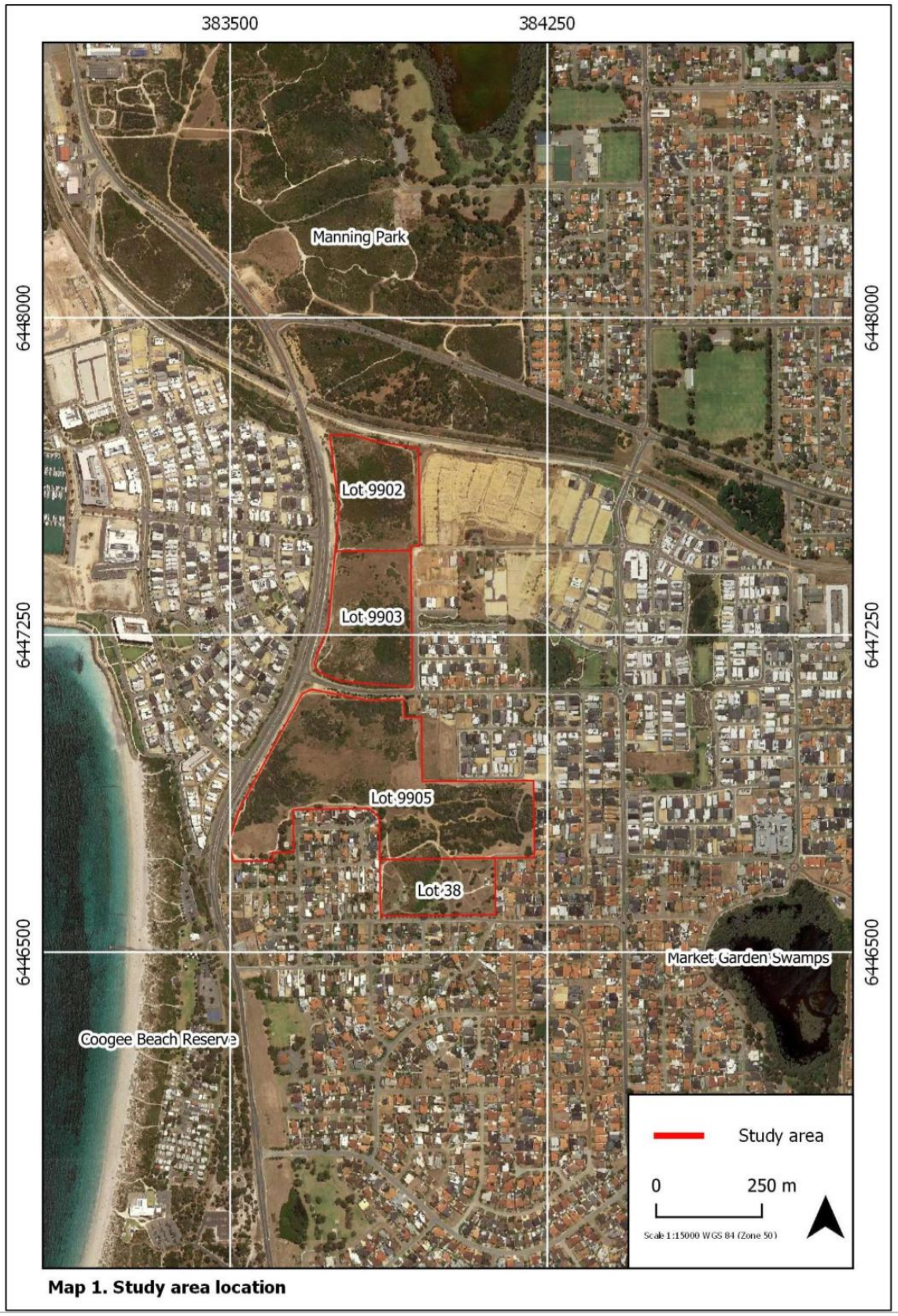
Due to the location and habitats present, the study area is known, or has the potential, to support a range of conservation significant species including:

- Baudin's, Carnaby's and Forest red-tailed black cockatoos
- Fork-tailed swift, Rainbow bee-eater and Peregrine falcon
- Perth-lined slider and Black-striped snake
- Quenda
- Several conservation significant invertebrate species, and
- A range of locally significant species, including habitat restricted bush birds.

1.2 Survey objectives

The objectives of the survey were as follows:

- Compile a list of all vertebrate fauna occurring or likely to occur within the study area (desktop assessment).
- Identify species of conservation significance likely to occur within the study area.
- Undertake a site reconnaissance survey / site inspection.
- Document any fauna recorded during targeted searches or opportunistically carried out during the site visit.
- Determine fauna habitats present within the study area.
- Report on the likelihood of occurrence of terrestrial vertebrate fauna, particularly those of conservation significance, based on location, habitats present and vegetation condition, and
- Obtain baseline data/survey information to determine whether a Golf Complex is viable given the environmental constraints and if future management plans (or other work) are required should the proposed Golf Complex come to realisation.



Map 1. Study area location

2. Methods

2.1 Database searches

Searches for fauna incorporated a 5km radius centred on the following co-ordinates:

-32.106316°/115.768676°

The following sources were consulted in the formulation of potential fauna lists:

- Atlas of Living Australia (ALA, 2023). Accessed 4th September 2023.
- Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Museum NatureMap Species Database (DBCA, 2023a). Requested 4th September 2023.
- DBCA Threatened and Priority Fauna Database (DBCA, 2023b). Requested 4th September 2023
- EPBC Act Protected Matters Search Tool (DAWE, 2023). Accessed 20th September 2023.
- BirdLife Australia's BirdData Database (BirdLife, 2023a). Accessed 18th September 2023.
- DBCA's Dandjoo Biodiversity Data Repository (DBCA, 2023c), and
- Results of previous fauna surveys conducted in the study area(s) and/or local area.

Previous fauna survey undertaken within the study area include:

- Regen4 et. al. (2018) Level 1 Flora and Fauna Survey: Lots 38, 9902, 9903, 9905 and 9909, Cockburn, Spearwood and Ocean Roads. Unpublished report to the City of Cockburn, and
- Regen4 et. al. (2013) Level 1 Flora and Fauna Survey: Lots 9902, 9903, 9905 and 38, Cockburn and Ocean Roads. Unpublished report to the City of Cockburn.

While several other fauna surveys and assessments have been undertaken in the immediate vicinity of the study area, including:

- FaunaTrack (2019a) Level 1 Fauna survey of Coogee Beach Reserve. Unpublished report to the City of Cockburn
- FaunaTrack (2019b) Level 1 Fauna survey of CY O'Connor Reserve. Unpublished report to the City of Cockburn
- FaunaTrack (2018) Amphibians, reptiles, and mammals of Manning Park. Unpublished report to the City of Cockburn
- Western Wildlife (2010) Roe Highway Extension: Wetland and Migratory Bird Study, 2009-2010. Unpublished report to South Metro Connect
- WASAH (1999) Herpetofauna survey of Manning Park bushland, and
- BirdLife (2023b) Numerous bird surveys undertaken throughout the broader area (predominantly Woodman Point) from 1982 to 2023.

Forming part of the Desktop Assessment, these searches help to identify several species that may potentially occur or have previously been recorded within the study area. Species were then assigned to a likelihood presence category based on habitats present and distributional range.

Categories were defined as follows:

- **Known:** Records previously confirmed within the study area.
- **Likely:** Both suitable habitat present and local records exist within a radius of 5 km.
- **Possible:** Either suitable habitat present or local records exist within a radius of 5 km.
- **Unlikely:** Area contains no suitable habitat or local records, and/ or locally extinct.

These searches often comprise a large percentage of wetland, migratory or marine bird species that either infrequently visit the local coastline and/or the broader area, or are inhabitants of offshore coastal islands, near coastal or inland wetlands and are of low likelihood to use the study area on a regular basis or even at all. Most species however are associated with significant coastal areas such as Woodman Point and Fremantle ports, or nearby waterbodies such as Manning Lake, or large, saline lakes such as Lake Coogee, with many species unlikely to occur in or regularly frequent the study area besides a potential flyover and many of these species have been excluded from putative species tables. In addition, all pelagic bird species (i.e. albatross and petrels), marine mammals (i.e. whales and seals), fish (i.e. sharks) and marine reptiles (i.e. sea turtles and sea snakes) have been completely excluded from searches as these are unlikely to occur within the study area. Subsequently, desktop assessments resulted in the identification of 15 species of conservation significance that are likely to occur or known to occur within 5km of the study area (Tables 2, 3, 4 and 6).

Very few fauna species have been confirmed within the study area, however the following species of conservation significance have previously been recorded via the following sources (Map 2):

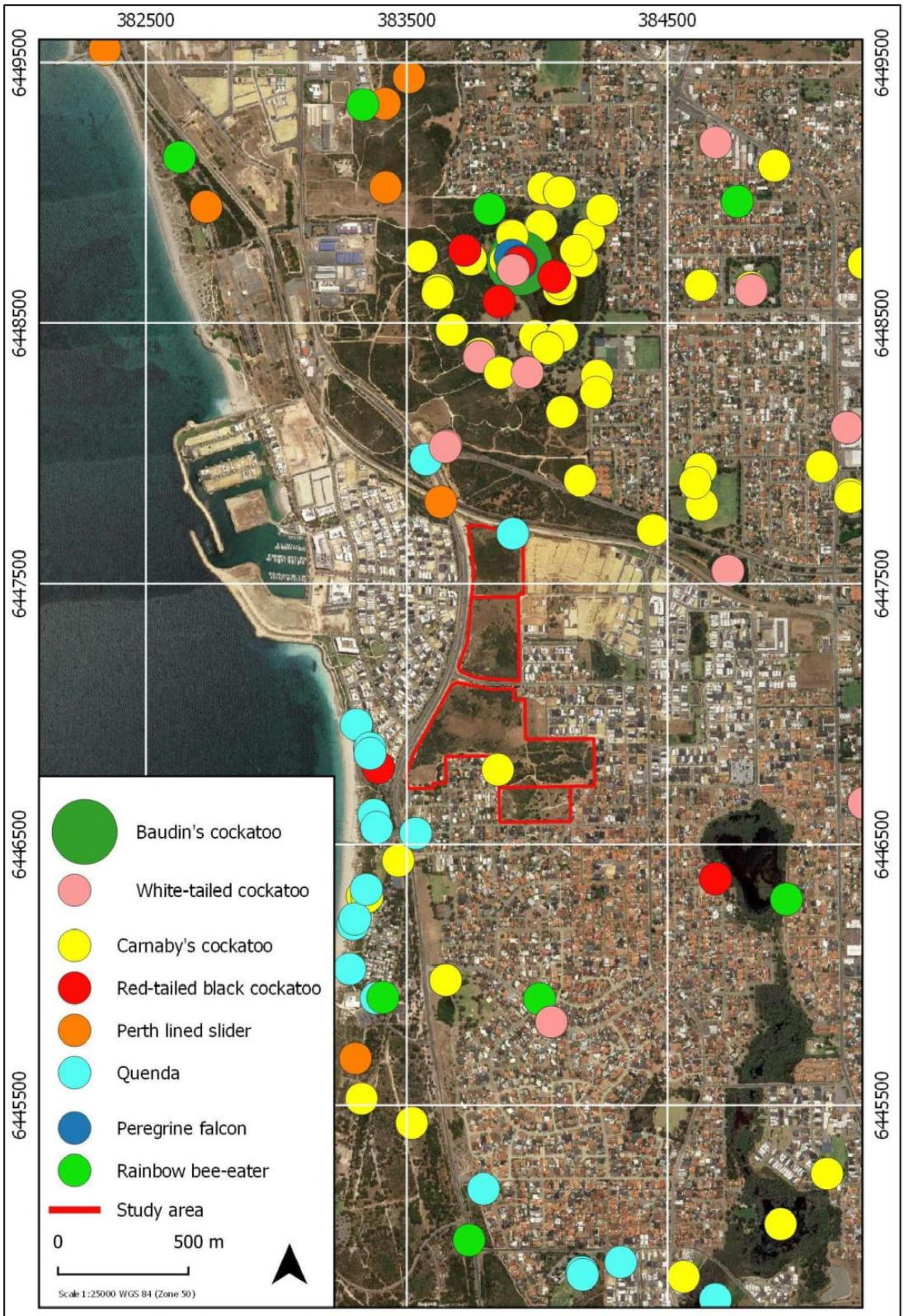
- Carnaby's cockatoo (Birdlife, 2023a)
- Rainbow bee-eater (Regen4 et. al. 2018, 2013), and
- Quenda (DBCA, 2023b)

While the following species have been recorded within 1-2km of the study area (Map 2):

- Baudin's cockatoo (Birdlife, 2023a)
- Forest red-tailed black cockatoo (Birdlife, 2023a)
- Peregrine falcon (Birdlife, 2023a)
- Perth-lined slider (DBCA, 2023b; FaunaTrack, 2019b, 2018; WASAH, 1999)
- Black-striped snake (DBCA, 2023b), and
- Invertebrate species including the Swan Coastal Plain Shield-back trapdoor and Graceful sun-moth (DBCA, 2023b)

Additionally, search results of the DBCA Threatened Fauna Database also identified the Fork-tailed Swift from bird surveys undertaken in the late 1970's and early 1980's from a nearby location 2.5km to the northwest of the study area at North Coogee. However, due to the age of the records, the exact location of the record cannot be certain, with the same record not appearing on the Birdlife Australia database search. This record however is assumed to be valid and potentially near to the study area, which may have included a brief flyover.

A single Quokka record also exists from approximately 3km northwest of the study area, which represents a moderately certain observation of dead specimen on South Beach in 2009 (DBCA, 2023b). This may potentially be a beach-washed animal; however, the Quokka is assumed to be locally extinct in the immediate mainland area and highly unlikely to be present within the study area and/or the local area.



Map 2. Location of conservation significant fauna (excluding wetland and wading birds) previously recorded in and around the study area

2.2 Reconnaissance survey / site visit

The reconnaissance survey/site visit aims to verify the accuracy of the Desktop Assessment and to delineate and characterise the fauna and fauna habitats present in the study area.

Site visits were undertaken on five separate occasions (11th, 12th and 18th October, and 7th and 9th November 2023), whereby a variety of survey techniques were employed. This involved the following methods:

- Targeted searches for vertebrate fauna, particularly those of conservation significance, including a visual assessment of Black cockatoo habitat (nesting, foraging and roosting potential)
- Motion sensor camera deployment
- Opportunistic observations, and
- Fauna habitat assessment

Field surveys were undertaken by Mr Ray Lloyd and Mr Jeff Turpin. This report was prepared by Ray Lloyd. Field work was carried out under the permit BA27000904 issued by the Department of Biodiversity, Conservation and Attractions (DBCA), Scientific User Licence U316 (2023-2025) issued by the Department of Primary Industries and Regional Development (DPIRD) and Animals Ethics Approval Number WAEC 23-09-56 issued by the DPIRD Wildlife Animal Ethics Committee.

2.3 Targeted searches

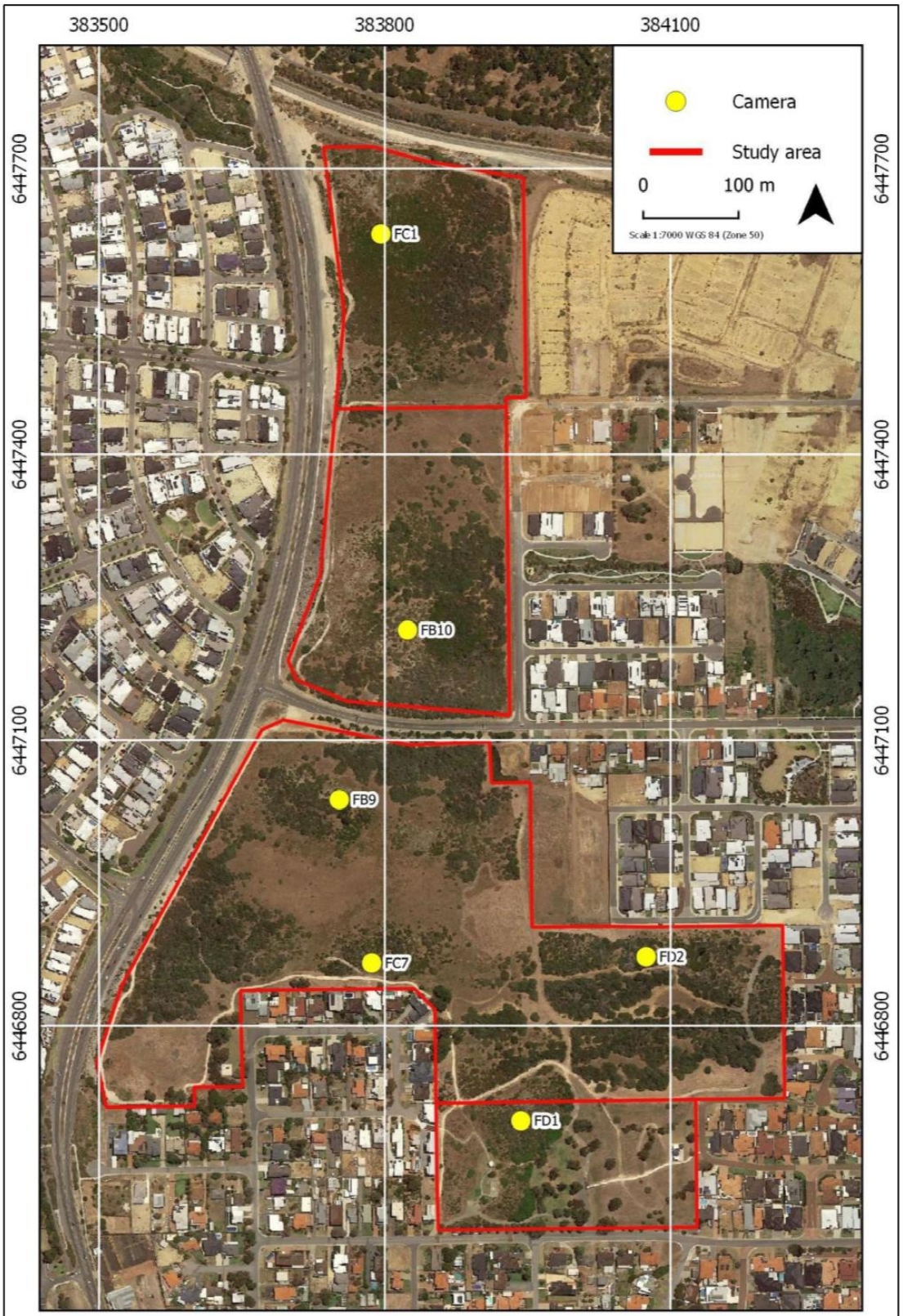
Targeted searches for terrestrial vertebrate fauna were undertaken on the 11th and 12th October, and 7th November 2023 during the site inspection. Searches involved the raking of leaf litter and soft soil, the turning of rocks, fallen timber and rubbish, inspecting under bark, investigating hollows and burrows and examining tracks, scats and other traces of fauna.

2.4 Motion-sensor cameras

Survey using motion-sensor cameras were undertaken over a seven-night period from the 11th to 18th October 2023, whereby six motion-sensor camera units were deployed. The cameras were placed off main pathways and baited with a tuna oil-soaked cloth concealed within a small PVC cannister fixed to the ground. Cameras were attached to a fence post and positioned approximately 50 cm above the ground, angled downwards slightly and set to take a single photograph with a three second interval between successive photographs. Camera footage was downloaded at the completion of the seven-night period.

2.5 Opportunistic records

Additional species opportunistically observed whilst traversing the survey area were recorded. Secondary evidence such as tracks, diggings, nests, scats and scratches were also recorded.



Map 3. Motion camera locations within the study area

2.6 Fauna habitat assessment

Fauna habitat assessments were undertaken throughout the study area. Factors used to assess fauna habitat quality incorporated the size of habitat, level of habitat connectivity, soil type and availability, tree hollow and other resource availability, fire history, and vegetation quality (EPA, 2020). These were further quantified using the following fauna habitat quality categories used in recent, nearby fauna surveys (i.e. PGV Env, 2021):

- **High:** No obvious disturbance, with vegetation structure, diversity, and quality like that prior to any disturbances, with a high level of habitat connectivity and is likely to contain a natural fauna assemblage.
- **Very Good:** Minimal disturbance and retaining habitat characteristics like that if it had not been disturbed, with a good level of habitat connectivity and fauna assemblages minimally affected by disturbance.
- **Good:** Some signs of disturbance, but still retaining many habitat characteristics if it had not been disturbed, with a good level of habitat connectivity, but the fauna assemblage has likely been affected by disturbances.
- **Disturbed:** Significant signs of disturbance, habitat characteristics have been modified (clearing of trees, shrubs, grazing, damage by vehicles and machinery and weed infestations) and limited habitat connectivity and fauna assemblages likely to differ from those expected in undisturbed sites.
- **Completely degraded:** Significant loss of vegetation, large weed infestations, a high number of vehicle tracks or have been completely cleared, with limited or no habitat connectivity and fauna assemblages likely to differ from those expected in undisturbed sites.

The fauna habitat of the site was also assessed for its value as an ecological linkage.

2.7 Taxonomy and nomenclature

Field identification of vertebrate species was based on the following field guides:

Birds	Simpson & Day (1999); Pizzey & Knight (1998); Morcombe & Stewart (2010)
Mammals	Menkhorst & Knight (2001); van Dyck *et al*. (2013)
Reptiles	Wilson & Swan (2021)
Amphibians	Tyler & Doughty (2009)

- In this report, nomenclature follows the Western Australian Museum's '*Checklist of the Fauna of Western Australia*'. WAM (2023).

2.8 Visual black cockatoo assessment

The study site was visually inspected for the presence or evidence of black cockatoo breeding, night roosting and/or foraging habitat. Any signs of live individuals and/or evidence of activity such as chew marks, branch clippings and chewed fruit and nuts were recorded.

2.8.1 Breeding habitat

Defined as habitat that contains known, suitable, or potential nesting trees (DAWE, 2022).

- A known nesting tree is a standing tree (dead or alive) containing a hollow where cockatoo breeding has been recorded or shows evidence of breeding (scratches, chew marks or feathers).
- Suitable nesting trees are those containing suitable hollows (>10cm wide), though have no evidence of use.
- A potential future nesting tree are those with a diameter at breast height (DBH) that may develop a hollow in the future. All trees with a diameter of 50cm or above were classed as potential future nesting trees.

Habitat trees were individually identified and incorporated the following attributes:

- Unique identification number
- Species
- Waypoint (Latitude/longitude)
- Alive or dead
- Diameter at breast height (DBH)
- Presence of hollows
- Number of hollows
- Hollow width
- Any usage, and
- Habitat category (known, suitable, potential, or foraging only)

2.8.2 Roosting habitat

Any groups of tall, native trees in or around the study site were assumed to provide potential roosting habitat for black cockatoo species and were recorded. Any signs of roosting behaviour were also noted.

2.8.3 Foraging habitat

Foraging habitat includes those habitats that typically comprise of plant species known to be consumed by black cockatoo species. These include a variety of proteaceous woodlands, shrublands and low heath, Eucalypt woodlands and a range of non-native habitats and species including pine trees and plantations, and parklands and gardens supporting species such as Cape Lilac (DAWE, 2022).

Foraging habitat was mapped for all three species, based on the presence of the following plant species known to be consumed by each species of black cockatoo, these include:

- **Baudin's cockatoo:** Woodland tree species such as Marri (*Corymbia calophylla*), proteaceous shrubs such as *Banksia* and *Hakea* spp., as well as Pine trees (*Pinus* sp.) (DAWE, 2022; Johnstone et. al. 2011).

- **Carnaby's cockatoo:** Proteaceous species such as *Banksia* and/or *Hakea* species, particularly Parrot bush (*Banksia sessilis*), and woodland tree species (many *Eucalyptus*/*Corymbia* species), particularly Tuart (*Eucalyptus gomphocephala*) and Marri and Pine trees (DAWE, 2022; Groom, 2011; Johnstone et. al. 2011).

- **Forest red-tailed black cockatoo:** Woodland tree species, particularly Jarrah (*Eucalyptus marginata*), Marri and Tuart, and the introduced Cape Lilac (DAWE, 2022; Johnstone et. al. 2017, 2011).

3. Results and discussion

3.1 Fauna habitats

Three broad fauna habitats were identified within the survey area (Map 4):

- Shrublands and heath
- Parkland
- Disturbed areas/weedy grasslands

Shrublands and heath

Shrublands and heath habitats cover approximately 55.51% of the study area (17.84ha) and is predominantly centred along the taller, limestone ridges and associated slopes, with much of the area containing skeletal sandy soils and extensive limestone exposure. Habitats generally include low heaths dominated by *Melaleuca huegelii* on skeletal soils and limestone exposure in the southern and eastern parts of the study area, with areas of taller heath/shrubland on the slopes and lower ridges supporting extensive Parrot-bush (*Banksia sessilis*) shrublands and dense thickets dominated by *Acacia rostellifera,* particularly in the north of the study area. Parts of this habitat, particularly throughout much of Lots 9903 and 9905, contain large infestations of the introduced Coastal tea-tree (*Leptospermum laevigatum*), with many isolated patches spread throughout a large portion of the study area.

Shrubland and heath habitats are of very high significance, as these areas provide an important food source for Baudin's and Carnaby's cockatoo (proteaceous shrublands), while the dense, low shrublands also provide dense cover important for species such as Quenda and a range of small bushland birds, as well as sandy soils and extensive leaf litter, a habitat requirement for species such as the Perth lined slider.

Parkland

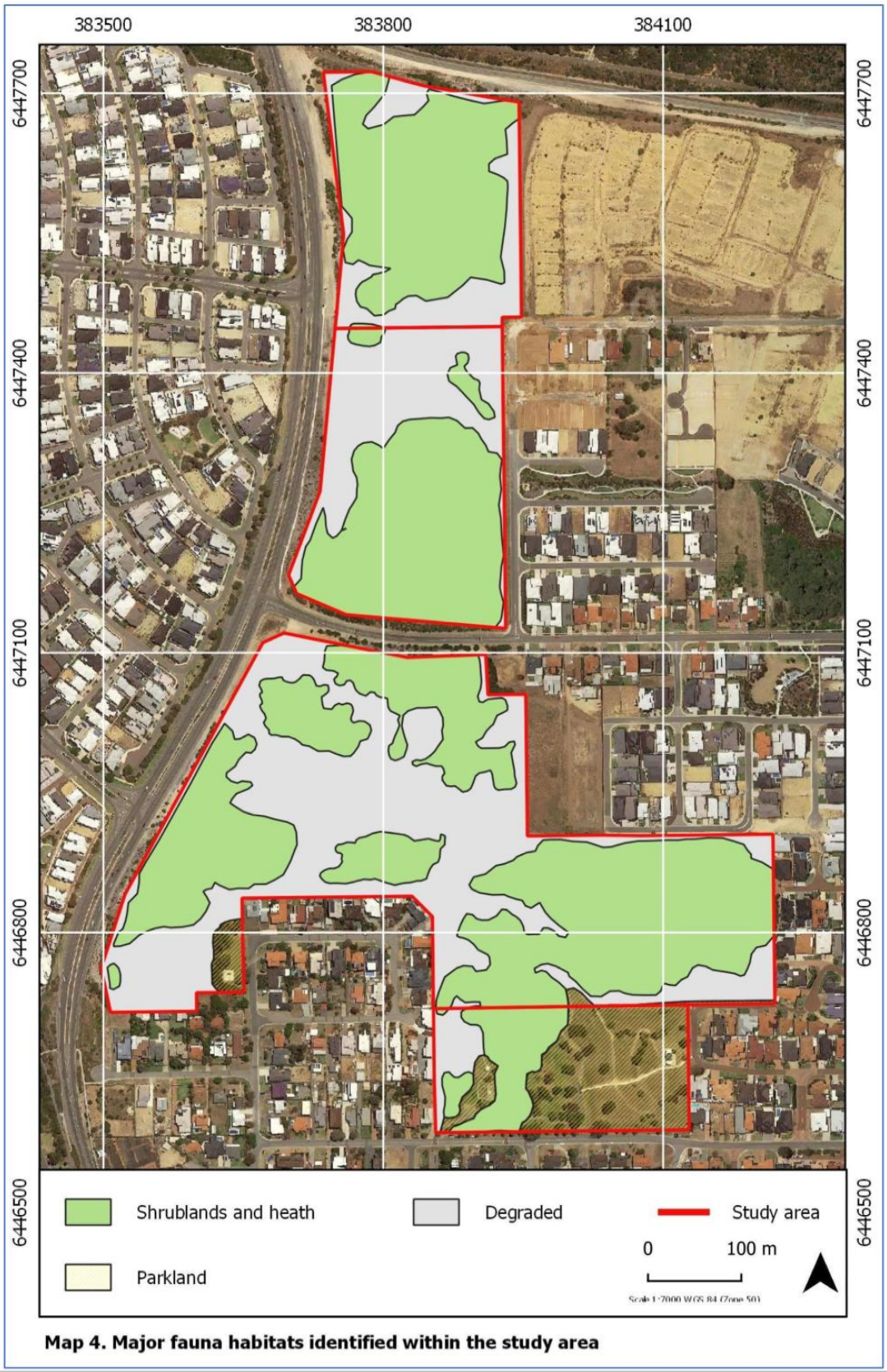
Covering approximately 8.12% of the study area (2.61ha), this habitat occurs across much of Lot 38 and southern parts of Lot 9905. This habitat mainly consists of manicured lawns, playground areas and the scenic lookout. This area also incorporates current carparking facilities and a community garden. These areas are also the only parts of the study site containing large habitat trees. The large trees in the area are likely to provide foraging resources for both Carnaby's and Forest Red-tailed Black Cockatoos and the open, sandy areas bordering the grassy areas, and numerous sandy tracks may provide nesting opportunities for Rainbow bee-eaters.

Degraded areas/weedy grasslands

Large areas of completely cleared and/or altered habitats also occur throughout the study area. These areas have generally been completely altered and no longer support any remaining native vegetation, of which are now predominantly bare soil and weedy grasslands. These areas cover the remaining 36.37% of the study area (11.69ha). Although disturbed/degraded, this area provides low cover (dense grasses) for species such as Quenda and isolated vegetation thickets important for a range of locally significant bush birds, and open, sandy areas that may provide nesting opportunities for Rainbow bee-eaters.



Figure 1. Fauna habitats of the study area: (a & b) Shrublands and heath; (c) Parkland; (d) Degraded areas/weedy grasslands.



Map 4. Major fauna habitats identified within the study area

3.2 Fauna habitat condition

A total of forty-one fauna habitat assessments were undertaken throughout the study area. These assessments aimed to quantify the habitat quality throughout the site, with raw data presented in Appendix 2.

Fauna habitat condition varied throughout the site from good through to completely degraded. Essentially all habitats within the study area have experienced some level of disturbance or degradation through historical land uses, the establishment of tracks, weedy grass infestations and feral species. Much of the remaining areas of remnant vegetation are also extremely isolated from surrounding patches, subsequently no habitat was regarded as high-quality/pristine or very good, however the majority of Lot 9902, the eastern part of Lot 9905 and western part of Lot 38 presented a much higher level of habitat quality and/or connectivity.

Habitats considered of 'Good' condition covered approximately 15.84% (5.09 ha) of the study area and incorporated the 'Shrubland and Heath' habitats which is the dominant fauna habitat occurring within the study area (Map 6; Figure 2a). These habitats generally have a relatively intact vegetation structure, substantial level of limestone exposure, skeletal soils and a very dense, in some instances almost impenetrable shrub layer and a high flora diversity, including some herbs. These areas also contain extensive feeding grounds for black cockatoos, primarily Carnaby's and to a lesser extent Baudin's, of which the proteaceous shrubland, particularly Parrot bush (*Banksia sessilis*) forms a dominant feature of the upper shrub layer. These areas also present as having less tracks and pathways, and less cleared areas/exposed soil, erosion and weedy grass infestations, and possess important habitat characteristics such as extensive leaf litter and woody debris. They also have little or considerably less tea-tree infestations than other parts of the study area.

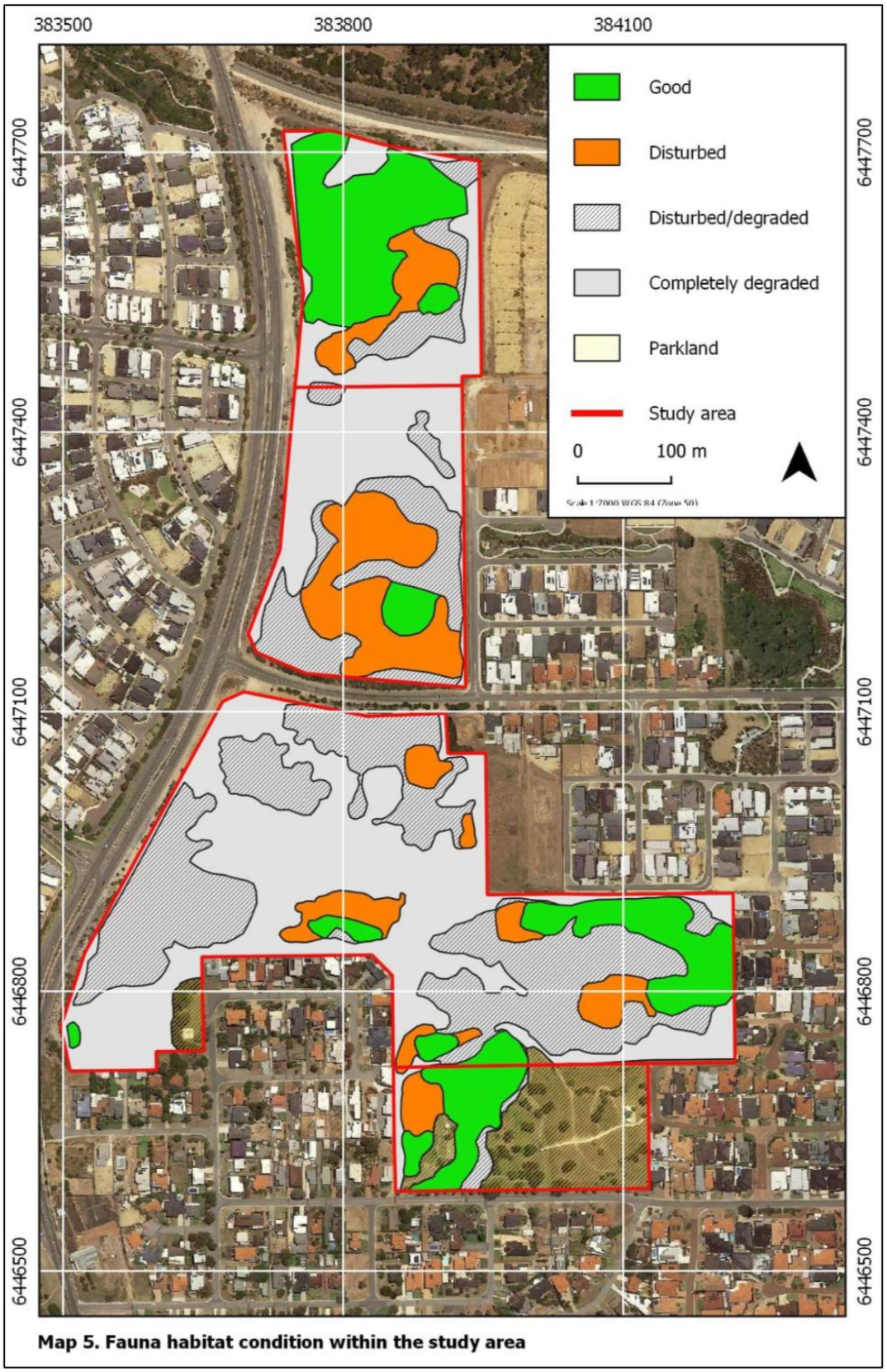
Disturbed areas cover approximately 11.23% (3.61 ha) of the study area (Map 6; Figure 2c). These areas are concentrated in the central-southern portion of Lot 9903 and the western part of Lot 9905. Much of the disturbed habitats generally fringe areas of higher-quality habitats. A dominant feature of these habitats are the extensive infestations of the introduced Coastal tea-tree *(Leptospermum laevigatum*), which dominates the shrub/upper canopy layer. However, much of this habitat still comprise several elements of higher quality habitats, in particular scattered or isolated thickets of *Banksia sessilis*, extensive leaf litter patches and a dense, often impenetrable shrub layer, which offers adequate habitat for significant species such as Quenda, Perth-lined slider and locally significant bush birds such as the Splendid fairy-wren or White-browed scrub-wren, as well as offering some connectivity to nearby or adjacent bushland patches. These areas also often comprise of patchy cleared landscapes, scattered rubbish, and feral animals, in particular rabbits. An additional 9.14ha (28.44%) of the study area has been highlighted as disturbed/degraded, however these areas no longer support any significant areas of native vegetation. However, from a fauna perspective, these area are of considerable importance as they are known to support Quenda, Splendid fairy-wren and Western bluetongue in parts, providing important areas of cover and refuge.

Completely degraded areas cover approximately 36.37% (11.69 ha) of the study area (Map 6; Figure 2d). These areas comprise a large percentage of Lots 9903 and 9905 and are generally devoid of most of the original vegetation. Some isolated shrubs may be scattered around, but most areas contained extensive weedy grass infestations and exposed soils. Most of the highly degraded areas are associated with current and historical clearings, the powerline corridor along the southern section of Lot 9902/northern section of Lot 9903, and remaining areas subject to previous clearing and degradation. These areas contain a high level of soil exposure, woody and grassy weeds, rubbish and numerous tracks and pathways, and feral species including rabbits.

The remaining 8.12% (2.61 ha) incorporates parkland habitats.



Figure 2. Fauna habitat condition within the study area: (a) Shrubland/heath in ' Good' condition, with little disturbance such as tracks and paths, and/or fragmentation and with low level weedy grass infestation, and large areas of dense, low vegetation and extensive foraging resources (i.e. *Banksia sessilis*); (b) 'Disturbed' shrublands, with historical clearing/thinning, and low level to significant woody weed infestations, though some foraging resources persist; (c) 'Completely Degraded' habitats with high level disturbance such as clearing, weed infestation and fragmentation, with very little to no cover and/or foraging resources; (d) Improved areas such as the Community Garden located in Lot 38.



Map 5. Fauna habitat condition within the study area

3.3 Ecological linkage habitat value

An 'Ecological linkage' is defined as 'a series of vegetated patches which act as stepping stones of habitat, facilitating the maintenance of ecological processes and the movement of organisms within, and across, a landscape' (Molloy et. al. 2009). While a 'Regional ecological linkage' serves to link protected patches of regional significance by identifying the best condition patches available to act as stepping stones for flora and fauna between regionally significant areas (Molloy et. al. 2009).

Previous surveys within the study area have discussed the ecological linkage habitat value of the study area (see Regen4 et. al. 2018, 2013). This describes the habitat of the site of being not just important for resident fauna, but for fauna that rely on a larger area and/or numerous habitat types. The ecological linkage value of the study area forms part of Regional Ecological Linkage 76 in the Regional Framework for the Perth and Peel Regions and covers habitats such as the high-quality Parrot bush (*Banksia sessilis*) shrublands on Lot 9902 and existing remnant habitats of Lots 38 and 9905 (refer to Regen4 et. al. 2018, 2013). The study area provides a discontinuous link between the large bushland area of Manning Park to the north, including the adjacent CY O'Connor Reserve, and Woodman Point Regional Park and Lake Coogee in the south. An example of how this linkage is important is presented in Map 6, whereby the study area forms an integral part of a clear north-south linkage corridor between bushland in the north and south for conservation significant species such as Quenda, Perth lined slider and the Western bluetongue. Very little habitat and few to no records of these species exist to the immediate east of this area, while to the immediate west of the study area is entirely residential developments with no linkage value. In addition, many wider-ranging species, such as black cockatoo species and many locally significant birds of prey are likely to rely on this area, which currently provide suitable foraging habitats.



Map 6. Ecological linkage value of the study area, connecting CY O'Connor Reserve and Manning Park in the North to Woodman Point and Lake Coogee in the south

3.4 Black cockatoo habitat

3.4.1 Breeding habitat

Thirty-five potential habitat trees were located within the study area, which included both future potential nesting trees and those trees only suitable as foraging habitat (Table 1; Map 7). Habitat trees identified within the study area included 22 out of 24 trees that had previously been identified within the study area (1-24) (see Regen4 et. al. 2018; 2013). One of these (#1) was originally identified outside of the cadastral boundary, however it could not be located during the current study and is presumed to have been removed. A large (600mm DBH) Tuart (#22), previously identified in the parkland habitats in the west of Lot 9905 was also unable to be located. A further 13 habitat trees were identified throughout the study area that were not identified during the 2012 and 2017 surveys (Table 1).

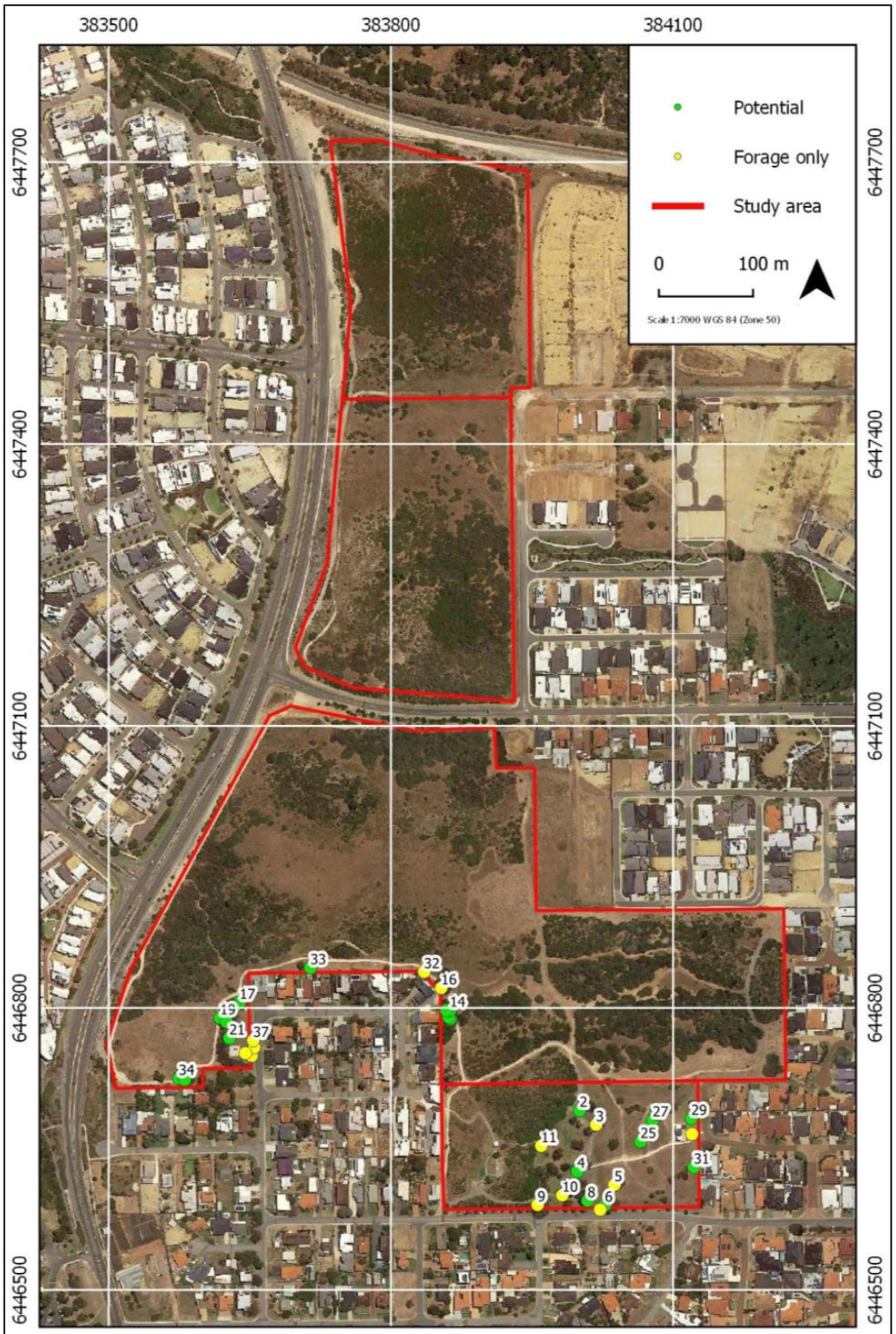
Tree species identified were predominantly Tuart (*Eucalyptus gomphocephala*; 16 trees), while a single Marri (*Corymbia calophylla*) and a further five unknown large *Eucalyptus* species were also identified as potential breeding habitat. The remaining 13 trees all represented foraging habitat trees only, consisting of mainly Peppermint (*Agonis flexuosa*), She-oak (*Allocasuarina fraseriana*), the introduced Pine (*Pinus* sp.), and Pepper trees (*Schinus molle*) (Table 1).

None of the trees identified in the study area contained visible hollows. It is also of note that not all hollows or potential hollows are visible from the ground, and some of the larger trees within the study area may contain hollows, potentially of suitability for black cockatoo species. No known breeding hollows are present within the study area and is unlikely that any White-tailed cockatoos will use the site for breeding, with the species rarely using the southern Perth metropolitan area of the Swan Coastal Plain as breeding locations (Johnstone et. al. 2011).

No known breeding hollows were observed within the study area of the Forest red-tailed black cockatoo, however, unlike the white-tailed species, Forest red-tailed black cockatoos have been known to breed on the Swan Coastal Plain (including within the City of Cockburn), with known breeding locations in the vicinity of Murdoch University and possibly Perry Lakes (Johnstone et. al. 2017) and Bibra Lake (Birdlife, 2023a).



Figure 3. (a & b) Large trees scattered throughout parkland habitats, including several large Tuarts (*Eucalyptus gomphocephala*) that may provide future potential breeding habitat for Black cockatoo species.



Map 7. Location of Black cockatoo habitat trees identified within the study area

Table 1. Location and measurements of potential habitat trees identified in the study area during the current survey.

#	Species	Lat	Long	Dead/ Alive	DBH (cm)	Hollows & width (cm)	Usage	Comments
1	Not located							
2	Marri (*Corymbia calophylla*)	-32.110172	115.770485	Alive	47			F
3	She-oak (*Allocasuarina fraseriana*)	-32.110312	115.770668	Alive	50			F. Two trunks (50 & 40cm)
4	Unknown (*Eucalyptus* sp.)	-32.110758	115.77045	Alive	60			P
5	She-oak (*Allocasuarina fraseriana*)	-32.11089	115.770867	Alive	80			F
6	Tuart (*Eucalyptus gomphocephala*)	-32.111085	115.770757	Alive	70			P
7	She-oak (*Allocasuarina fraseriana*)	-32.111128	115.770702	Alive	60			F. Two trunks (60 & 50cm)
8	Tuart (*Eucalyptus gomphocephala*)	-32.11104	115.770563	Alive	78			P. Two trunks (78 & 75cm)
9	Pine tree (*Pinus* sp.)*	-32.111075	115.769998	Alive	150			F
10	Peppermint (*Agonis flexuosa*)	-32.110985	115.770278	Alive	65			F. Two trunks (65 & 45cm)
11	She-oak (*Allocasuarina fraseriana*)	-32.110508	115.770047	Alive	67			F
12	Unknown (*Eucalyptus* sp.)	-32.109278	115.769037	Alive	61			P
13	Tuart (*Eucalyptus gomphocephala*)	-32.109263	115.76902	Alive	60			P. Two trunks (60 & 50cm)
14	Unknown (*Eucalyptus* sp.)	-32.109198	115.769035	Alive	54			P
15	Tuart (*Eucalyptus gomphocephala*)	-32.109198	115.768995	Alive	77			P
16	Pepper tree (*Schinus molle*)*	-32.108982	115.76894	Alive	75			F. Two trunks (75 & 50cm)
17	Tuart (*Eucalyptus gomphocephala*)	-32.109098	115.766667	Alive	77			P
18	Tuart (*Eucalyptus gomphocephala*)	-32.109138	115.766613	Dead	50			P
19	Tuart (*Eucalyptus gomphocephala*)	-32.109245	115.766445	Alive	95			P. Two trunks (95 & 46cm)
20	Tuart (*Eucalyptus gomphocephala*)	-32.109283	115.766515	Alive	70			P
21	Tuart (*Eucalyptus gomphocephala*)	-32.10944	115.766547	Alive	75			P. Two trunks (75 & 30cm)
22	Not located							
23	Peppermint (*Agonis flexuosa*)	-32.109587	115.766725	Alive	80			F
24	Unknown (*Eucalyptus* sp.)	-32.109835	115.766037	Alive	55			P. Two trunks (55 & 54cm)
25	Tuart (*Eucalyptus gomphocephala*)	-32.110478	115.771167	Alive	55			P. Two trunks (55 & 44cm)
26	Tuart (*Eucalyptus gomphocephala*)	-32.110337	115.771272	Alive	65			P. Two trunks (65 & 40cm)
27	Tuart (*Eucalyptus gomphocephala*)	-32.110273	115.771307	Alive	42			F
28	Tuart (*Eucalyptus gomphocephala*)	-32.110215	115.771347	Alive	50			P. Two trunks (50 & 28cm)
29	Tuart (*Eucalyptus gomphocephala*)	-32.110262	115.771742	Alive	65			P
30	Peppermint (*Agonis flexuosa*)	-32.110412	115.771747	Alive	52			F
31	Tuart (*Eucalyptus gomphocephala*)	-32.11073	115.771765	Alive	69			P
32	She-oak (*Allocasuarina fraseriana*)	-32.108825	115.76875	Alive	50			F
33	Unknown (*Eucalyptus* sp.)	-32.108773	115.76747	Alive	47			F
34	Tuart (*Eucalyptus gomphocephala*)	-32.109822	115.765973	Alive	43			F. Four trunks (43, 33, 28 & 25cm)
35	Peppermint (*Agonis flexuosa*)	-32.109612	115.766795	Alive	57			F
36	Peppermint (*Agonis flexuosa*)	-32.109532	115.766825	Alive	41			F. Three trunks (41, 38 & 30cm)
37	Peppermint (*Agonis flexuosa*)	-32.109465	115.766815	Alive	45			F

P = Potential future nesting tree
F = Foraging only or DBH not large enough to be considered as a future nesting tree at the time of this study
*** = Introduced species**

3.4.2 Roosting habitat

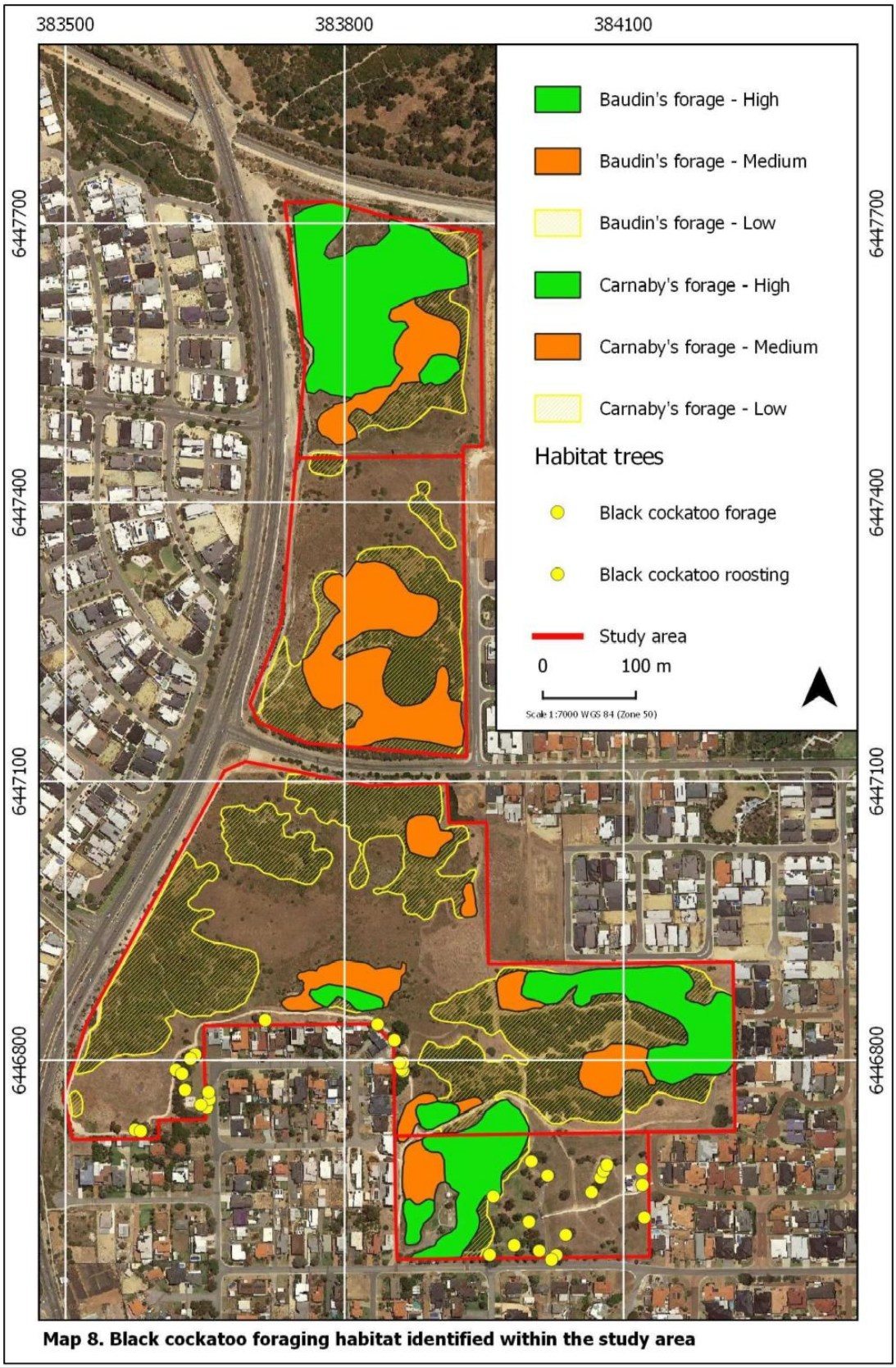
Although not extensive, the area of parkland containing large Eucalypts may provide suitable for night roosting of black-cockatoo species. No White-tailed black cockatoo roosts are currently known from the study area, however four confirmed White-tailed black cockatoo roosts are known from within 1.5km of the study area, including two from nearby Manning Park, while a further 11 known roosts, and another 16 unconfirmed roosts occur within 12km of the study area (Birdlife, 2023a; DBCA, 2023b). No Forest-red-tailed black cockatoo roosts are currently known from the study area, however one confirmed roost is known within 2km of the study area, while a further 10 known, and a further 16 unconfirmed roosts occur within 12km of the study area (Birdlife, 2023a; DBCA, 2023b).

3.4.3 Foraging habitat

Suitable foraging habitat for all three black-cockatoo species was identified within the study area. This primarily incorporated shrublands and heath habitats containing proteaceous shrubs, particularly Parrot bush (*Banksia sessilis*) and the parkland areas containing numerous tree species known to be consumed by all three species (Map 8).

Up to 4.83 hectares of high-quality foraging habitat suitable for Baudin's and Carnaby's cockatoo is present within the study area. These areas are predominantly those habitats mapped as good condition and contain extensive *Banksia sessilis* shrublands and thickets. A further 3.78 hectares of medium-quality foraging habitat was identified within the disturbed habitats, which support isolated, smaller stands of *Banksia sessilis*. A further 9.23 hectares has been identified as low to negligible foraging habitat, with these areas predominantly being the remaining areas of vegetation within the study area. These areas consist predominantly of the introduced Coastal tea-tree, as well as other non-food plants such as *Templetonia retusa*. These areas however contain the occasional small clump or isolated individual of *Banksia sessilis* as well as several isolated Pine trees (*Pinus* sp.) which are known to be consumed by both Baudin's and Carnaby's cockatoo. Forest red-tailed black cockatoo foraging habitat was identified within the study area, which is predominantly the parkland areas supporting numerous Tuart and She-oak, which are considered a high value food resource, in particular Tuart.

Few confirmed records of Baudin's cockatoo are known from the surrounding area (DBCA, 2023b), and they are unlikely to forage in the study area on a regular basis. However, several records of Carnaby's/White-tailed cockatoo species and Forest red-tailed black cockatoo occur either within and/or close by the study area, and within 5km of the study area (Birdlife, 2023a; DBCA, 2023b), and are highly likely to regularly use the study area as a foraging resource. Many large areas of foraging resources also exist within 20 kilometres of the study area, including the proteaceous shrublands and heath of nearby Manning Park, as well as the extensive *Banksia*/Eucalypt woodlands of Jandakot Regional Park and *Banksia*/Eucalypt woodlands, and the Tuart woodlands occurring throughout the Beeliar Regional Park.



Map 8. Black cockatoo foraging habitat identified within the study area



Figure 4. (a & b) Extensive foraging resources (i.e. *Banksia sessilis*) for Carnaby's and Baudin's cockatoo throughout the proteaceous shrublands and heath; (c) Isolated Pines (*Pinus* sp.) located within parkland and some disturbed sites, provides important foraging resources for Carnaby's and Baudin's cockatoo; (d) Large trees scattered throughout parkland habitats, including several large Tuarts (*Eucalyptus gomphocephala*) that may provide foraging resources and potential roosting habitat for Black cockatoo species.

3.5 Vertebrate fauna assemblage

The overall survey period incorporated seven motion camera nights, and 12 person hours of bird surveys and targeted searches. This resulted in the detection of seven species of reptile, six species of mammal (including five introduced species) and 28 species of bird (including four introduced species) (Tables 2, 3, 4 and 6).

The survey area however has the potential to support up to six amphibian species, 41 species of reptile (including four of conservation significance), 18 species of mammal (including two of conservation significance) and 104 species of bird (including eight species of conservation significance) (Tables 2, 3, 4 and 6).

Surveys yielded a single bird, mammal, and reptile species of conservation significance (Map 9):

- The EPBC Marine listed Rainbow bee-eater (*Merops ornatus*)
- The Priority 4 listed Quenda (*Isoodon fusciventer*), and
- The Priority 3 listed Perth-lined Slider (*Lerista lineata*)

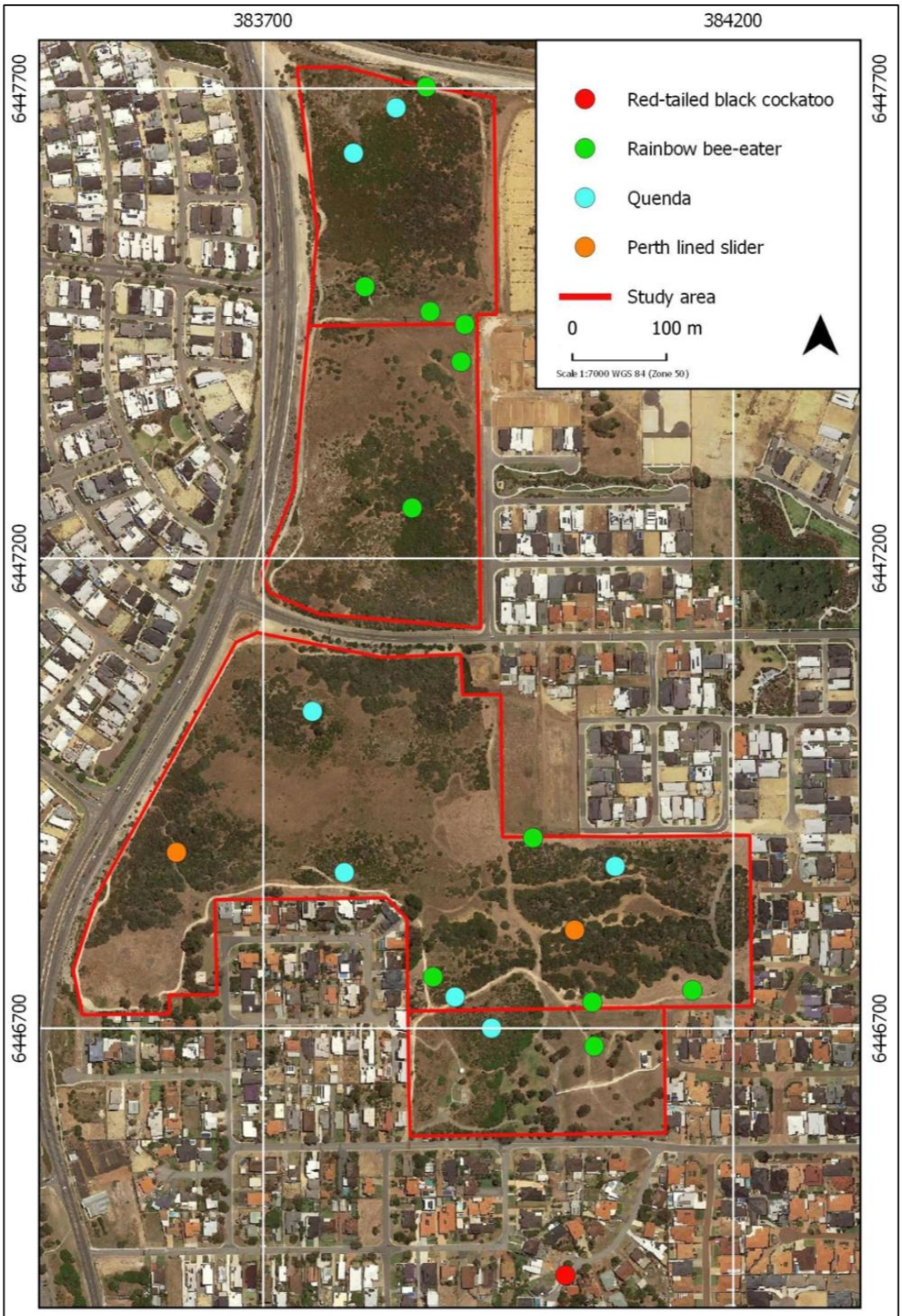
While the EPBC listed Endangered Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) was recorded near the study area (Map 9).

Additionally, a single reptile and six bird species of local significance were also detected (Map 10):

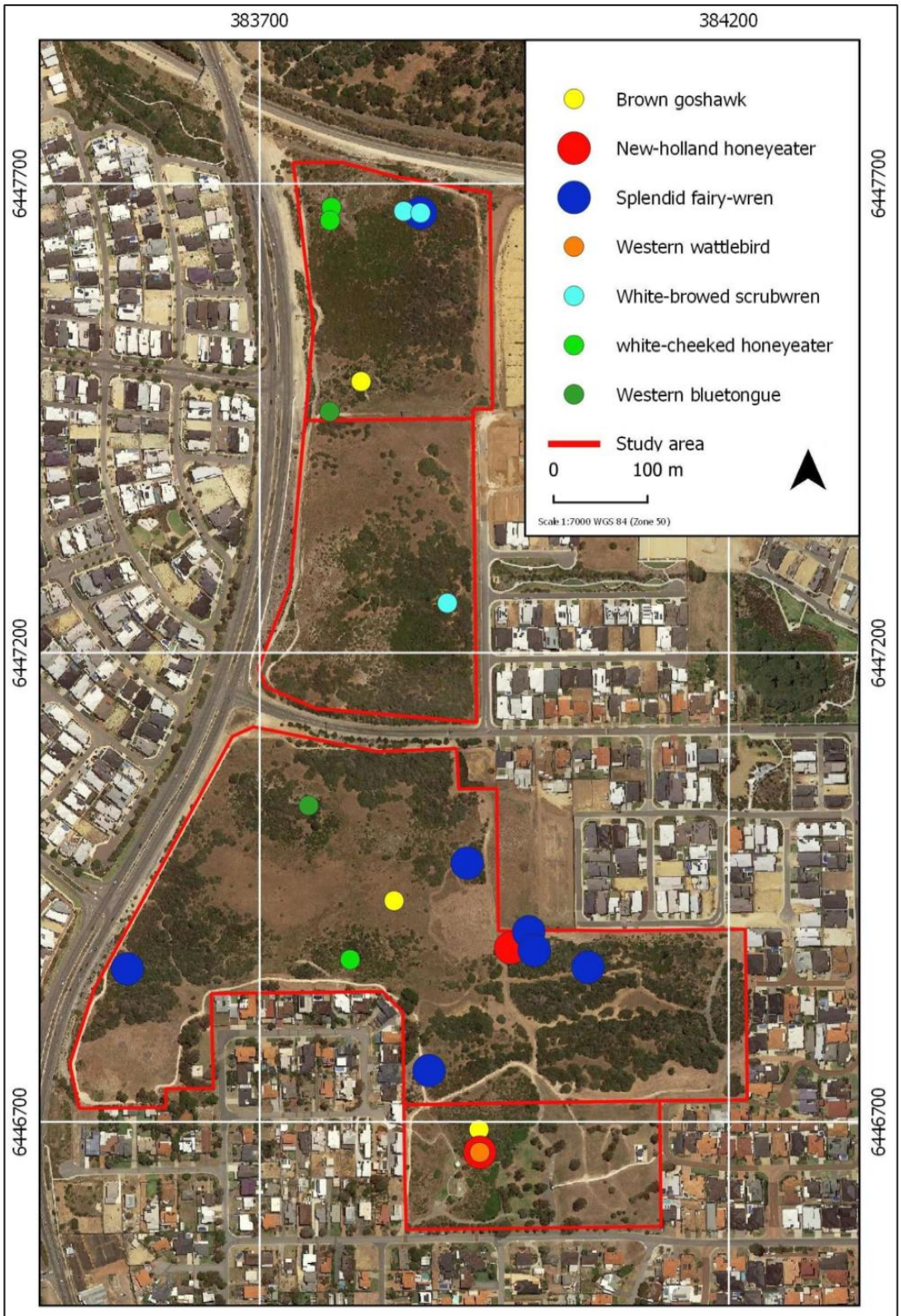
- Western bluetongue (*Tiliqua occipitalis*)
- White-browed scrub-wren
- New-holland honeyeater
- White-cheeked honeyeater
- Brown goshawk
- Splendid fairy-wren, and
- Western wattlebird

The survey area is also known to support a further two species of conservation and/or local significance:

- The EPBC listed Endangered Carnaby's cockatoo (*Zanda latirostris*), and
- Variegated fairy-wren



Map 9. Location of conservation significant fauna recorded within the study site during the current survey



Map 10. Location of locally significant fauna recorded within the study area during current surveys

3.5.1 Amphibians

The study area has the potential to support up to six species of amphibian (Table 2), however, no species of amphibian were recorded during the current survey. As no wetlands or other water sources currently exist in the study area, few species of frogs are likely to occur. The Moaning Frog (*Heleioporus eyrei*) and Banjo Frog (*Limnodynastes dorsalis*) are both likely to occur, with both species commonly occurring throughout limestone ridge habitats within the nearby Manning Park (WASAH, 1999). In addition, the Turtle frog (*Myobatrachus gouldii*) is a possibility to occur in the study area. These however are not easily detected due to their cryptic nature and their tendency to emerge in heavy rains, which were not encountered during the survey period. The Motorbike frog (*Litoria moorei*) may also occur in the study area due to the presence of artificial water sources in the parkland areas and neighbouring properties, including the community garden, with records from nearby Coogee (ALA, 2023). While species such as Slender tree frog (*Litoria adelaidensis*) and Squelching froglet (*Crinia insignifera*) are known from the chain of lakes incorporating the saline and freshwater systems between Market Garden Swamp and Lake Coogee (ALA, 2023), and also the nearby Manning Park (FaunaTrack, 2018; WASAH 1999). These species however, do not generally occur too far from the vicinity of wetlands (Government of Western Australia, 2000) and are most likely absent from the site.

No amphibians of conservation significance are expected to occur in the study area.

Table 2. Amphibians expected to occur, known to occur and/or recorded during the current survey

Species		Status	Likelihood	Recorded current survey
Pelodryadidae (Tree Frogs)				
Slender Tree Frog	*Litoria adelaidensis*		Unlikely	
Motorbike Frog	*Litoria moorei*		Possible	
Limnodynastidae (Large Ground Frogs)				
Moaning Frog	*Heleioporus eyrei*		Likely	
Pobblebonk	*Limnodynastes dorsalis*		Likely	
Myobatrachidae (Small Ground Frogs)				
Squelching Froglet	*Crinia insignifera*		Likely	
Turtle Frog	*Myobatrachus gouldii*		Possible	
Species expected	**6**			
Species recorded during 2023	**0**			

3.5.2 Reptiles

The study area potentially supports up to 41 species of reptiles. Seven species were detected during the current surveys including: The West coast Ctenotus (*Ctenotus fallens*), Shrublands Morethia (*Morethia obscura*), Western bearded dragon (*Pogona minor*), Bobtail (*Tiliqua rugosa*), Dugite (*Pseudonaja affinis*), the conservation significant Perth lined slider (*Lerista lineata*), and the locally significant Western bluetongue (*Tiliqua occipitalis*) (Table 3). Due to the size, isolation, and degradation of the area, the reptile assemblage present within the site may be significantly reduced, however a range of other reptile species are highly likely to occur within the study area including lizards such as: Marbled gecko (*Christinus marmoratus*), Fence skink (*Cryptoblepharus buchananii*), Two-toed mulch skink (*Hemiergis quadrilineata*), Burton's snake-lizard (*Lialis burtonis*) and Dwarf skink (*Menetia greyii*). These species are well known to persist in disturbed/degraded landscapes, including man-made and suburban gardens, and use a variety of habitats including standing and fallen timber, logs and rocks (Bush et. al. 2010). The Southern blind snake (*Anilios australis*) may also occur in the study area, as these can also be common in suburban gardens and/or disturbed areas close to bushland (Bush et al. 2010). Many of these species are also known from close by to the study area (DBCA, 2023c; FaunaTrack, 2019a; WASAH, 1999).

The Perth lined slider was the only reptile species of conservation significance recorded during the current survey, detected on two separate occasions in Coastal tea-tree scrub within Lot 9905 (Map 9; Figure 5). The Perth lined slider is largely restricted to the Swan Coastal Plain, from East Fremantle in the north (including Rottnest and Garden Islands) to Mandurah in the south, where it is found on coastal dunes supporting heath and shrublands, and *Banksia* and/or Eucalypt woodlands with pale sand on coastal plains, where it shelters in the loose upper soil, leaf litter and under logs. Its core range is centred around the highly disturbed southern Perth metropolitan areas, however much of its habitat has been destroyed through urbanisation and it is now restricted to remnant bushland areas and suburban gardens, where it is subject to a range of threats including weeds, fires, introduced predators and further habitat clearing and fragmentation (Maryan et. al. 2015). The Perth-lined slider has previously been detected from the surrounding area including Manning Park, North Coogee, Coogee Beach, and Woodman Point Regional Park (DBCA, 2023b; FaunaTrack, 2019b, 2018; WASAH, 1999). The Perth lined slider is likely to occur throughout the entire study area, particularly in the remaining shrubland habitats, including the introduced tea-tree thickets which provide sandy soils, extensive ground litter and vegetation cover.

Few other species of conservation significance have the potential to occur, though species such the Black-striped snake (*Neelaps calonotos*) may occur within the study area. The Black-striped snake is confined to the Swan Coastal Plain from Dongara in the north to Mandurah in the south, where it is an inhabitant of coastal dunes and sandplains supporting *Banksia*/Eucalypt woodlands and heath. It is a fossorial species, sheltering in leaf litter and soil at the base of trees and shrubs, where it feeds exclusively on lizards, particularly *Lerista* and *Aprasia* (Bush et. al. 2010). It is generally more common north of Perth, particularly large bushland areas north of Alkimos, with records south of Perth uncommon to scarce, with most occurring from the larger inland reserves such as Jandakot Airport or coastal heath between Peron and Mandurah (He, 2021). Much of its distribution in the greater Perth metropolitan area has and continues to be threatened by habitat loss through increased urban developments, and as such, this species is becoming increasingly restricted to these larger bushland remnants and becoming harder to find. A nearby record exists from Woodman Point (DBCA, 2023b) approximately 2.5km southwest of the study area, however this record is from 1965 and bushland in the local area was most likely much more connected and it is thought that *N. calonotos* populations may not persist in bushland areas of less than 1000 hectares (see How & Shine 1999; Bamford & Wilcox 2005).

In addition, the Western carpet python (*Morelia spilota imbricata*) is known to persist in large bushland remnants supporting woodlands and coastal limestone, however, most recent records are also from north of the Swan River (Bush et. al. 2010). Records further south are scarce, with no known recent records nearby to the study area. While the Jewelled Ctenotus (*Ctenotus gemmula*) may also be absent from the study area. This species is primarily an inhabitant of *Banksia* woodland with low vegetation (Bush *et. al.* 2010), a habitat generally absent from the study area. There are no nearby records and recent records are generally scarce, most also being north of the Swan River as much of its former range south of the river has been cleared for developments (Bush *et al.* 2010).

The locally significant Western bluetongue was detected on two occasions within lots 9902 and 9905. The study area represents the near southern distributional limit of for this species on the Swan Coastal Plain, which is reliant on large, undisturbed bushland areas, particularly with low, dense vegetation (Bush *et. al.* 2010). The Western bluetongue has previously been detected nearby to the study area including Manning Park, North Coogee and Henderson (ALA, 2023; WASAH, 1999; unpublished data). This species most likely persists due to the size and remaining bushland areas within the study area, and proximity to nearby bushland, creating a semi-connected habitat corridor from Manning Park in the north through to the Woodman Point area in the south.

The study area also has the potential to support a further four species of local significance: Keeled legless lizard (*Pletholax gracilis)*, Southwest crevice skink (*Egernia napoleonis*), Worm Lerista (*Lerista praepedita*) and Gould's hooded snake (*Suta gouldii)*. All these species require large, undisturbed bushland areas, particularly with low, dense vegetation (Bush *et. al.* 2010). There are however very few records of these species nearby. The Keeled legless lizard is known from Thomson's Lake Nature Reserve and Henderson over 4km away (DBCA, 2023c), where it occurs in shrublands with dense heath, including coastal limestone (FaunaTrack, 2024), and some of the heathy shrublands within the study area may support this species, particularly in Lots 38 and 9905. The south-west crevice skink predominantly occupies *Banksia*/Eucalypt woodlands with grasstrees on the Swan Coastal Plain (Bush et. al. 2010). A single record occurs from nearby Hamilton Hill (ALA, 2023), however the lack of *Banksia*/Eucalypt woodland within the study area may fail to support the species. The Worm Lerista generally inhabits coastal dunes and *Banksia*/Eucalypt woodlands, and is scarce south of the Swan River (Bush et. al. 2010). No records occur nearby and it is unlikely to occur in the study area due to the lack of adequate habitat. Gould's hooded snake is also predominantly found in *Banksia*/Eucalypt woodlands with grasstrees on the Swan Coastal Plain (Bush et. al. 2010). No recent records occur nearby and the study area may not support this species.



Figure 5. The conservation significant (Priority 3) Perth-lined Slider (*Lerista lineata*) was detected on several occasions in disturbed shrubland habitats within Lot 9905; (b) The locally significant Western bluetongue (*Tiliqua occipitalis*) was detected on several occasions on motion cameras and during targeted searches.

Table 3. Reptiles expected to occur, known to occur and/or recorded during the current survey

Species		Conservation status			Likelihood	Likelihood
		BC Act	DBCA	Local		
Agamidae (Dragon Lizards)						
Dwarf Bearded Dragon	*Pogona minor*				Likely	+
Western Heath Dragon	*Ctenophorus adelaidensis*				Possible	
Diplodactylidae (Gondwanan Geckos)						
Southern Spiny-tailed Gecko	*Strophurus spinigerus*				Likely	
Gekkonidae (Cosmopolitan Geckos)						
Marbled Gecko	*Christinus marmoratus*				Likely	
Bynoe's Gecko	*Heteronotia binoei*				Possible	
Pygopodidae (Legless Lizards)						
Sandplain Worm Lizard	*Aprasia repens*				Likely	
Fraser's Legless Lizard	*Delma fraseri*				Likely	
Gray's Legless Lizard	*Delma grayii*				Likely	
Burton's Snake Lizard	*Lialis burtonis*				Likely	
Keeled Legless Lizard	*Pletholax gracilis*			L	Possible	
Common Scaly-foot	*Pygopus lepidopodus*				Possible	

Species		Conservation status			Likelihood	Likelihood
		BC Act	DBCA	Local		
Scincidae (Skinks)						
Southwest Cool Skink	*Acritoscincus trilineatus*			L	Unlikely	
Fence Skink	*Cryptoblepharus buchananii*				Likely	
Limestone Ctenotus	*Ctenotus australis*				Likely	
West Coast Ctenotus	*Ctenotus fallens*				Likely	+
Jewelled Ctenotus	*Ctenotus gemmula*		P3		Unlikely	
King Skink	*Egernia kingii*				Possible	
South-west Crevice Skink	*Egernia napoleonis*			L	Possible	
Two-toed Mulch Skink	*Hemiergis quadrilineata*				Likely	
South-west four-toed Lerista	*Lerista distinguenda*				Possible	
West-coast four-toed Lerista	*Lerista elegans*				Likely	
Perth Lined Slider	*Lerista lineata*		P3		Likely	+
Worm Lerista	*Lerista praepedita*			L	Possible	
Dwarf Skink	*Menetia greyii*				Likely	
West Coast Morethia	*Morethia lineoocellata*				Likely	
Obscure Skink	*Morethia obscura*				Likely	+
Western Bluetongue	*Tiliqua occipitalis*			L	Possible	+
Bobtail	*Tiliqua rugosa*				Known	+
Varanidae (Goannas)						
Gould's Goanna	*Varanus gouldii*				Unlikely	
Rosenberg's Goanna	*Varanus rosenbergi*			L	Unlikely	
Pythonidae (Pythons)						
Western Carpet Python	*Morelia spilota imbricata*	S			Unlikely	
Typhlopidae (Blind Snakes)						
Southern Blind Snake	*Anilios australis*				Likely	
Elapidae (Front-fanged Land Snakes)						
Narrow-banded Shovel-nosed Snake	*Brachyurophis fasciolatus*				Possible	
Southern Shovel-nosed Snake	*Brachyurophis semifasciatus*				Possible	
Yellow-faced Whipsnake	*Demansia reticulata*			L	Unlikely	
Black-naped Snake	*Neelaps bimaculatus*				Likely	
Black-striped Snake	*Neelaps calonotos*		P3		Possible	
Tiger Snake	*Notechis scutatus*				Unlikely	
Gould's Hooded Snake	*Suta gouldii*			L	Possible	
Dugite	*Pseudonaja affinis*				Likely	+
Jan's Banded Snake	*Simoselaps bertholdi*				Possible	
Species expected	**41**					
Species recorded during 2023	**7**					

+ = Species recorded during the 2023 survey
S = Specially Protected (BC Act)
P3 = Priority 3 (DBCA)
L = Locally significant due to a reduced distribution and/or population on the Swan Coastal Plain (Government of WA 2000)

3.5.3 Mammals

The study area has the potential to support up to 18 species of mammal, eight of these however are highly mobile, insectivorous bat species while another six are introduced (Table 4). The Quenda (*Isoodon fusciventer*) was the only species of native, terrestrial mammal detected, and the only mammal of conservation significance detected during the current survey.

Quenda were detected on five out of six motion cameras, with Lots 38, 9902 and 9905 all supporting Quenda populations (Map 9). Several Quenda diggings were also observed in Lots 38 and 9902. Most detections were from limestone ridge habitats of Lot 38, 9902 and 9905, which generally consisted of good quality shrublands and heath with a dense, low shrub cover, a habitat requirement for the species. In addition, Quenda were also detected in the disturbed habitats in the northwest of Lot 9905. Quenda are generally known to inhabit a range of forest, woodlands and wetland habitats, providing there is sufficient low vegetation and habitat connectivity (Paull, 2008). Quenda, may also occur in dense thickets of the introduced tea-tree (*Leptospermum laevigatum*) throughout the remainder of study area. The tea-tree is an established weed, that dominates the vegetation throughout much of the study area, this also occurs in scattered localities throughout the area where it grows in disturbed sites and outcompetes local vegetation due to it dense, sprawling canopy and dense leaf-litter mats. Although generally in disturbed to degraded areas, this habitat may currently play a role as a habitat corridor, helping to link other bushland patches within the study area as well as to nearby areas such as neighbouring bushland of Lot 9909 Cockburn Road and across to Manning Park, and south towards Coogee Beach, where significant populations of Quenda currently occur (FaunaTrack, 2019a; DBCA, 2023b).

Few other mammal species of conservation significance are expected to occur within the study area. A single Quokka record exists from approximately 3km northwest of the study area, which represents a moderately certain observation of dead specimen on South Beach in 2009 (DBCA, 2023b). This may potentially be a beach-washed animal; however, the Quokka is assumed to be locally extinct in the immediate mainland area and highly unlikely to be present within the site or the local area.

The Priority 4 listed Western false pipistrelle (*Falsistrellus mackenziei*) may occasionally use the study area. Although primarily an inhabitant of Eucalypt forests and woodlands of the lower south-west, it is generally only known to inhabit *Banksia* woodlands on the Swan Coastal Plain (Churchill, 1998). *Banksia* woodland habitats are absent in the study area, however due to presence of numerous large trees and the potential for tree hollows within the study area, there is potential for the species to roost in or nearby to the area, or possibly forage within and around the study area. Few records are known from Swan Coastal Plain around Perth, with only one nearby record from Thomson's Lake Nature Reserve (DBCA, 2023b), with the species being rarely detected.

The locally significant Honey possum (*Tarsipes rostratus*) may occur in the study area. Honey possums in particular rely on diverse, long-unburnt *Banksia* woodlands which provide a food source (nectar and pollen) all year round, which the study area does contain (*Banksia sessilis* and other proteaceous shrubs on the limestone ridge), however, the species is becoming increasingly scarce on the Swan Coastal Plain around Perth, mainly due to the reduction and degradation of habitat through increased urban development, fire and dieback (Bradshaw, 2014) and there are only a handful of records known from the broader area (i.e. Harry Waring Marsupial Reserve; DBCA, 2023b). The isolation and significant degradation within the site coupled with the lack of habitat and connectivity may limit their occurrence and further survey work is required to help determine their presence in the study area.

Several introduced mammals were also detected during the survey, including the House mouse (*Mus musculus*), Black rat (*Rattus rattus*), Cat (*Felis catus*), Red fox (*Vulpes vulpes*) and European rabbit (*Oryctolagus cuniculus*). The House mouse was only detected on a single occasion from under rubbish in the degraded part of Lot 9903, while the Black rat was detected on a single occasion from motion camera FC7 in Lot 9905. A Fox carcass was also observed in the degraded area of Lot 9905. Cats and Rabbits appeared more prolific within the study area, with two cats detected on motion cameras within the higher quality bushland of Lots 38 and 9905, while another cat was sighted during the day in the higher quality bushland in the eastern part of Lot 9905. Most Rabbit activity was detected in the degraded areas of Lots 9902, 9903 and 9905, with several detections on motion cameras and scat piles (buck heaps), as well as the detection of four warrens.



Figure 6. (a) The conservation significant (Priority 4) Quenda (*Isoodon fusciventer*) was readily detected on five out of six motion cameras; (b) Quenda diggings were also detected within Lots 38 and 9902; (c) Two Cats (*Felis catus*) (one collared, one not) detected on motion cameras; (d) Rabbits (*Oryctolagus cuniculus*) were detected from cameras, scats and burrows, particularly in the degraded areas of Lots 9902, 9903 and 9905.

Table 4. Mammals expected to occur, known to occur and/or recorded during the current survey

Species		Status		Likelihood	Recorded
		DBCA	Local		
Tachyglossidae (Echidnas)					
Echidna	*Tachyglossus aculeatus*		L	Unlikely	
Peramelidae (Bandicoots)					
Quenda	*Isoodon fusciventer*	P4		Likely	+
Phalangeridae (Brushtail Possums)					
Brush-tailed Possum	*Trichosurus vulpecula*		L	Possible	
Tarsipedidae (Honey Possum)					
Honey Possum	*Tarsipes rostratus*		L	Possible	
Molossidae (Free-tail Bats)					
White-striped Mastiff Bat	*Austronomus australis*			Likely	
Western Free-tail Bat	*Ozimops kitcheneri*			Likely	
Vespertilionidae (Vespertilionid Bats)					
Southern Forest Bat	*Vespadelus regulus*			Likely	
Gould's Wattled Bat	*Chalinolobus gouldii*			Likely	
Chocolate Wattled Bat	*Chalinolobus morio*			Unlikely	
Western False Pipistrelle	*Falsistrellus mackenziei*	P4		Possible	
Lesser Long-eared Bat	*Nyctophilus geoffroyi*			Likely	
Greater Long-eared Bat	*Nyctophilus major*			Possible	
Muridae (Rate and Mice)					
House Mouse	*Mus musculus*	*		Likely	+
Brown Rat	*Rattus norvegicus*	*		Possible	
Black Rat	*Rattus rattus*	*		Likely	+
Leporidae (Rabbit)					
European Rabbit	*Oryctolagus cuniculus*	*		Likely	+
Canidae (Fox and Dog)					
European Red Fox	*Vulpes vulpes*	*		Likely	+
Felidae (Cats)					
Cat	*Felis catus*	*		Likely	+
Species expected	**18**				
Species recorded during 2023	**6**				

+ = Species recorded during the 2023 survey

*** = Introduced species**

P4 = Priority 4 (DBCA)

L = Locally significant due to a reduced distribution and/or population on the Swan Coastal Plain (Government of WA 2000)

Table 5. Motion camera number and species detected on each camera (represented by an '+') within the study area.

Species/Site	FB9	FB10	FC1	FC7	FD1	FD2
Quenda	+		+	+	+	+
Black Rat				+		
Cat					+	+
Bobtail	+	+		+	+	+
Western bluetongue	+					
Rabbit			+			

3.5.4 Birds

Twenty-eight species of bird were recorded during the current survey of a possible total of 104 potential species (Table 6). The Rainbow bee-eater (*Merops ornatus*) was the only species of conservation significance recorded, while the Carnaby's cockatoo has previously been recorded in the study area (DBCA, 2023b; Map 2). A further six species of local conservation significant bird species were also detected.

Highest bird diversity was recorded in Lots 38 (16), 9902 (14) and 9905 (16), which included several observations of the conservation significant Rainbow bee-eater and a range of locally significant bush birds, while only five bird species were recorded from Lot 9903 (Table 6). Lots 38, 9902 and 9905 were also where the few areas of higher quality habitats remain. Lot 9903 only contains a small area of shrubland of good quality (predominantly *Acacia rostellifera* thickets), however significant species such as the Rainbow bee-eater and White-browed scrubwren were present here (Table 6).

The Rainbow bee-eater was regularly observed flying in and around the study area, particularly around the wooded parkland habitats of Lot 38 and exposed sandy areas of Lots 9902, 9903 and 9905 (Map 9). The Rainbow bee-eater has previously been recorded in the study area (Regen4 et. al. 2018; 2013) and is most likely a regular summer visitor/breeder to the site. Ranging from scarce to common throughout much of Western Australia, Rainbow bee-eaters inhabit lightly wooded landscapes with open sandy country, often near water. It can occur as either a resident, a breeding visitor or winter visitor to Western Australia, where it moves to the southwest during spring to breed, whereby nests are created in burrows, dug into sandy ground, often open areas including sandy banks and edges of roads and tracks (Johnstone & Storr, 1998). No birds were observed nesting during the current survey period, however, due to the presence of exposed areas and sandy track edges, particularly in the degraded parts of the study area, this species is likely to nest in the study area.

No sightings or foraging evidence of Carnaby's cockatoo were made during the current survey, however Carnaby's cockatoo are known to use the study area, with an observation of an individual using the Tuart trees along the southern edge of Lot 9905 (DBCA, 2023b), and many records exist from the surrounding area (DBCA, 2023b; BirdLife, 2023a). Carnaby's cockatoo is endemic to the south-west of Western Australia. They typically breed in the wheatbelt region of Western Australia, where nesting primarily occurs in smooth-barked Eucalypts but are also known to nest in Tuart, Jarrah, Marri and Flooded Gums. They then move westwards onto the Swan Coastal Plain after breeding (late-spring to mid-winter) into near coastal *Banksia* woodlands and pine plantations, including the southern Perth metropolitan area, with large flocks often seen. Important food sources include *Banksia attenuata, B. menziesii*, *B. grandis, B.ilicifolia, B. sessilis, B. prionotes,* Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*). The species however has suffered a substantial decline in the last 50 years, particularly through clearing and fragmentation of habitat, with the loss of breeding hollows, increase of hollow competitors (i.e. galahs & bees), and vehicle strikes contributing a large part. On the Swan Coastal Plain Carnaby's cockatoo have changed their migration and foraging patterns in response to ongoing habitat destruction and discovery of new food sources, with locations of roosting sites and foraging areas often changing from year to year. Carnaby's cockatoo has started breeding further south and west, including parts of the Darling Range and Swan Coastal Plain, however breeding records on the coastal plain are generally south of Baldivis (Johnstone et. al. 2011). The study area is of high importance for the species, containing suitable foraging habitat (Proteaceous shrubland, isolated stands of Eucalypts in the parklands, and scattered pine trees), as well as the potential for roosting and future breeding habitat.

The Forest red-tailed black cockatoo was not detected in the study area during the current survey and no records exist within the survey area. An observation was made nearby to the study area in adjacent residential housing, 150 metres south of the study area on Element Parade, where five individuals were observed feeding in the trees in the backyard of private property (see Map 9). Several additional records also exist nearby, including immediately to the west at Perlinte Park, Market Garden Swamps to the southeast and several records from Manning Park to the north (DBCA, 2023b; Birdlife, 2023a). The Forest red-tailed black cockatoo is endemic to the south-west corner of Western Australia where it

is distributed from Gingin in the north, to as far east as Brookton and south-east to Green Range, and throughout much of the remaining south-west. Although once common, it is now patchily distributed through this region and is regarded as rare on the Swan Coastal Plain, however recent changes in foraging ecology in the northern Darling Range has seen the species slowly expand out onto the sandplains to the south of Perth, which has been attributed to their discovery of the introduced Cape Lilac. This change in foraging ecology has since seen the establishment of roosting sites on the coastal plain, as well as a small number of breeding locations (Johnstone et. al. 2017). On the coastal plain it feeds a variety of plant seeds including Jarrah and Marri, Tuart or She-oak and Cape Lilac and will roost in any tall trees, but prefers Jarrah, Marri or Tuart, and breeding has been recorded in November to December (Johnstone et. al. 2011). The study area is of potential high importance for the species, containing suitable foraging habitat (*Eucalypt* trees and She-oaks) within parkland habitats, as well as the potential for roosting and future breeding habitat.

No other bird species of conservation significance were recorded during the current survey, though other species of conservation significance such as the Baudin's cockatoo (*Zanda baudini*), Fork-tailed swift (*Apus pacificus*) and Peregrine falcon (*Falco peregrinus*), may potentially use the study area.

Baudin's cockatoo is endemic to the south-west of Western Australia. It is primarily a resident of the deep south-west where it inhabits eucalypt forests, particularly Jarrah-Marri woodlands and Karri forests and forages widely throughout this habitat, with a preference for proteaceous trees and shrubs, particularly *Banksia* species. The species breeds during September to December in the deep south-west, where they prefer large, vertical tree hollows, and migrate northwards in the autumn where they move to the central and northern Darling Range and the adjacent far east of the Swan Coastal Plain (Johnstone et. al. 2011). Only a single record occurs nearby to the study site from Manning Park (Birdlife, 2023a) and this species is not likely to use the study area on a regular basis.

The Fork-tailed swift may also occasionally use the study area. A migratory species that breeds in Asia, it generally arrives in Australia in winter, where it is a regarded as a relatively common visitor. In Western Australia, the species begins to arrive in the Kimberley in late September, the Pilbara in November and the southwest by mid-December. It is considered uncommon to moderately common and the west coasts, but rare to scarce in the southwest. They respond to broad-scale weather pattern changes and are attracted to thunderstorms. They rarely come to ground, living almost exclusively in the air where they feed on aerial insects (Johnstone & Storr 1998). Few records are known locally, with the closest being from North Coogee, Woodman Point, and North and Bibra Lakes (Birdlife, 2023a; DBCA, 2023b), with the species rarely detected in the region.

The Peregrine falcon was recently recorded from Manning Park in May 2023 (Birdlife, 2023a), which represents the only nearby record to the study area. Several other records are also known from further afield at areas including Lake Coogee and Woodman Point, with the majority of sightings occurring along the eastern Beeliar Lake chain from North Lake south to Thomson's Lake (Birdlife, 2023a; DBCA, 2023b). This species is considered rare to scarce on the Swan Coastal Plain, however they are often associated with wooded watercourses and lakes, where they feed almost exclusively on birds (Johnstone & Storr, 1998), suitable habitat and food sources occur nearby (i.e. Manning Park) and the species may use the study area, possibly more frequently than the lack of observations suggest.

In addition, six species of bird were recorded during the survey that are considered of local conservation significance:

- New-holland honeyeater
- White-cheeked honeyeater
- White-browed scrubwren
- Western wattlebird
- Brown goshawk, and
- Splendid fairy-wren

The Variegated fairy-wren has also been recorded previously in the study area (Regen4 et. al. 2018, 2013).

Many of these species have decreased in abundance since European settlement, with many species declining due to land clearing, with some now completely absent from large parts of the Swan Coastal Plain, most only surviving due to the persistence of some urban remnants (Government of Western Australia, 2000). The confirmation of these bird species in the study area show some existing suitable level of habitat quality and/or connectivity, with almost all of these observations made in the areas of higher habitat within Lots 38, 9902 and 9905 (Map 10). Of note is the presence of the Variegated fairy-wren, which although was not detected during the current surveys, was detected during previous surveys (see Regen4 et. al. 2018, 2013). This species is uncommon on the Swan Coastal Plain to the south of Perth, where this represents its southern distributional limit where it doesn't generally occur more than 2km from the coast, and closely associated with *Acacia rostellifera* thickets (Johnstone & Storr, 2004). This habitat is poorly represented in the study area and may be an important stronghold for this species in the local area. Many of the locally significant species known from the study area occur in neighbouring bushland areas such as Manning Park and Coogee Beach Reserve (Birdlife, 2023b; FaunaTrack, 2019a), with the study area likely forming an important ecological linkage between these areas.

Table 6. Birds expected to occur, known to occur and/or recorded during the current survey.

Species		Conservation status				Likelihood	Lot Number			
		EPBC Act	BC Act	DBCA	Local		38	9902	9903	9905
Phasianidae (true quails)										
Brown Quail	*Coturnix ypsilophora*					Possible				
Stubble Quail	*Coturnix pectoralis*					Possible				
Columbidae (pigeons & doves)										
Rock Dove	*Columba livia*		*			Known				+
Spotted Dove	*Streptopelia chinensis*		*			Known				
Laughing Dove	*Streptopelia senegalensis*		*			Known	+	+		
Common Bronzewing	*Phaps chalcoptera*				L	Likely				
Crested Pigeon	*Ocyphaps lophotes*					Likely				
Cuculidae (cuckoos)										
Horsfield's Bronze-Cuckoo	*Chalcites basalis*					Likely				
Shining Bronze-Cuckoo	*Chalcites lucidus*					Likely				
Fan-tailed Cuckoo	*Cacomantis flabelliformis*					Likely				
Pallid Cuckoo	*Cacomantis pallidus*					Likely				
Podargidae (frogmouths)										
Tawny Frogmouth	*Podargus strigoides*					Likely				
Apododae (swifts & swiftlets)										
Fork-tailed Swift	*Apus pacificus*	MI/MA	MI			Possible				
Turnicidae (button-quails)										
Painted Button-quail	*Turnix varius*				L	Possible				
Laridae (gulls & terns)										
Silver Gull	*Chroicocephalus novaehollandiae*					Possible				
Pelicanidae (pelican)										
Australian Pelican	*Pelecanus conspicillatus*					Unlikely				
Ardeidae (bittern, egrets & herons)										
Nankeen Night-Heron	*Nycticorax caledonicus*				L	Possible				
White-faced Heron	*Egretta novaehollandiae*					Possible				
Threskiornithidae (ibis & spoonbills)										
Australian White Ibis	*Threskiornis moluccus*					Possible				
Straw-necked Ibis	*Threskiornis spinicollis*					Possible				
Accipitridae (eagles, harriers & kites)										

Species		Conservation status				Likelihood	Lot Number			
		EPBC Act	BC Act	DBCA	Local		38	9902	9903	9905
Black-shouldered Kite	*Elanus axillaris*					Likely				+
Square-tailed Kite	*Lophoictinia isura*				L	Possible				
Wedge-tailed Eagle	*Aquila audax*				L	Possible				
Little Eagle	*Hieraaetus morphnoides*				L	Likely				
Swamp Harrier	*Circus approximans*					Possible				
Brown Goshawk	*Accipiter fasciatus*				L	Likely				+
Collared Sparrowhawk	*Accipiter cirrocephalus*				L	Likely				
Whistling Kite	*Haliastur sphenurus*					Possible				
Tytonidae (barn owls)										
Barn Owl	*Tyto alba*					Likely				
Masked Owl (SW)	*Tyto n. novaehollandie*			P3		Unlikely				
Strigidae (hawk owls)										
Australian Boobook	*Ninox boobook*					Likely				
Barking Owl (SW)	*Ninox c. connivens*			P2		Unlikely				
Meropidae (bee-eaters)										
Rainbow Bee-eater	*Merops ornatus*	MA				Known	+	+	+	+
Halcyonidae (kingfishers)										
Sacred Kingfisher	*Todiramphus sanctus*					Possible				
Laughing Kookaburra	*Dacelo novaeguineae*		*			Likely				
Falconidae (falcons)										
Nankeen Kestrel	*Falco cenchroides*					Likely				+
Australian Hobby	*Falco longipennis*					Likely				
Brown Falcon	*Falco berigora*					Possible				
Peregrine Falcon	*Falco peregrinus*		S			Possible				
Cacatuidae (cockatoos & corellas)										
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	VU	VU			Likely				
Baudin's Cockatoo	*Zanda baudini*	EN	EN			Possible				
Carnaby's Cockatoo	*Zanda latirostris*	EN	EN			Known				
Galah	*Eolophus roseicapilla*					Likely	+	+		+
Western Corella	*Cacatua pastinator*					Possible				
Little Corella	*Cacatua sanguinea*					Likely				
Long-billed Corella	*Cacatua tenuirostris*					Possible				
Psittacidae (parrots)										
Regent Parrot	*Polytelis anthopeplus*					Unlikely				
Red-capped Parrot	*Purpureicephalus spurius*					Likely				
Western Rosella	*Platycercus icterotis*				L	Possible				
Australian Ringneck	*Barnardius zonarius*					Likely				
Elegant Parrot	*Neophema elegans*					Likely				
Rock Parrot	*Neophema petrophila*				L	Possible				
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*					Possible				
Rainbow Lorikeet	*Trichoglossus moluccanus*		*			Known	+		+	+
Maluridae (fairy-wrens)										
Splendid Fairy-wren	*Malurus splendens*				L	Likely		+		+
Variegated Fairy-wren	*Malurus lamberti*				L	Known				
Meliphagidae (honeyeaters)										
Brown Honeyeater	*Lichmera indistincta*					Known	+	+		
New Holland Honeyeater	*Phylidonyris novaehollandiae*				L	Likely	+			+

Species		Conservation status				Likelihood	Lot Number			
		EPBC Act	BC Act	DBCA	Local		38	9902	9903	9905
White-cheeked Honeyeater	*Phylidonyris niger*				L	Known		+		
Brown-headed Honeyeater	*Melithreptus brevirostris*					Unlikely				
White-naped Honeyeater	*Melithreptus lunatus*				L	Possible				
Tawny-crowned Honeyeater	*Glyciphila melanops*				L	Possible				
Western Spinebill	*Acanthorhynchus superciliosus*					Possible				
White-fronted Chat	*Epthianura albifrons*					Possible				
Western Wattlebird	*Anthochaera lunulata*				L	Likely	+			
Red Wattlebird	*Anthochaera carunculata*					Known	+			
Yellow-throated Minor	*Manorina flavigula*				L	Unlikely				
Yellow-plumed Honeyeater	*Ptilotula ornata*					Unlikely				
Singing Honeyeater	*Gavicalis virescens*					Known	+	+	+	+
Pardalotidae (pardalotes & thornbills)										
Spotted Pardalote	*Pardalotus punctatus*					Likely				
Striated Pardalote	*Pardalotus striatus*					Likely				+
Western Gerygone	*Gerygone fusca*					Known		+		
Weebill	*Smicrornis brevirostris*				L	Likely				
White-browed Scrub-wren	*Sericornis frontalis*				L	Known		+		
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*				L	Likely				
Inland Thornbill	*Acanthiza apicalis*				L	Likely				
Western Thornbill	*Acanthiza inornata*				L	Possible				
Varied Sittella	*Daphoenositta chrysoptera*				L	Possible				
Campephagidae (cuckoo-shrikes)										
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*					Known	+	+		
White-winged Triller	*Lalage tricolor*					Possible				
Pachycephalidae (whistlers)										
Rufous Whistler	*Pachycephala rufiventris*					Known		+		
Western Golden Whistler	*Pachycephala occidentalis*				L	Possible				
Grey Shrike-thrush	*Colluricincla harmonica*				L	Likely				
Artamidae (woodswallows & magpies)										
Grey Currawong	*Strepera versicolor*				L	Unlikely				
Australian Magpie	*Gymnorhina tibicen*					Known	+	+		+
Pied Butcherbird	*Cracticus nigrogularis*					Possible				
Grey Butcherbird	*Cracticus torquatus*					Known				+
Black-faced woodswallow	*Artamus cinereus*				L	Possible				
Dusky Woodswallow	*Artamus cyanopterus*				L	Possible				
Corvidae (ravens & crows)										
Little Crow	*Corvus bennetti*					Unlikely				
Australian Raven	*Corvus coronoides*					Known	+	+	+	
Dicruidae (fantails & flycatchers)										
Magpie-lark	*Grallina cyanoleuca*					Known	+			
Willie Wagtail	*Rhipidura leucophrys*					Known	+			+
Grey Fantail	*Rhipidura fuliginosa*					Known				
Petroicidae (robins)										
Scarlet Robin	*Petroica multicolor*				L	Possible				
Red-capped Robin	*Petroica goodenovii*					Likely				
Hooded Robin	*Melanodryas cucullata*					Unlikely				

Species		Conservation status				Likelihood	Lot Number			
		EPBC Act	BC Act	DBCA	Local		38	9902	9903	9905
Jacky Winter	*Microeca fascinans*					Unlikely				
Mistletoebird	*Dicaeum hirundinaceum*					Likely				
Motacillidae (pipits)										
Australasian Pipit	*Anthus novaeseelandiae*					Likely				
Hirundinidae (swallows & martins)										
Fairy Martin	*Petrochelidon ariel*					Possible				
Tree Martin	*Petrochelidon nigricans*					Likely	+			+
Welcome Swallow	*Hirundo neoxena*					Likely				
Zosteropidae (white-eyes)										
Silvereye	*Zosterops lateralis*					Known	+	+	+	+
Species expected	**104**						16	14	5	16
Species recorded during 2023	**28**									

+ = Species recorded during the 2023 survey
*** = Introduced species**
EN = Endangered (EPBC and/or BC Act)
VU = Vulnerable (EPBC and/or BC Act)
MI = Migratory species (EPBC and/or BC Act)
MA = Marine species (EPBC Act)
S = Specially Protected (BC Act)
P2 = Priority 2 (DBCA)
P3 = Priority 3 (DBCA)
L = Locally significant due to a reduced distribution and/or population on the Swan Coastal Plain (Government of WA 2000)

3.4.5 Invertebrates

Two conservation significant invertebrate species have the potential to occur within the study area, the Priority 3 Swan Coastal Plain Shied-backed trapdoor spider (*Idiosoma sigillatum*) and the Priority 3 Graceful sun-moth (*Synemon gratiosa*), however no detections of either species were made during the survey period.

The Swan Coastal Plain Shied-backed trapdoor spider is widely distribution along the Swan Coastal Plain, where it is known to occur from Dalyellup in the south to at least Ledge Point in the north and across to the foothills of the Darling Escarpment. It is also known from Rottnest and Garden Islands. Once widespread throughout the Perth region, it is now restricted to remnant bushland areas, where it inhabits *Banksia* woodlands and heath on sandy soils. It is now locally extinct throughout much of its former range due to land clearing (Rix et al 2018). Recent records (2019) exist within 5km including Spearwood and Beeliar (DBCA, 2023b) and this species may occur on in the study site. Searching for burrows during the wetter parts of the years within suitable habitat is the most effective way of surveying for Shield-back trapdoor spiders, and pit-traps placed around vegetation in suitable habitats during May-July may be used to catch wandering males, when activity is known to peak in May corresponding to the first winter rains (Rix et. al. 2018). Further surveys during late autumn to winter may help to determine the presence of the Swan Coastal Plain Shied-backed trapdoor spider within the study area.

The Graceful sun-moth is widely distributed along the Swan Coastal Plain from Nambung National Park in the north through to Mandurah in the south. It strictly associated two habitat types: Coastal heathland on Quindalup dunes, where is occurs on sand dunes supporting the host plant *Lomandra maritima*, and *Banksia* woodlands on Spearwood and Bassendean dunes which support the host plant *Lomandra hermaphrodita*. Adults breed once and only during February to April, with a very short flight time of one to two weeks and may only fly in suitable weather conditions. Sites in limestone may have both *Lomandra hermaphrodita* and *L. maritima* present and can often comprise the dominant understorey herb in these habitats (Bishop et. al. 2010). The study area has the potential to support populations of the Graceful sun-moth, with several known localities within 5km, including *Banksia* woodland at Sir Frederick Sampson Park in Samson, and Forrest Road in Bibra Lake (DBCA, 2023b). The host plant *Lomandra maritima* has been recorded from the study area, with plants known to occur in the Closed Heath supporting *Melaleuca huegelii*, *Templetonia retusa* and *Banksia sessilis* around the Rotary Lookout area of Lot 38 (see Regen4 et al. 2018, 2013). Few plants were detected and the habitat is not considered large enough to sustain a population of the moth (Regen4 et. al. 2018, 2013). Targeted surveys searching for live moths during February to April may help to determine the presence of the Graceful sun-moth within the area.

4. Significant outcomes and fauna values

The current Basic Fauna and Fauna Assemblages survey, including the incorporation of results of previous surveys (Regen4 et. al. 2018, 2013) of Lots 38 King Road, and Lots 9902, 9903, and 9905 Cockburn Road resulted in the following key findings:

- The conservation significant Carnaby's cockatoo, Rainbow bee-eater, Quenda and Perth lined slider, as well as the locally significant Western bluetongue and several bush birds were all confirmed to occur within the study area.
- Three fauna habitats were identified on site, including proteaceous shrublands and heath, with up to 16% of the study area comprising habitat of 'Good' condition.
- The remaining study area has been disturbed and/or severely degraded, including the establishment of large woody weed infestations and grassland habitats, and/or improved parkland habitats.
- Significant, areas of high-quality foraging habitat for Carnaby's cockatoo exist with Lot 9902 and parts of Lot 38 and 9905. Disturbed habitats within the remaining lots also contain some foraging habitat but are generally of much lower quality.
- Numerous large trees occur within the parkland habitats of Lot 38 and Lot 9905, providing potential future nesting habitat for the Forest red-tail black cockatoo, potential roosting habitat for black cockatoo species and important foraging resources for Carnaby's and Forest red-tailed black cockatoos.
- The study area forms a key part of a regional ecological linkage, connecting nearby bushland areas such as Manning Park and Coogee Beach, while the higher quality native shrubland habitats, as well as areas of significant woody weed infestations currently provide, or potentially provide important cover and habitat connectivity for Quenda, Perth lined slider and a range of locally significant reptile and bird species, as well as semi-connected habitat corridors throughout the study area.
- Open sandy areas and track edges may potentially provide nesting habitat for the Rainbow bee-eater.
- Up to seven species of locally significant bushland bird are known from the site, which rely of key habitat features such as dense shrublands and habitat connectivity.

In addition, numerous conservation significant species also have the potential to occur within or close by to the study area, including:

- Baudin's cockatoo
- Forest red-tailed black cockatoo
- Peregrine falcon
- Fork-tailed swift, and
- Black striped snake

The study indicated that the survey area is unlikely to provide nesting habitat for Baudin's or Carnaby's cockatoo, however the scattered Eucalypt species within the parkland environments may provide potential future nesting for Forest red-tailed black cockatoos if they were to develop suitable hollows, as well as potential roosting habitat. If the development of the site impacts on any potential future nesting trees or more than 1ha of foraging habitat for Black cockatoo species, proposals should be referred to the Federal Government for formal assessment under the Commonwealth EPBC Act 1999.

5. Discussion of potential impacts to fauna

The current state of the study area presents a highly disturbed and, in some parts, highly degraded landscape, with only relatively small, largely separated areas of higher quality fauna habitats remaining. Three priority areas of habitat protection have been identified by Regen4 et. al. (2018, 2013). These areas remain of high conservation value and protection of these areas should be considered to help minimise any further impacts to areas of higher quality and significant fauna species.

In addition, some areas such as the disturbed areas to the west of Lot 9905 were found to contain Quenda and Perth lined slider during the current survey, as well as the Western bluetongue and Splendid fairy-wren in additional disturbed areas. It is also highly likely that both Quenda and Perth lined slider, occur throughout the entire study area, particularly where dense vegetation and/or sandy soils and leaf litter persist. These areas may warrant or require future protection or careful management, including potential trapping and relocation programs, if future developments were to impact on these locations.

The largest threats currently facing the fauna occurring within the study area include habitat condition, extent, and fragmentation, weed infestations and feral animals. A range of additional threats also become apparent when considering developments of areas such as these, the most significant being:

- Further loss of habitat, particularly black cockatoo breeding, roosting and foraging habitats.
- Increased habitat degradation and fragmentation, including higher weed infestations and feral animal activity, and increased exposure to extreme weather conditions (i.e. hotter, drier summers).
- Direct mortality during the development process, and
- New and ongoing disturbances such as machinery, lights and increased human activity associated with the development and related infrastructure, including road mortalities.

To reduce potential environmental impacts during development, the following advice and recommendations may help in the future planning and development of the site. These recommendations strongly support those previously suggested (see Regen4 et. al. 2018, 2013) and include:

- Retaining Priority habitat areas, which will greatly reduce significant habitat loss (refer to Regen4 et. al. 2018. 2013).
- Revegetating and landscaping degraded areas.
- Minimising clearing of vegetation and clearing in a progressive fashion towards existing bushland.
- Impacts may also be minimised by avoiding clearing activities in late winter and spring when young birds are in nests, while also avoiding the summer months when Rainbow bee-eaters may be nesting in open sandy clearings.
- Avoid positioning high activity centres and areas of substantial lighting such as the clubhouse facilities and car-parking facilities, tennis courts and pitch and putt areas, nearby to any of the high priority fauna habitats, particularly the Parrot-bush thickets of 9902.
- Traffic management along Ocean Road. Increased vehicle traffic along this stretch of road has a high likelihood to increase road mortalities of local wildlife. The installation of speed management techniques such as speed bumps and chicanes, road signage and appropriate speed limits should be considered. Fauna underpasses may also be of consideration and may be included during the planning stages, particularly in conjunction with pedestrian crossings.
- The provision of additional habitat connectivity. This may include to the north into Lot 9009 and also Manning Park, the southwest into Coogee Beach Reserve, and east through Galipo Park, Santorini Park, Kooboolong Park, Dalmatia park and through to the Market Garden Swamps.

- Avoidance of any major barrier fencing or netting. Golf courses often incorporate tall barrier fences and/or netting, particularly in conjunction with driving ranges. This is essentially to stop wayward golf balls landing on adjacent properties, including roads and houses. Tall barricades may have negative consequences for birds during flight, particularly black cockatoo species, as well as netting that can trap and entangle wildlife such as Bobtail lizards and dugites.
- Additionally, the large tea-infestations occurring throughout the study site currently offer significant cover for a range of species. This habitat is of additional importance due to the level of cover (including shade) it provides, particularly during the hotter months. This however may also result in hotter, more intense fires and may require careful management if kept. If future developments plan to remove these thickets, they should be done in stages, ensuring to replace with suitable habitat features to provide replacement cover.

In addition, the following management actions should be considered as part of the longer-term management of the site:

- Future surveys incorporating targeted trapping and/or motion camera surveys, particularly those of longer duration to monitor significant species or to help detect a greater diversity of species. This may also include establishing a long term monitoring program for particular species, such as regular bird surveys and/or Quenda monitoring will be an important aspect of future management.
- Feral animal management is also crucial, in particular cats. Due to the proximity of the study area to residential dwellings, domestic cats were observed during the current survey. Regulatory options and practices should be considered and implemented to help mitigate the potential negative effects cats may be having on fauna. This could include imposing restrictions on the number of cats allowed to be kept, imposing cat curfew restrictions, or introducing cat confinement rules. Regular and effective fox and rabbit management within the study area should also be included in future management plans.

Conversely, the establishment of a facility such as a golf complex (providing existing patches of native vegetation are protected and managed) may in fact benefit some fauna species occurring in the site. Much of the site is currently weed infested, and is also subject to a range of other localised impacts such as rubbish dumping and damage to bushland caused by local kids such as cubby house structures (Figure 7). Ensuring key habitats were protected, along with establishing connecting corridors and effective landscaping, as well as managing weeds, pests and rubbish dumping will help to conserve many species occurring in the area. The development of additional features to the landscape such as dams (or wetlands) and watering points as part of the golf course design may also benefit local species, particularly birds and frogs. This may contribute a significant feature, particularly as a drinking water source for Black cockatoo species, which is increasingly important due to the potential of hotter, drier climates.

In addition, the use local fauna (European and/or indigenous) names and information as part of the golf course as well as signage and educational programs may help to highlight the significance of local fauna of the area, educating local residents and users of the Golf Complex of the need to manage and protect the local environment and the species it supports.



Figure 7. (a) Weed infestations, predominantly lawn grass clippings and garden weeds, dumped on the boundary to residential properties of Lot 9905; (b) One of several clearings and associated rubbish within the study area currently used as cubby house and campsites (including unsanctioned fireplaces), possibly by local kids; (c) Current developments underway along the eastern boundary of the study area; (d) Extensive weedy grasslands along and around the powerline corridor within Lots 9902 and 9903.

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APPENDIX 1. All species detected within the study area during the current survey.

Date	Common Name	Taxon Name	Type	Lat	Long
11/10/2023	Splendid fairy-wren		Sighting	-32.108608	115.771027
11/10/2023	White-cheeked honeyeater		Sighting	-32.108509	115.768341
11/10/2023		*Felis catus*	Sighting	-32.109047	115.772263
11/10/2023		*Lerista lineata*	Sighting	-32.10915	115.770821
11/10/2023		*Lerista lineata*	Sighting	-32.10836	115.766342
11/10/2023		*Pogona minor*	Sighting	-32.102196	115.767952
12/10/2023	Brown goshawk		Sighting	-32.102951	115.768539
12/10/2023	Rainbow bee-eater		Sighting	-32.102951	115.768539
12/10/2023		*Oryctolagus cuniculus*	Scat	-32.103317	115.768509
12/10/2023		*Vulpes vulpes*	Sighting	-32.108715	115.769905
12/10/2023		*Ctenotus fallens*	Sighting	-32.102951	115.768539
12/10/2023		*Pseudonaja affinis*	Sighting	-32.103245	115.768181
12/10/2023		*Tiliqua occipitalis*	Sighting	-32.103237	115.768181
12/10/2023		*Tiliqua rugosa*	Sighting	-32.106369	115.767662
12/10/2023		*Tiliqua rugosa*	Sighting	-32.107723	115.768654
18/10/2023		*Felis catus*	Motion camera	-32.110083	115.769872
18/10/2023		*Felis catus*	Motion camera	-32.108543	115.771287
18/10/2023		*Isoodon fusciventer*	Motion camera	-32.107022	115.767892
18/10/2023		*Isoodon fusciventer*	Motion camera	-32.101668	115.768427
18/10/2023		*Isoodon fusciventer*	Motion camera	-32.108573	115.768232
18/10/2023		*Isoodon fusciventer*	Motion camera	-32.110083	115.769872
18/10/2023		*Isoodon fusciventer*	Motion camera	-32.108543	115.771287
18/10/2023		*Oryctolagus cuniculus*	Motion camera	-32.101668	115.768427
18/10/2023		*Rattus rattus*	Motion camera	-32.108573	115.768232
18/10/2023		*Tiliqua occipitalis*	Motion camera	-32.107022	115.767892
18/10/2023		*Tiliqua rugosa*	Motion camera	-32.107022	115.767892
18/10/2023		*Tiliqua rugosa*	Motion camera	-32.105423	115.768673
18/10/2023		*Tiliqua rugosa*	Motion camera	-32.108573	115.768232
18/10/2023		*Tiliqua rugosa*	Motion camera	-32.110083	115.769872
18/10/2023		*Tiliqua rugosa*	Motion camera	-32.108543	115.771287
7/11/2023	Australian Kestrel		Sighting	-32.107804	115.767603
7/11/2023	Australian Magpie		Sighting	-32.110431	115.770553
7/11/2023	Australian Magpie		Sighting	-32.109349	115.766519
7/11/2023	Australian Magpie		Sighting	-32.10304	115.769609
7/11/2023	Australian Raven		Sighting	-32.110431	115.770553
7/11/2023	Australian Raven		Sighting	-32.10304	115.769609
7/11/2023	Australian Raven		Sighting	-32.104014	115.769663
7/11/2023	Black-faced Cuckoo Shrike		Sighting	-32.110431	115.770553
7/11/2023	Black-faced Cuckoo Shrike		Sighting	-32.10304	115.769609
7/11/2023	Brown goshawk		Sighting	-32.107948	115.768845
7/11/2023	Brown Goshawk		Sighting	-32.107948	115.768845
7/11/2023	Brown Honeyeater		Sighting	-32.110376	115.769781
7/11/2023	Brown Honeyeater		Sighting	-32.101059	115.768364
7/11/2023	Feral Pigeon		Sighting	-32.109349	115.766519
7/11/2023	Galah		Sighting	-32.110431	115.770553
7/11/2023	Galah		Sighting	-32.109349	115.766519
7/11/2023	Galah		Sighting	-32.10304	115.769609
7/11/2023	Laughing Dove		Sighting	-32.110431	115.770553
7/11/2023	Laughing Dove		Sighting	-32.10304	115.769609

Date	Common Name	Taxon Name	Type	Lat	Long
7/11/2023	Magpie-lark		Sighting	-32.110431	115.770553
7/11/2023	New-holland Honeyeater		Sighting	-32.110376	115.769781
7/11/2023	New-holland Honeyeater		Sighting	-32.108413	115.770156
7/11/2023	Rainbow bee-eater		Sighting	-32.109585	115.769218
7/11/2023	Rainbow bee-eater		Sighting	-32.108261	115.770363
7/11/2023	Rainbow bee-eater		Sighting	-32.109844	115.771011
7/11/2023	Rainbow bee-eater		Sighting	-32.10104	115.769257
7/11/2023	Rainbow bee-eater		Sighting	-32.10508	115.769043
7/11/2023	Rainbow Bee-eater		Sighting	-32.110267	115.771025
7/11/2023	Rainbow Bee-eater		Sighting	-32.10974	115.772141
7/11/2023	Rainbow Bee-eater		Sighting	-32.103197	115.769271
7/11/2023	Rainbow Bee-eater		Sighting	-32.103682	115.769614
7/11/2023	Rainbow Lorikeet		Sighting	-32.110431	115.770553
7/11/2023	Rainbow Lorikeet		Sighting	-32.109349	115.766519
7/11/2023	Rainbow Lorikeet		Sighting	-32.105144	115.769325
7/11/2023	Red Wattlebird		Sighting	-32.110431	115.770553
7/11/2023	Rufous Whistler		Sighting	-32.102218	115.769577
7/11/2023	Silvereye		Sighting	-32.110325	115.770231
7/11/2023	Silvereye		Sighting	-32.10874	115.76697
7/11/2023	Silvereye		Sighting	-32.10304	115.769609
7/11/2023	Silvereye		Sighting	-32.104014	115.769663
7/11/2023	Singing Honeyeater		Sighting	-32.110376	115.769781
7/11/2023	Singing Honeyeater		Sighting	-32.108577	115.768751
7/11/2023	Singing Honeyeater		Sighting	-32.101059	115.768364
7/11/2023	Singing Honeyeater		Sighting	-32.105174	115.769644
7/11/2023	Splendid fairy-wren		Sighting	-32.109585	115.769218
7/11/2023	Splendid fairy-wren		Sighting	-32.108574	115.765823
7/11/2023	Splendid fairy-wren		Sighting	-32.108261	115.770363
7/11/2023	Splendid Fairy-wren		Sighting	-32.108441	115.770424
7/11/2023	Splendid Fairy-wren		Sighting	-32.101336	115.769233
7/11/2023	Spotted Dove		Sighting	-32.109349	115.766519
7/11/2023	Striated Pardalote		Sighting	-32.10934	115.769062
7/11/2023	Tree Martin		Sighting	-32.110267	115.771025
7/11/2023	Tree Martin		Sighting	-32.107804	115.767603
7/11/2023	Western Gerygone		Sighting	-32.102218	115.769577
7/11/2023	Western Wattlebird		Sighting	-32.110376	115.769781
7/11/2023	White-browed scrub wren		Sighting	-32.101318	115.769043
7/11/2023	White-browed scrub wren		Sighting	-32.101336	115.769233
7/11/2023	white-cheeked honeyeater		Sighting	-32.101273	115.768227
7/11/2023	White-cheeked Honeyeater		Sighting	-32.101399	115.768209
7/11/2023	Willie Wagtail		Sighting	-32.110431	115.770553
7/11/2023	Willie Wagtail		Sighting	-32.109349	115.766519
7/11/2023		*Isoodon fusciventer*	Digging	-32.101238	115.768913
7/11/2023		*Mus musculus*	Sighting	-32.103249	115.768181
7/11/2023		*Oryctolagus cuniculus*	Burrow	-32.103569	115.768898
7/11/2023		*Oryctolagus cuniculus*	Scat	-32.101524	115.768486
7/11/2023		*Ctenotus fallens*	Sighting	-32.10561	115.767548
9/11/2023	Black-shouldered kite		Sighting	-32.108665	115.768036
9/11/2023	Brown goshawk		Sighting	-32.110157	115.769775
9/11/2023	Common bronzewing		Sighting	-32.105118	115.768997

Date	Common Name	Taxon Name	Type	Lat	Long
9/11/2023	Grey butcherbird		Sighting	-32.106583	115.767532
9/11/2023	Rainbow bee-eater		Sighting	-32.103325	115.769661
9/11/2023	Red-tailed Black-cockatoo		Sighting	-32.112462	115.770673
9/11/2023	Rufous whistler		Sighting	-32.105465	115.76976
9/11/2023	Splendid fairy-wren		Sighting	-32.107594	115.769676
9/11/2023	White-browed scrub wren		Sighting	-32.105091	115.769485
9/11/2023		*Isoodon fusciventer*	Digging	-32.109779	115.769463
9/11/2023		*Oryctolagus cuniculus*	Burrow	-32.106503	115.768425
9/11/2023		*Oryctolagus cuniculus*	Burrow	-32.10186	115.76976
9/11/2023		*Oryctolagus cuniculus*	Burrow	-32.104408	115.769203
9/11/2023		*Morethia obscura*	Sighting	-32.106762	115.767807
9/11/2023		*Pseudonaja affinis*	Sighting	-32.101559	115.769272

APPENDIX 2: Habitat and disturbance characteristics identified during fauna habitat assessment of the study area.

#	Location		Habitat	Landform	Aspect	Slope	Soil	Soil availability	Rocks		Leaf litter	Woody debris	Veg structure	Disturbances	Condition	Key flora/weed Species identified
	Lat	Long							Type	Size						
1	-32.1105	115.7704	parkland	Hillslope	E	Moderate	Sand	Scarce					Tree > 5m; Grass;	C, W, T	Completely degraded	
2	-32.1103	115.7717	parkland	Hillslope	E	Low	Sand	Scarce					Tree > 5m; Grass;	C, W, T	Completely degraded	
3	-32.1108	115.7694	parkland	Hillcrest/upper slope	W	Moderate	Sand	Scarce	Limestone	Large rocks	Few small patches	Scarce	Tree > 5m; Shrub >1m; Grass;	C, W, T	Completely degraded	
4	-32.1102	115.7697	shrubland	Hillcrest/upper slope	N	Low	Sand	Scarce	Limestone	Large rocks	Many small patches	Many small patches	Shrub >1m; Shrub <1m; Herb; Grass;	W	Good	
5	-32.1097	115.7696	shrubland	Hillcrest/upper slope	N	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Many small patches	Shrub >1m; Grass;	W	Good	*Banksia sessilis*
6	-32.1085	115.7691	shrubland	Hillslope	SW	Low	Sand	Few Large Patches	Limestone	Large rocks	Few large patches	Scarce	Shrub <1m; Grass;		Completely degraded	Tea-tree
7	-32.1085	115.7682	shrubland	Hillcrest/upper slope	N	Low	Sand	Few Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Herb; Grass;		Good	
8	-32.1094	115.7667	parkland	Hillslope	S	Moderate	Sand	Scarce			Scarce	Scarce	Tree > 5m; Grass;	C, W, T	Completely degraded	
9	-32.1091	115.7665	parkland	Hillslope	S	Low	Sand	Few Small Patches			Evenly Spread	Many large patches	Tree > 5m; Shrub >1m;	C, W, T	Good	
10	-32.1096	115.7659	cleared	Hillslope	S	Low	Sand	Many Small Patches			Scarce	Few small patches	Grass;		Completely degraded	
11	-32.1094	115.7653	shrubland	Hillslope	E	Low	Sand	Few Small Patches			Evenly Spread	Few large patches	Shrub >1m; Grass;		Good	*Acacia rostellifera*
12	-32.1087	115.7658	shrubland	Hillcrest/upper slope	SW	Low	Sand	Few Small Patches	Limestone	Large rocks	Many large patches	Many small patches	Shrub >1m; Shrub <1m; Grass;	W, T	Disturbed	Tea-tree
13	-32.1079	115.7665	shrubland	Hillslope	W	Low	Sand	Few Small Patches	Limestone	Large rocks	Many large patches	Many small patches	Shrub >1m; Shrub <1m; Grass;	C, W	Disturbed	*Banksia sessilis* Tea-tree
14	-32.1079	115.7678	cleared area	Hillslope	W	Low	Sand	Scarce			Many large patches	Scarce	Shrub >1m; Grass;	F, C, W	Completely degraded	
15	-32.1072	115.768	shrubland	Hillcrest/upper slope	SE	Low	Sand	Few Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Grass;	C, W	Disturbed	Tea-tree
16	-32.1065	115.7674	cleared	Hillslope	SE	Low	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Grass;	C, W, T	Completely degraded	Tea-tree
17	-32.1065	115.7684	disturbed	Hillslope	SE	Low	Sand	Many Small Patches	Limestone	Large rocks	Evenly Spread	Many large patches	Tree 2 to 5m;	F, C, W, T	Completely degraded	Tea-tree
18	-32.1076	115.7689	shrubland	Hillcrest/upper slope	S	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Grass;	C, W	Disturbed	Tea-tree
19	-32.1076	115.7697	disturbed	Hillslope	E	Low	Sand	Many Small Patches	Limestone	Large rocks	Few large patches	Few small patches	Tree 2 to 5m; Tree < 2m; Grass;	F, C, W	Completely degraded	Tea-tree
20	-32.1086	115.7707	shrubland	Hillcrest/upper slope	N	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Herb; Grass;	W	Good	
21	-32.1083	115.7714	shrubland	Hillslope	N	Steep	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub <1m; Herb; Grass;	W	Good	
22	-32.1084	115.7717	shrubland	Hillslope	N	Steep	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Grass;	W	Good	*Acacia rostellifera*
23	-32.1088	115.7723	shrubland	Hillcrest/upper slope	N	Steep	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Many small patches	Shrub >1m; Shrub <1m; Grass;	F, C, W	Good	
24	-32.1091	115.772	shrubland	Hillcrest/upper slope	S	Moderate	Sand	Many Small Patches	Limestone	Small rocks	Many small patches	Many large patches	Shrub >1m; Shrub <1m; Grass;	W, T	Good	*Banksia sessilis*
25	-32.109	115.7701	cleared/degraded	Hillslope	NW	Low	Sand	Many Small Patches			Few large patches	Scarce	Tree 2 to 5m; Shrub >1m;	F, C, W, T	Completely degraded	*Banksia sessilis* Tea-tree
26	-32.1091	115.7714	shrubland	Hillslope	NW	Low	Sand	Many Large Patches			Many large patches	Few large patches	Tree 2 to 5m; Shrub >1m;	F, C, W, T	Disturbed	*Banksia sessilis* Tea-tree
27	-32.1032	115.7696	cleared	Hillslope	SE	Low	Sand	Few Small Patches	Limestone	Large rocks	Scarce	Scarce	Grass;	C, W, T	Completely degraded	
28	-32.1025	115.7697	shrubland	Hillslope	E	Low	Sand	Few Small Patches			Many large patches	Many large patches	Tree < 2m; Shrub >1m;	F, W	Disturbed	*Banksia sessilis* Tea-tree
29	-32.1016	115.7693	shrubland	Hillslope	SE	Low	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few large patches	Shrub >1m; Grass;	F, C, W	Good	*Banksia sessilis*

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#	Location		Habitat	Landform	Aspect	Slope	Soil	Soil availability	Rocks		Leaf litter	Woody debris	Veg structure	Disturbances	Condition	Key flora/weed Species identified
	Lat	Long							Type	Size						
30	-32.1011	115.7684	shrubland	Hillslope	N	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Herb; Grass;	F, C, W	Good	*Banksia sessilis & Hakea sp.*
31	-32.1015	115.7685	shrubland	Hillcrest/upper slope	SE	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Shrub <1m; Grass;	F, C, W	Good	*Banksia sessilis & Acacia rostellifera*
32	-32.1026	115.7687	shrubland	Hillslope	NE	Moderate	Sand	Few Small Patches			Many small patches	Few small patches	Shrub >1m; Shrub <1m; Grass;	F, C, W	Good	*Banksia sessilis*
33	-32.103	115.7683	shrubland	Hillcrest/upper slope	SE	Moderate	Sand	Few Small Patches	Limestone	Large rocks	Many small patches	Scarce	Shrub >1m; Shrub <1m; Grass;	F, C, W	Good	
34	-32.104	115.7684	cleared	Hillslope	E	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Scarce	Scarce	Grass;	F, C, W	Completely degraded	Tea-tree
35	-32.105	115.768	shrubland	Hillcrest/upper slope	NW	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Few small patches	Scarce	Shrub <1m; Grass;	C, W	Completely degraded	Tea-tree
36	-32.1058	115.7685	degraded	Hillcrest/upper slope	W	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many large patches	Few large patches	Tree 2 to 5m; Grass;	C, W, T	Completely degraded	Tea-tree
37	-32.1054	115.7686	shrubland	Hillcrest/upper slope	NE	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many large patches	Few small patches	Shrub >1m; Shrub <1m;	W	Disturbed	*Banksia sessilis* Tea-tree
38	-32.1052	115.769	shrubland	Hillslope	NE	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many large patches	Many large patches	Shrub >1m;	W	Good	*Acacia rostellifera* Tea-tree
39	-32.1058	115.7697	shrubland	Hillslope	E	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Shrub >1m; Grass;	W	Disturbed	Tea-tree
40	-32.1044	115.7692	degraded	Hillslope	NE	Moderate	Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Few small patches	Tree 2 to 5m; Tree < 2m; Grass;	F, C, W	Completely degraded	Tea-tree
41	-32.109	115.7726	shrubland	Hillcrest/upper slope	E	Steep	Loamy Sand	Many Small Patches	Limestone	Large rocks	Many small patches	Many small patches	Shrub >1m; Shrub <1m;	F, W	Good	

F = Feral animals, C = Cleared areas, W = Weed infestations, T = Tracks and paths

APPENDIX 3: Conservation significant fauna (including locally significant fauna) known to occur within 5km of the study area (excluding marine, wetland and migratory bird species), with conservation code listing, preferred habitat and/or ecology and location of nearby records.

Species	Commonwealth (EPBC Act) Status	Western Australia (BC Act/DBCA/local) Status	Habitat/Ecology	Nearby records
Baudin's Cockatoo *Zanda baudini*	Endangered	Endangered	Woodlands and forest (Karri, Marri, Jarrah, Wandoo, Bullich & Tuart). Uncommon on SCP, though may breed in the south. Roosts near water, particularly riparian habitats. Feeds on Marri, proteaceous shrubs as well as non-native species (pines) also insects and their larvae (DAEE, 2022).	Few nearby. Manning Park
Carnaby's Cockatoo *Zanda latirostris*	Endangered	Endangered	Common along the SCP. Can forage all year round. Breeds in tree hollows, generally tuart, jarrah & marri but rarely on SCP. Roosts near water, particularly riparian habitats. Forages on proteaceous woodlands and heath, riparian vegetation and some introduced species (pines) (DAEE, 2022)	Known. Many nearby. Manning Park, Coogee
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	Vulnerable	Vulnerable	Woodlands of Darling Range. Becoming more common on the SCP. May breed where suitable large, suitable tree species occur (i.e. hollow-bearing Marri, Jarrah & Tuart). Will roost in any tall trees, prefers Jarrah, Marri, Blackbutt or Tuart. Feeds on Jarrah & Marri, Tuart or She-oak and also Cape Lilac. (Johnstone et al 2011)	Several nearby. Manning Park, Coogee
Fork-tailed Swift *Apus pacificus*	Migratory/Marine	Migratory	Non-breeding visitor to Australia, but rare in Western Australia. Almost entirely restricted to flying, mainly in open spaces though will occasionally fly over forests and cities (Pizzey & Knight 1998)	Few nearby. Woodman Pt. Nth Coogee
Rainbow Bee-eater *Merops ornatus*	Marine		Open forests, woodlands and shrublands. Nests in open sandy areas and track edges (Johnstone & Storr, 1998)	Known. Many nearby. Manning Park, Coogee
Peregrine Falcon *Falco peregrinus*		Specially protected	Scarce on the SCP. Inhabits tall forest and woodland, and cliffs along the coast, breeding on rock ledges, granite outcrops and quarries (Johnstone & Storr 1998)	Several nearby. Manning Park, Lake Coogee, Woodman Pt.
Barking Owl (SW) *Ninox c. connivens*		Priority 3	Dense vegetation, particularly forest, thickets and waterside *Melaleuca* (Johnstone & Storr 1998). Declining in the SW (Johnstone & Storr 1998). Thought to be locally extinct on SCP (Government of WA, 2000)	Few nearby. Coogee
Australian Masked Owl (SW) *Tyto n. novaehollandiae*		Priority 3	Forests and woodlands. Locally common in the deep south-west but generally uncommon elsewhere (Johnstone & Storr 1998)	Few nearby. Munster & Henderson
Western Ringtail Possum *Pseudocheirus occidentalis*	Critically Endangered	Critically Endangered	Coastal areas south of Bunbury in woodlands and forest dominated by Peppermints (*Agonis flexuosa*), including some inland areas of Jarrah, Marri & Wandoo forest (De Tores, 2008a)	Locally extinct
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Dry woodlands, sclerophyll forests, heath and mallee shrublands (Serena & Soderquist, 2008)	None nearby. No recent records from local area
Quokka *Setonix brachyurus*	Vulnerable	Vulnerable	Formerly occurring throughout much of the SW, now largely confined to Rottnest Island and a few mainland localities, it is thought to be locally extinct from much of the SCP (De Tores, 2008b)	Locally extinct
Western False Pipistrelle *Falsistrellus mackenziei*		Priority 4	Mainly occurs in the Karri, Jarrah and Tuart forests of higher rainfall areas of the southwest, but known to inhabit *Banksia* woodlands on the Swan Coastal Plain (Churchill, 1998)	Few records. Thomson's Lake/ Harry Waring NR
Water Rat *Hydromys chrysogaster*		Priority 4	Dense vegetation associated with swamps, lakes and waterways (Government of WA, 2000)	Few records. Thomson's Lake/ Harry Waring NR

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Species	Commonwealth (EPBC Act) Status	Western Australia (BC Act/DBCA/local) Status	Habitat/Ecology	Nearby records
Quenda *Isoodon fusciventer*		Priority 4	Forest, woodland, shrubland, heath, wetland habitats on sandy soils and dense low vegetation (Paull, 2008)	Known. Several nearby. Manning Park, Coogee.
Tammar Wallaby *Notomacropus eugenii derbianus*		Priority 4	Coastal scrub, heath, dry sclerophyll forest and dense low thickets in mallee and woodland (Hinds, 2008)	Locally extinct
Carpet Python *Morelia spilota imbricata*		Specially protected	Uncommon, only persisting in large bushland remnants particularly woodlands and coastal limestone (Bush et al 2010)	None nearby. No recent records from local area
Perth-lined Slider *Lerista lineata*		Priority 3	Occurs in coastal dunes and sandplains supporting *Banksia*/Eucalypt woodland and heath south of the Swan River where it shelters in leaf litter and soil at the base of shrubs. Much of its habitat has been cleared for developments but can be locally common in small remnants and suburban gardens (Bush et. al. 2010)	Known. Several nearby. Manning Park, Coogee
Black-striped Snake *Neelaps calonotos*		Priority 3	Occurs in coastal dunes and sandplains supporting *Banksia*/Eucalypt woodlands and heath throughout the swan coastal plain where it shelters in leaf litter and soil at the base of trees and shrubs (Bush et al 2010).	Few records. Woodman Point
Inland Thornbill *Acanthiza apicalis*		Locally significant	Coastal scrubs and heath (Pizzey & Knight, 1998)	Few nearby. Manning Park, Market Gardens, Coogee.
Yellow-rumped Thornbill *Acanthiza chrysorrhoa*		Locally significant	Open grassy areas (Pizzey & Knight, 1998)	Several nearby. Manning Park, Lake Coogee, Woodman Pt.
Western Thornbill *Acanthiza inornata*		Locally significant	Open woodland and coastal scrub (Pizzey & Knight, 1998)	Few nearby. Woodman Pt. Lake Coogee
Grey Shrike-thrush *Colluricincla harmonica*		Locally significant	Forests, woodlands riparian forest and coastal scrub (Pizzey & Knight, 1998)	Several nearby. Manning Park, Lake Coogee, Woodman Pt.
Yellow-plumed Honeyeater *Lichenostomas ornatus*		Locally significant	Coastal forests (Pizzey & Knight, 1998)	Few nearby. Lake Coogee
Variegated Fairy-wren *Malurus lamberti*		Locally significant	Associated with shrublands particularly in dune and coastal vegetation (Pizzey & Knight, 1998)	Known. Few nearby. Manning Park, Market Gardens
Splendid Fairy-wren *Malurus splendens*		Locally significant	Dense undergrowth in margins of forests, woodlands and watercourses (Pizzey & Knight, 1998)	Known. Many nearby. Manning Park, Coogee, Market Gardens, Lake Coogee

Species	Commonwealth (EPBC Act) Status	Western Australia (BC Act/DBCA/local) Status	Habitat/Ecology	Nearby records
Hooded Robin *Melanodryas cucullata*		Locally significant	Banksia dominated coastal scrub and drier woodlands (Pizzey & Knight, 1998)	Few nearby. One from near Coogee
Rock Parrot *Neophema petrophila*		Locally significant	Near coastal limestone, coastal dunes and scrub (Pizzey & Knight, 1998)	Few nearby. Coogee, Woodman Pt.
Western Golden Whistler *Pachycephala fuliginosa*		Locally significant	Forests, woodlands riparian forest and coastal scrub (Pizzey & Knight, 1998)	Few nearby. Manning Park, Market Gardens, Woodman Pt.
Scarlet Robin *Petroica multicolor*		Locally significant	Open woodlands (Pizzey & Knight, 1998)	Few nearby. Coogee, Woodman Pt.
Common Bronzewing *Phaps chalcoptera*		Locally significant	Forests, woodlands and a range of shrublands, thickets and heaths (Pizzey & Knight, 1998)	Few nearby. Woodman Pt. Lake Coogee
Brush Bronzewing *Phaps elegans*		Locally significant	Woodlands, forests and heaths supporting a dense, scrubby understorey (Pizzey & Knight, 1998)	Few. Eastern Beeliar lakes
White-browed Scrubwren *Sericornis frontalis*		Locally significant	Dense undergrowth in forests, woodlands and shrublands (Pizzey & Knight, 1998)	Known. Many nearby. Manning Park, Coogee
Weebill *Smicrornis brevirostris*		Locally significant	Dry woodland and Acacia thickets (Pizzey & Knight, 1998)	Several nearby. Manning Park, Market Gardens, Lake Coogee, Woodman Pt.
Collared Sparrowhawk *Accipiter cirrocephalus*		Locally significant	Forages in and around forests, woodlands and suburban gardens (Pizzey & Knight, 1998)	Few nearby. Manning Park, Market Gardens
Brown Goshawk *Accipiter fasciatus*		Locally significant	Forages in and around forests, woodlands and suburban parkland and gardens (Pizzey & Knight, 1998)	Known. Many nearby. Manning Park, Coogee
Western Wattlebird *Anthochaera lunulata*		Locally significant	Banksia/Eucalypt woodland associations and heathland communities (Pizzey & Knight, 1998)	Known. Several nearby. Manning Park, Market Gardens
Wedge-tailed Eagle *Aquila audax*		Locally significant	Forages in a range of open and forested habitats, occasionally over lakes, beaches and towns (Pizzey & Knight, 1998)	Few nearby. Lake Coogee
Black-faced Woodswallow *Artamus cinereus*		Locally significant	Open country, as well as open woodlands, lake margins and wetlands (Pizzey & Knight, 1998)	Several. Woodman Pt.

Species	Commonwealth (EPBC Act) Status	Western Australia (BC Act/DBCA/local) Status	Habitat/Ecology	Nearby records
Dusky Woodswallow *Artamus cyanopterus*		Locally significant	Open forests and woodlands, and coastal scrub (Pizzey & Knight, 1998)	Few. Manning Park, Coogee
Brown Falcon *Falco berigora*		Locally significant	Forages in open woodlands, farmlands, roadsides and coastal dunes (Pizzey & Knight, 1998)	Few nearby. Fremantle, Market Gardens
Whistling Kite *Haliastur sphenurus*		Locally significant	Open forests, usually near water and near coastal environments (Pizzey & Knight, 1998)	Several nearby. Manning Park, North Coogee, Market Gardens
Little Eagle *Hieraaetus morphnoides*		Locally significant	Forages in open habitats, watercourses and lakes (Pizzey & Knight, 1998)	Several nearby. Manning Park, North Coogee, Market Gardens
Square-tailed Kite *Lophoictinia isura*		Locally significant	Forages over woodlands, heathlands and forests (Pizzey & Knight, 1998)	Few nearby. Manning Park, Coogee
White-naped Honeyeater *Melithreptus lunatus*		Locally significant	Forests and woodlands (Pizzey & Knight, 1998)	Few nearby. Woodman Pt.
Nankeen Night Heron *Nycticorax caledonicus*		Locally significant	River margins and wetlands (Pizzey & Knight, 1998)	Several nearby. Manning Park. Coogee
White-cheeked Honeyeater *Phylidonyris niger*		Locally significant	Coastal thickets and sandplain heaths (Pizzey & Knight, 1998)	Known. Many nearby. Manning Pk, Nth Coogee
New-holland Honeyeater *Phylidonyris novaehollandiae*		Locally significant	Forests and woodlands with a scrubby understorey, coastal scrubs and heaths (Pizzey & Knight, 1998)	Known. Many nearby. Manning Park, Coogee
Western Rosella *Platycercus icterotis*		Locally significant	Open forest and woodlands including nearby open parks, gardens and open areas (Pizzey & Knight, 1998)	Few nearby. Manning Park
Painted Button-quail *Turnix varius*		Locally significant	Open woodlands and shrublands with a dense understorey and ground debris (Pizzey & Knight, 1998)	Few nearby. Manning Park
Quacking Frog *Crinia georgiana*		Locally significant	Clay-based ephemeral swamps (Bush et. al. 2010)	None nearby. Eastern Beeliar wetlands
Western Grey Kangaroo *Macropus fuliginosus*		Locally significant	Woodland, shrublands, open areas. Requires habitat connectivity and large bushland remnants (Government of WA, 2000)	Few nearby. Eastern Beeliar wetlands
Echidna *Tachyglossus aculeatus*		Locally significant	No particular habitat requirements, however have thought to be lost from the SCP (Government of WA, 2000)	Locally extinct

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Species	Commonwealth (EPBC Act) Status	Western Australia (BC Act/DBCA/local) Status	Habitat/Ecology	Nearby records
Honey Possum *Tarsipes rostratus*		Locally significant	Diverse, long-unburnt Banksia woodlands which provide a food source (nectar and pollen) all year round. Scarce on the Swan Coastal Plain around Perth (Bradshaw 2014)	Few nearby. Harry Waring NR
Keeled Legless Lizard *Pletholax gracilis*		Locally significant	Heath, Banksia/Eucalypt woodlands with low, dense vegetation (Bush et. al. 2010)	Few nearby. Henderson, Thomson's Lake
Western three-lined skink *Acritoscincus trilineatus*		Locally significant	Dense vegetation on lake margins & ephemeral swamps (Bush et. al. 2010)	Few nearby. Lake Coogee
Western Blue-tongue Lizard *Tiliqua occipitalis*		Locally significant	Large, undisturbed habitats. Sandplains and dunes with *Bankia*/Eucalypt woodland (Bush et. al. 2010)	Known. Few nearby. Manning Park, Henderson, North Coogee
Southern Heath Monitor *Varanus rosenbergi*		Locally significant	Large, undisturbed bushland. Scarce in Perth region (Bush et. al. 2010)	Few nearby. North Lake
Yellow-faced whipsnake *Demansia reticulata*		Locally significant	Large bushland areas. Scarce in the Perth region (Bush et. al. 2010)	Few nearby. Eastern Beeliar wetlands

APPENDIX 4: Australian and Western Australian Conservation Codes

Commonwealth of Australia Conservation Codes

Threatened Flora and Fauna

Threatened fauna and flora may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in any one of the following six categories:

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.

Extinct in the wild

A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time it:

a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
b) 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.

Critically endangered

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing an **extremely high** risk of extinction in the wild.

Endangered

A taxon is Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, it is therefore considered to be facing a **very high** risk of extinction in the wild.

Vulnerable

A taxon is Vulnerable when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, it is therefore considered to be facing a **high** risk of extinction in the wild.

Conservation dependent

A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or
b) the following subparagraphs are satisfied:
    i) the species is a species of fish;
    ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;
    iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;
    iv) cessation of the plan of management would adversely affect the conservation status of the species.

The EPBC Act does not provide for listing in a data deficient category. Where sufficient data (evidence) is unavailable to allow assessment by the Threatened Species Scientific Committee against the criteria for listing, the species are found to be ineligible. A recommendation is made to the Minister to not include the species in any category under the EPBC Act. For reasons of transparency and to inform future research, the Threatened Species Scientific Committee publishes the names of those species found to be data deficient. As data deficient is not a listing category under the EPBC Act, this has no statutory implications and the species is not considered to be listed under the EPBC Act.

Conservation Codes for Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

- ***Threatened fauna*** is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species.
- ***Threatened flora*** is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species.

The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 2 that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria 3, and is based on the national distribution of the species.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no fauna or flora species listed as extinct in the wild.

SP 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 Migratory species

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). Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA)4, China (CAMBA)5 or The Republic of Korea (ROKAMBA)6, and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention)7, an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

CD Species of special conservation interest (conservation dependent)

Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Currently only fauna are listed as species of special conservation interest.

OS Species otherwise in need of special protection (other specially protected)

Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Currently only fauna are listed as species otherwise in need of special protection.

P Priority species

Priority is not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website. All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land). Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened. Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of priority status is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Priority 1 (P1): Poorly-known species - known from few locations, none on conservation lands

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

Priority 2 (P2): Poorly-known species - known from few locations, some on conservation lands

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, for example, national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.

Priority 3 (P3): Poorly-known species - known from several locations

Species that are known from several locations and the species does not appear to be under imminent threat or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.

Priority 4 (P4): 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 a conservation dependent specially protected species.
(c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.
(d) Other species in need of monitoring.

Natural Area
CONSULTING MANAGEMENT SERVICES

City of Cockburn

Flora and Vegetation Survey, Weed Mapping, and Black Cockatoo Habitat Assessment

Natural Area Holdings Pty Ltd
Whadjuk Country
57 Boulder Road, Malaga WA 6090
Ph: (08) 9209 2767
info@naturalarea.com.au
www.naturalarea.com.au



Acknowledgement of Country
Ngala kaaditj Noongar moort keyen kaadak nidja boodja.
Natural Area acknowledges the Traditional Owners of the lands on which we operate, and recognises their continuing connection to lands, waters and communities.

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Environmental management system registered to ISO 14001:2015
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D1	February 2024	New Document	LC/ BD	BC	Draft for Client comment

Executive Summary

Natural Area Consulting Management Services (Natural Area) was contracted by the City of Cockburn (the City) to undertake a flora and vegetation survey, weed mapping, and black cockatoo habitat assessment within Lots 38, 9902, 9903, and 9905, Coogee, forming the site of the proposed Coogee Golf Complex. The information gathered during the 2023 survey will be used to inform the City of the environmental values within the area. This report provides the results from the detailed flora, and vegetation survey, weed mapping and black cockatoo habitat assessment.

The surveys were undertaken to determine:

- flora species present (native and non-native)
- the extent and boundaries of vegetation type and condition
- the presence and location of any declared rare or priority flora, fauna and/or ecological communities
- the presence and location of any declared pests or Weeds of National Significance (WoNS)
- the presence and location of all black cockatoo breeding/roosting and feeding habitat trees.

The spring 2023 surveys within the site confirmed:

- a total of 110 flora (taxa) species from 41 families
- a total of 72 introduced (weed) species and 34 native species
- one species was unable to be identified to species level due to the lack of diagnostic features such as flowers and/or seed present at the time of survey
- one conservation significant flora was recorded during the survey, *Grevillea olivacea* (Olive Grevillea)
- two declared pests (DP) and Weeds of National Significance (WoNS), Bridal Creeper (**Asparagus asparagoides*) and African Boxthorn (**Lycium ferocissimum)*
- seven vegetation types:
  - **Gaudium laevigatum* Open Heath (GlOH)
  - **Gaudium laevigatum* and *Templetonia retusa* Tall Open Scrub (GlTrTOS)
  - *Banksia sessilis* Tall Open Scrub (BsTOS)
  - *Templetonia retusa* Open Heath (TrOH)
  - *Eucalyptus gomphocephala* Closed Forest (EgCF)
  - *Eucalyptus gomphocephala* Open Forest (EgOF)
  - *Banksia sessilis* Open Heath (BsOH)
- vegetation condition across the site ranged from Completely Degraded to Degraded, with the majority of the site in Completely Degraded condition (54.92 %)
- one Priority Ecological Community was identified: Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community
- high level of weed diversity on site when compared to native and dubious species
- 27 potential black cockatoo hollow trees, with no hollows sighted at the time of the survey
- significant foraging value of foraging species in site

Recommended management practices for weed control and rubbish include a weed management program and rubbish removal.

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1.0 Introduction

Natural Area Consulting Management Services (Natural Area) was commissioned by the City of Cockburn (the City) to conduct a detailed flora and vegetation survey, weed mapping and black cockatoo habitat assessment at lots 38, 9902, 9903 and 9905, Coogee, forming the site of the proposed Coogee Golf Complex. Information gathered during these studies will be used to inform the City of the environmental values within the area.

1.1 Location

The survey area is located in the suburb of Coogee and is located approximately 18 km south of Perth's Central Business District (CBD). The total survey area is bounded by Cockburn Road to the west, and bisected by Ocean Road and is approximately 35.5 ha (Figure 1). A portion (south-west) of the survey area is classified as an environmentally sensitive area (Department of Water and Environmental Regulation (DWER), 2024).

1.2 Scope

Natural Area undertook a detailed flora and vegetation survey, weed mapping and a black cockatoo habitat assessment at lots 38, 9902, 9903 and 9905 in Coogee. The scope of these works included the following:

- a desktop assessment to gain contextual knowledge about site characteristics including undertaking searches of the Department of Biodiversity, Conservation, and Attractions (DBCA) databases, NatureMap and Protected Matters Search Tool to identify potential conservation significant flora species, along with any threatened or priority ecological communities
- a detailed flora and vegetation survey undertaken in accordance with the methodology outlined in *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (2016), including setting out a minimum of three 10m x 10 m quadrat per floristic community
- mapping cover and location of environmental weeds across the entire area in 30 m grid nodes
- an assessment of all black cockatoo breeding/roosting and feeding habitat trees according to the *Referral guideline for 3 WA threatened black cockatoo species* (Department of Agriculture, Water and the Environment (DAWE), 2022)
- presentation of findings in a formal report, and provision of maps representing assessment outcomes
- preparation of GIS shapefiles in IBSA format.

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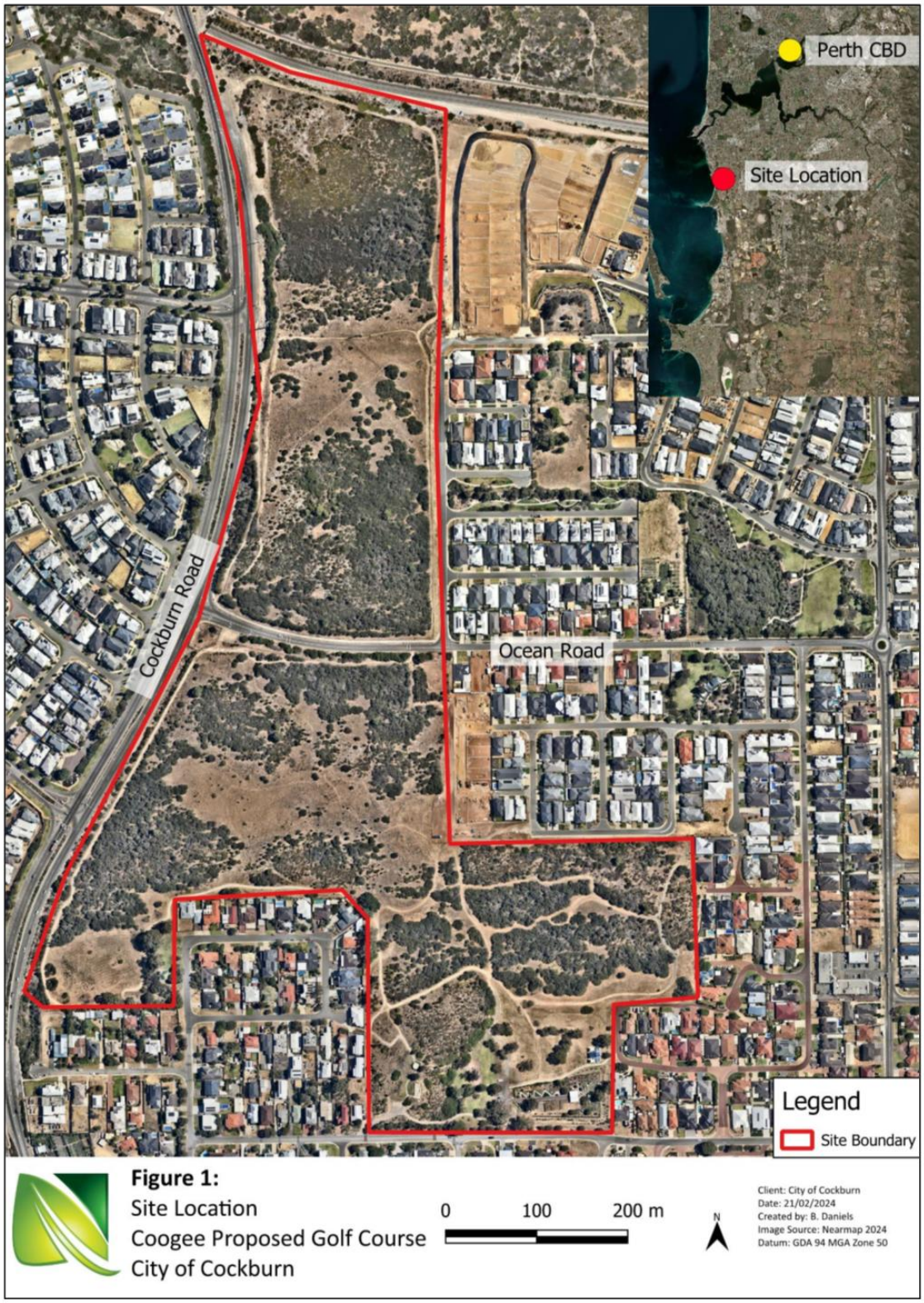


Figure 1:
Site Location
Coogee Proposed Golf Course
City of Cockburn

2.0 Site Characteristics

The characteristics of a site have a strong bearing on the flora, vegetation, fauna, and ecological communities present. The key characteristics of lots 38, 9902, 9903 and 9905 in Coogee are outlined in this section.

2.1 Regional Context

The site is located within the Swan Coastal Plain (SWA02) IBRA subregion (Department of Primary Industries and Regional Development (DPIRD), 2024a). This region is characterised by limestone under heath or woodlands, marine dunes under Banksia and Jarrah woodlands and colluvial and alluvial soils under Marri. Typically, this region consists of alluvial river flats, coastal limestone and colluvial an aeolian sands (Mitchell, Williams & Desmond, 2002). The region is composed of Tuart, *Banksia*, Jarrah and Marri (Mitchell et al., 2002).

2.2 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (2024); Jandakot Aero WA, site number 009172, 2024 the region has an average:

- rainfall of 807.3 mm pa, with rain falling predominantly between May and August
- maximum temperature ranging from 18.6 °C in winter to 30.8 °C in summer, with a maximum recorded temperature of 46.6 °C
- minimum temperatures ranging from 7.3 °C in winter to 16.7 °C in summer, with a minimum recorded temperature of -3.4 °C
- predominant wind directions include morning easterlies and south-westerly sea breezes in the afternoon, with an average wind speed of 18.6 km/h and gusts of more than 100 km/h.

2.3 Topography and Soils

Using the NRInfo Portal, two soil types were identified on site, being the EnvGeol LS1 phase and EnvGeol S7 phase (Table 1 and Figure 2) (DPIRD, 2024a). The four lots that make up the entire survey site differ in their topography. Lot 9902 ranges from 32 m Australian Height Datum (AHD) at two separate points in the north-west and south-west corners of the site with gentle sloping in the area between these two points to a low of 12 AHD in the south-east corner Lot 9903 slopes from 36 AHD in the south-west to 12 AHD in the north-east. Lot 9905 ranges from its highest point in the south-east of the site at 34 AHD to its lowest point of 8 AHD in the south-west with an additional area of height rising to 30 AHD in the north. Lot 38 has the highest point of all the aforementioned lots, measuring 42 AHD in the west and sloping to a low of 18 AHD in the east (DPIRD, 2024a).

Table 1: Soil types within site

Name	Symbol	Description
EnvGeol LS1 phase	211Sp_LS1	Limestone of light, yellowish brown colouring with fine to coarse-grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris,

Name	Symbol	Description
		variably lithified, surface kankar, of eolian origin. Minor heavy minerals.
EnvGeol S7 phase	211Sp_S7	Sand of pale and olive yellow colour with medium to coarse-grained, sub-angular to sub-rounded quartz, traces of feldspar, moderately sorted, of residual origin.

2.4 Vegetation Complex

One vegetation complex exists within the site boundary, the Cottesloe Complex-Central and South It is described by Heddle, Loneragan, and Havel (1980) as supporting heaths on limestone outcrops with its deeper sands supporting a dominant Tuart woodland and an open-forest of Tuart-Jarrah-Marri (Heddle *et al.,* 1980).

The pre-European extent of this vegetation complex remaining is:

- 32.16% within the Swan Coastal Plain
- 19.27% within the City of Cockburn (Government of Western Australia, 2019).

2.5 Black Cockatoo Habitat

There is the potential for the three threatened black cockatoos and their habitat to occur on site, including the Carnaby's Cockatoo (*Zanda latirostris*) listed as Endangered under the EPBC Act 1999 (Cwlth), the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) and the Baudin's Black Cockatoo (*Zanda baudinii*) listed as Vulnerable. All are listed as Threatened under the Biodiversity Conservation Act 2016 (WA).According to NationalMap the survey site occurs within an area classified as:

- Carnaby's Cockatoo Confirmed Roost Sites Buffered 6km (DBCA, 2024a)
- Carnaby's Cockatoo Confirmed Roost Sites (DBCA, 2024b)
- Black Cockatoo Roosting Sites (DBCA, 2024c).

2.6 Heritage Values

No known Aboriginal or European Heritage sites were recorded within the survey area (Department of Planning, Lands and Heritage (DPLH), 2024).

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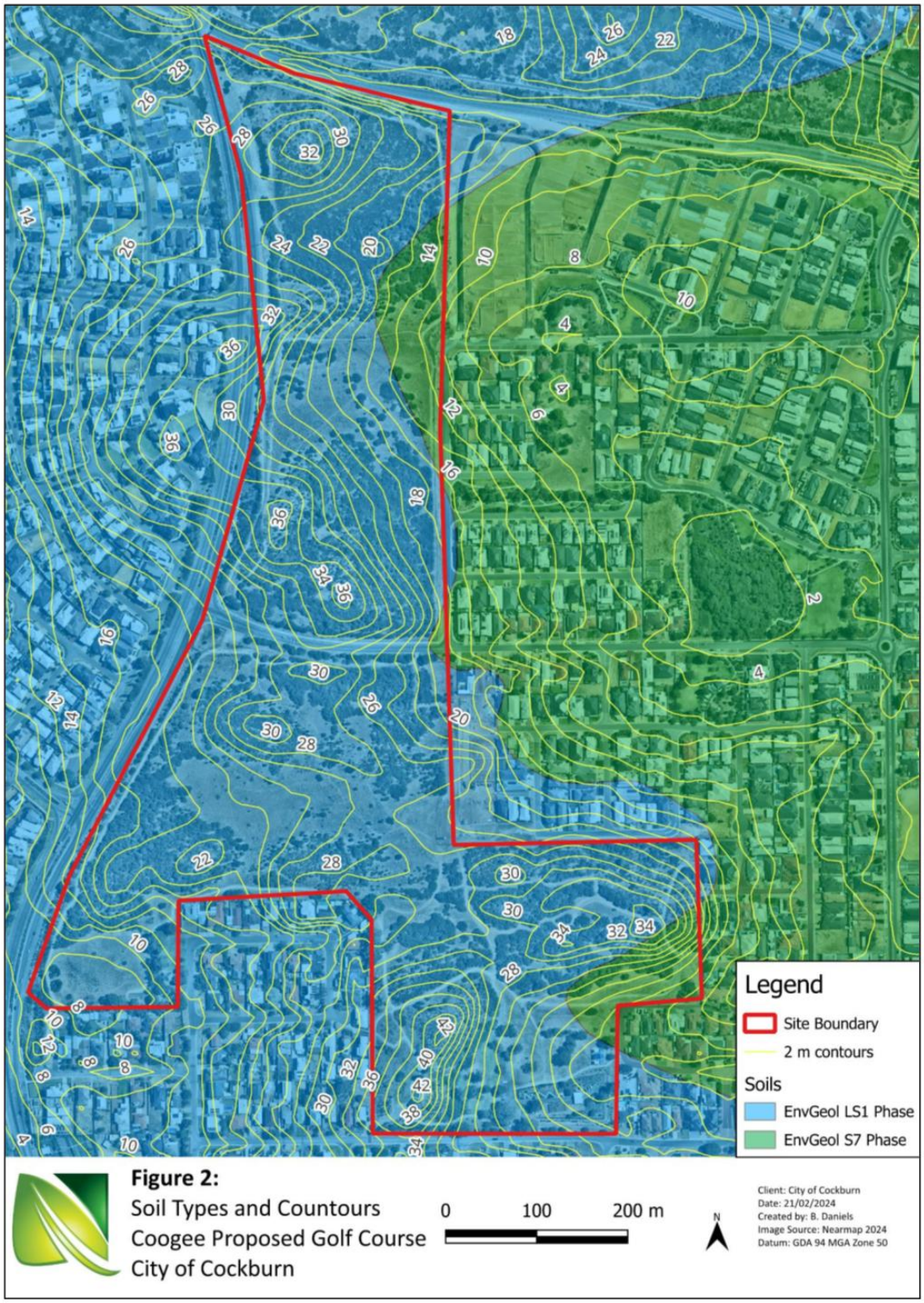


Figure 2:
Soil Types and Countours
Coogee Proposed Golf Course
City of Cockburn

3.0 Methodology

3.1 Desktop and Literature Review

The desktop survey included reviewing online databases to gather contextual knowledge and determine preliminary site characteristics including:

- likely native and non-native flora and fauna species present
- current extent of native vegetation
- general floristic community types
- likely presence of threatened or priority flora and fauna species
- likely presence of any threatened or priority ecological communities.

The following databases were accessed to obtain relevant information:

- NatureMap (DBCA, 2024d)
- Protected Matters Search Tool (Department of Climate Change, Energy, the Environment and Water (DCCEEW)), 2024) (Appendix 1)
- FloraBase (WA Herbarium, 2024)
- Threatened and priority flora (DBCA, 2024e) and ecological community database searches (DBCA, 2024f)

Information relating to conservation significant species from database searches were summarised into field reference guides to aid with on-ground flora surveys which is provided in Appendix 2. Conservation code definitions for the State and Commonwealth are provided in Appendix 3.

3.2 On-ground Flora Survey

The flora and vegetation survey was conducted in accordance with *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority (EPA), 2016). Samples were collected, or photographs taken of unfamiliar species to enable later identification.

Natural Area environmental scientists undertook the survey between November 13 and 17, 2023, with key data recorded using Mappt software on a handheld tablet. Survey activities included:

- setting out a total of nine 10 x 10 m quadrats across the three vegetation types present (Figure 3)
- photographing each quadrat in the north-west corner and recording GPS coordinates using GDA2020 Zone 50 datum
- recording landscape characteristics including soil types/colour, aspect, slope, surface rock, topography and drainage using Natural Area's modified recording sheets based on the NAIA templates developed for the Perth Biodiversity Project
- determining leaf litter depth, percentage cover, and percentage of bare ground
- recording percentage cover, height, number alive/dead stems and life form for each flora species in the quadrats
- marking locations of any conservation significant flora, Declared Pests (DP) and/or Weeds of National Significance (WoNS) identified
- recording vegetation type including dominant over, middle and understorey species (Table 2) and condition using the scale attributed to Keighery (Table 3) (Government of Western Australia, 2000)

- the use of GPS to map significant species and boundaries of differing vegetation type and condition
- recording evidence of disturbance, such as fire.

Quadrat data obtained during the survey has been provided in Appendix 4.

3.2.1 Vegetation Type

The vegetation type was determined using the structural classes described in *Bush Forever Volume 2* (Government of Western Australia, 2000), and records dominant over, middle and understorey species. A description of the various structural classes is provided in Table 2.

Table 2: Vegetation structural classes

Life Form/Height Class	Canopy Percentage Cover			
	100 – 70%	70 – 30%	30 – 10%	10 – 2 %
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10 – 30 m	Closed forest	Open forest	Woodland	Open woodland
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Tree Mallee	Closed tree mallee	Tree mallee	Open tree mallee	Very open tree mallee
Shrub Mallee	Closed shrub mallee	Shrub mallee	Open shrub mallee	Very open shrub mallee
Shrubs over 2 m	Closed tall scrub	Tall open scrub	Tall shrubland	Tall open shrubland
Shrubs 1 – 2 m	Closed heath	Open heath	Shrubland	Open shrubland
Shrubs under 1 m	Closed low heath	Open low heath	Low shrubland	Low open shrubland
Grasses	Closed grassland	Grassland	Open grassland	Very open grassland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland

Source: Government of Western Australia, 2000

3.2.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery in *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016) (Table 3). Table 3 provides a description of the rating scale.

Table 3: Vegetation condition ratings

Category		Description
1	Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.

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

Source: EPA, 2016

3.3 Weed Mapping

Natural Area Environmental Scientists undertook the survey between November 13 and 17, 2023, with key data recorded using Mappt software on a handheld tablet. The survey was conducted in line with the *Techniques for Mapping Weed Distribution and Cover in Bushland and Wetlands* (DEC, 2011). Assessment activities included:

- mapping all weed species in either point or density mapping (or a combination of both) using the following as a guide:
  - recording scattered weed species in a small area as a point
  - recording scattered weed species in a large area as a density
  - recording clumps of bulbous weeds as a single point per clump
  - recording rhizomatous grasses as single unit
  - recording fumaria species as a single unit
- recording weed species present at every 30-50 m grid nodes within each site (size of the grid depended on the size of the reserve)
- recording percentage cover of each weed at each grid node with <5% (rating 1), 6-30% (rating 2), 31-60% (rating 3), or >61% (rating 4)
- displaying the weed species on maps in accordance with the City's requirements (Table 4).

Table 4: Weeds to be mapped and mapping method as specified by the City (P denotes point mapping and D denotes density mapping).

Scientific Name	Common Name		Mapping Method
Grass Weeds			
Ammophila arenaria	Marram Grass		P & D
Cenchrus sp.	Buffel Grass, Burr Grass		P & D
Cortaderia selloana	Pampas Grass		P
Hyparrhenia hirta	Tambookie Grass		P
Ehrharta villosa	Pyp Grass		D
Eragrostis curvula	African Lovegrass		D
Ehrharta calycina	Perennial Veldt Grass		D
Pennisetum setaceum	Fountain Grass		P & D
Thinopyrum distichum	Sea Wheat		D
Cynodon dactylon	Couch		
Pennisetum clandestinum	Kikuyu	Rhizomatous grass	D
Stenotaphrum secundatum	Buffalo		
Woody Weeds			
Acacia longifolia	Sydney Golden Wattle		P
Ficus carica	Edible Fig		P
Leptospermum laevigatum	Victorian Tea Tree		P
Melaleuca nesophila	Mindiyed		P
Melia azedarach	Cape Lilac		P
Olea europea	Olive		P
Schinus terebinthifolia	Japanese Pepper		P
Solanum linnaeanum	Apple of Sodom		P
Bulbous Weeds			
Asphodelus fistulosus	Onion Weed		P & D
Chasmanthe floribunda	African Cornflag		P & D
Ferraria crispa	Black Flag		P & D
Freesia hybrid	Freesia		P & D
Gladiolus caryophyllaceus	Gladiolus		P & D
Lachenalia reflexa, Lachenalia sp.	Yellow Soldiers, Soldiers		P & D
Moraea flaccida	One-Leaf Cape Tulip		P & D

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Scientific Name	Common Name	Mapping Method
Trachyandra divaricata	Dune Onion Weed	P & D
Watsonia bulbillifera	Watsonia	P & D
Zantedeschia aethiopica	Arum Lily	P & D
Other Weeds		
Anredera cordifolia	Potato Creeper, Madeira Vine	P
Asparagus asparagoides	Bridal Creeper	P & D
Cakile maritima	Sea Rocket	D
Carpobrotus edulis	Pigface	D
Chrysanthemoides monilifera	Boneseed	P & D
Cirsium vulgare	Spearthistle	P & D
Echium plantagineum	Paterson's Curse	D
Emex australis	Doublegee	P
Euphorbia paralias	Sea Spurge	D
Euphorbia terracina	Geraldton Carnation	D
Foeniculum vulgare	Fennel	P
Fumaria bastardii, F. capreolata, F. muralis	Fumitory	D
Gomphocarpus fruticosus	Narrow Leaf Cotton Bush	P & D
Lupinus cosentinii	Sandplain Lupin	P & D
Lycium ferocissimum	African boxthorn	P & D
Juncus acutus	Spiny Rush	P & D
Pelargonium capitatum	Rose Pelargonium	D
Opuntia stricta	Prickly Pear	P
Persicaria maculosa	Redshank	D
Raphanus raphanistrum	Wild Raddish	D
Retama raetam	White Broom	P
Ricinus communis	Castor Oil	P
Rubus discolor	Blackberry	P
Tetragonia decumbens	Sea Spinach	D
Tribulus terrestris	Caltrop	D
Typha orientalis#	Bulrush	D
Vicia sativa	Vetch	P & D

Source: City of Cockburn

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3.4 Black Cockatoo Habitat Assessment

A Black Cockatoo habitat assessment was conducted in accordance with *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo* (DAWE, 2022).

Natural Area Ecologists undertook the survey between November 13 and 17, 2023, with key data recorded using Mappt software on a handheld tablet. Survey activities included:

- traversing the whole site in a systematic grid search
- recording the location and evidence of breeding, roosting and foraging activities (e.g. chew marks, feathers, scats)
- marking the GPS locations of each habitat tree with a diameter at breast height (DBH) ≥ 500 mm
- recording the height, DBH, health, and species of each habitat tree
- recording evidence of hollows, including size, type, and location within the tree
- recording foraging habitat, vegetation type, and condition.

3.5 Limitations

The limitations associated with flora and vegetation surveys, weed mapping and black cockatoo surveys at the Coogee Golf Course have been outlined in Table 5 below.

Table 5: Flora survey limitations

Potential Limitation	Degree of Limitation	Comments
Availability of contextual information	None	Regional and local contextual information was readily available for the survey site.
Competency/experience of team	None	Survey activities were undertaken by experienced environmental scientists who have extensive experience undertaking detailed flora surveys, weed mapping and black cockatoo habitat assessments within the Swan Coastal Plain bioregion.
Proportion of flora recorded/collected, any identification issues	Minor	A total of 110 flora species (taxa) were recorded from 41 families during the field survey, comprised of 72 introduced (weeds), four dubious and 34 native species. Of these, one species (0.91 %) was unable to be identified to species level due to a lack of diagnostic characteristics present at the time of survey. This species was able to be identified to genus level (**Bougainvillea* sp.) and is not considered likely to be conservation significant flora following comparison with desktop data.
Survey effort and extent	None/Minor	A detailed survey was undertaken over a period of five days. The entire survey area was traversed, and a total of nine quadrats

Potential Limitation	Degree of Limitation	Comments
		were established to adequately survey the vegetation types present. Additionally, the entire site was traversed to assist in compiling a species list. Weed mapping was conducted through a grid mapping approach to ensure all areas of the survey area was covered. A targeted black cockatoo habitat survey was undertaken involving the marking of trees with a DBH ≥ 500 mm and recording significant characteristics. As this was a targeted search for this species, other faunal groups which may have been present within the site have not been recorded. The black cockatoo hollow assessment was conducted from the ground and is therefore limited to those hollows visible from ground-level. As such, not all hollows may have been observed as new growth, dense foliage and position in the landscape can hide hollows from vision. Additionally, internal hollow inspections would be required to confirm hollow characteristics such as internal hollow depth and structure and therefore to confirm their suitability to support nesting by black cockatoos.
Access restrictions	None	There were no access restrictions on site.
Survey timing	None	The survey was undertaken during spring which is the optimal season for flora surveys within the Swan Coastal Plain subregion. Whilst the survey was undertaken during flowering season, some species may flower earlier or later in the season and therefore may not be able to be identified. Of the nine conservation significant flora species identified in the desktop survey as being likely to occur within the survey area, five species have flowering periods outside of the survey period.

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Potential Limitation	Degree of Limitation	Comments
		These species are perennial shrubs, mallees and grasses for which identification would have been possible outside of their flowering periods due to distinct morphological characteristics including growth habitat and leaf structure.
Disturbances	None	No recent disturbances which may have had an impact on survey results (e.g. fire, recent clearing or floods) were identified during the survey.

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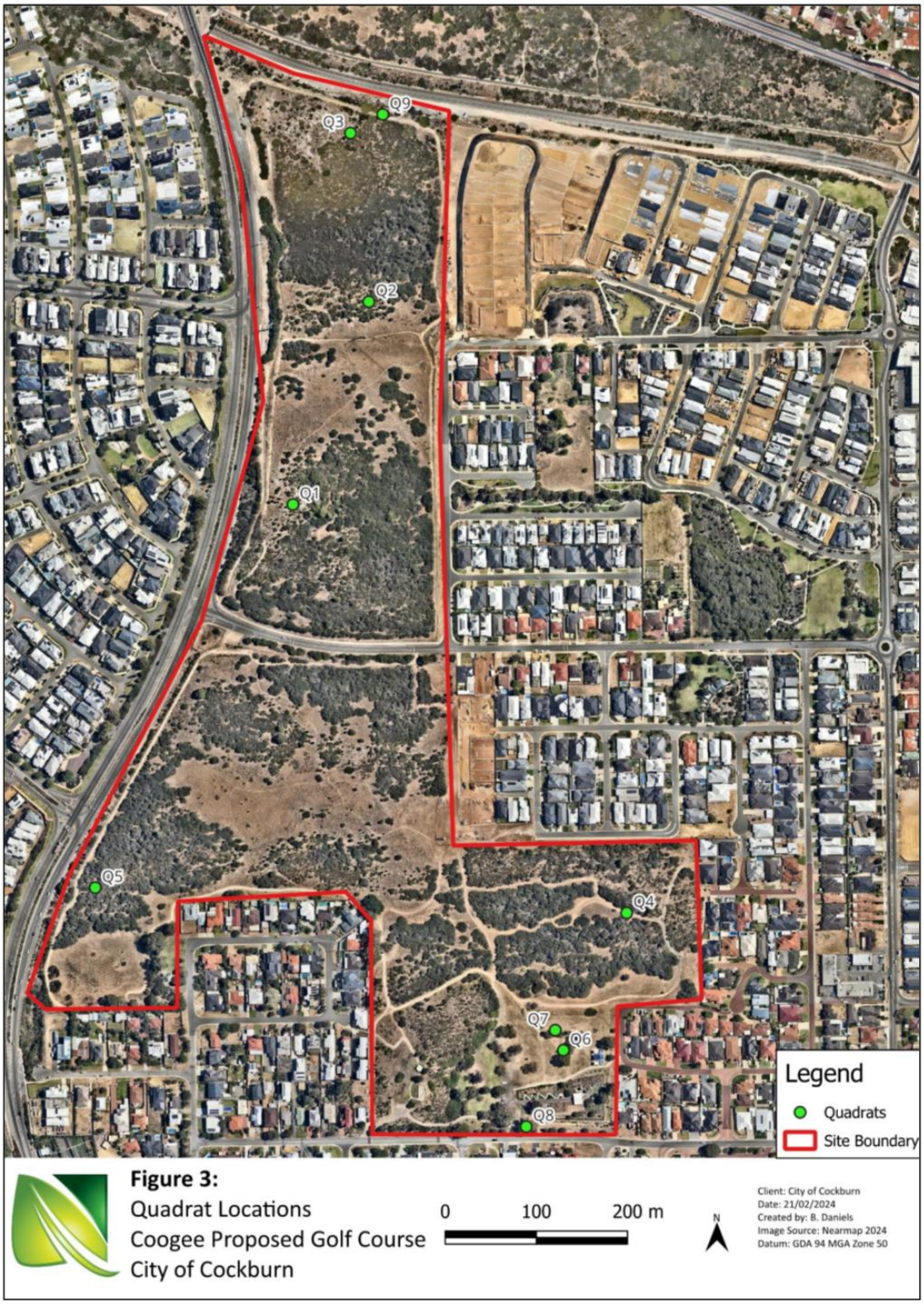


Figure 3:
Quadrat Locations
Coogee Proposed Golf Course
City of Cockburn

4.0 Flora Survey Results

4.1 Desktop Survey

A desktop survey of online databases indicated the potential for a total of 35 conservation significant species to occur within 10 km of the survey area (Table 6). NatureMap indicated 23 conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA) or by the Western Australian Herbarium (1998-), as potentially occurring within 10 km radius of the site (DBCA, 2024d). A review of the Protected Matters Search Tool (PMST) (DCCEEW, 2024) indicated 12 significant flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) as potentially occurring within a 10 km radius of the site (Appendix 1). A review of the DBCA (2024e) threatened and priority flora database indicated 25 threatened or priority species have been recorded within 10 km of the site. Of the conservation significant species potentially found in the area, it was determined that the site conditions (soil type, drainage, location) may be suitable for nine (highlighted green) of these species (Table 6). Conservation code descriptions are provided in Appendix 3.

Table 6: Threatened and Priority flora species listed by NatureMap, PMST and DBCA

Species Name	Cons Code	NatureMap	PMST	DBCA
Acacia lasiocarpa var. *bracteolata* long peduncle variant	P1	X		X
Andersonia gracilis	EN		X	
Angianthus micropodioides	P3	X		X
Austrostipa mundula	P3	X		X
Banksia mimica	EN		X	
Beyeria cinerea subsp. *cinerea*	P3	X		X
Caladenia huegelii	T	X	X	X
Cyathochaeta teretifolia	P3	X		X
Dampiera triloba	P3	X		X
Diuris drummondii	T	X	X	X
Diuris micrantha	VU		X	
Diuris purdiei	EN		X	
Dodonaea hackettiana	P4	X		X
Drakaea elastica	EN		X	
Drakaea micrantha	VU		X	
Eleocharis keigheryi	VU		X	
Eucalyptus foecunda subsp. *foecunda*	P4	X		X
Grevillea olivacea	P4	X		X
Grevillea thelemanniana	T	X		X

Species Name	Cons Code	NatureMap	PMST	DBCA
Hibbertia leptotheca	P3	X		X
Hydrocotyle lemnoides	P4			X
Jacksonia gracillima	P3	X		X
Jacksonia sericea	P4	X		X
Macarthuria keigheryi	EN		X	
Microtis quadrata	P4	X		X
Phlebocarya pilosissima subsp. *pilosissima*	P3	X		X
Pimelea calcicola	P3	X		X
Stylidium longitubum	P4	X		X
Stylidium maritimum	P3	X		X
Stylidium paludicola	P3	X		X
Styphelia filifolia	P3	X		X
Synaphea sp. Fairbridge Farm	CR		X	
Thelymitra stellata	EN		X	
Thelymitra variegata	T			X
Tripterococcus sp. Brachylobus	P4	X		X

4.1.1 Threatened and Priority Ecological Communities

A review of the PMST report identified five listed Threatened Ecological Communities that could potentially occur within 10 km of the site (Table 7).

Table 7: Potential Threatened Ecological Communities within the survey area

Name	Status	Presence
Banksia Woodlands of the Swan Coastal Plain	Endangered	Community likely to occur within area
Empodisma peatlands of southwestern Australia	Endangered	Community may occur within area
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Source: DCCEEW 2024

A review of DBCA'S threatened community database indicated the presence of the following threatened and priority communities which have the potential to occur within the site (Table 8).

Table 8: Potential Threatened Ecological Communities within the survey area

Name	Status	Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Recorded in close proximity to survey boundary
Callitris preissii (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson et al. 1994)	Critically Endangered	Previously recorded within survey boundary
Melaleuca huegelii - M. systena shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994)	Critically Endangered	Previously recorded within survey boundary
Northern Spearwood shrublands and woodlands	Priority 3	Previously recorded within survey boundary
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain	Critically Endangered	Recorded in close proximity to survey boundary

Source: DBCA, 2023c

4.2 Flora Survey Results

4.2.1 Vegetation Types

Seven vegetation types were recorded within Coogee Golf Course. Vegetation types are described in Table 9 and shown in Figure 4.

Table 9: Vegetation type within the proposed Coogee Golf Course

Vegetation Type	Description	Photograph
**Gaudium laevigatum* Open Heath (GlOH)	**Gaudium laevigatum* and *Templetonia retusa* open heath over **Lagurus ovatus* and mixed herbs.	
	**Gaudium laevigatum, Templetonia retusa* and *Rhagodia baccata* open heath over **Ehrharta calycina* and mixed introduced herbs.	

Vegetation Type	Description	Photograph
**Gaudium laevigatum* and *Templetonia retusa* Tall Open Scrub (GlTrTOS)	**Gaudium laevigatum* and *Templetonia retusa* Tall open scrub over **Lagurus ovatus* and mixed herbs.	
Banksia sessilis Tall Open Scrub (BsTOS)	*Banksia sessilis* Tall open scrub and *Xanthorrhoea preissii* over mixed introduced grasses and herbs.	
Templetonia retusa Open Heath (TrOH)	*Templetonia retusa* and **Gaudium laevigatum* open heath over mixed introduced grasses and herbs.	

Vegetation Type	Description	Photograph
Eucalyptus gomphocephala Closed Forest (EgCF)	*Eucalyptus gomphocephala* and *Agonis flexuosa* closed forest over **Cynodon dactylon* and mixed introduced grasses.	
Eucalyptus gomphocephala Open Forest (EgOF)	*Eucalyptus gomphocephala* and *Agonis flexuosa* open Forest over introduced grasses and herbs.	
Banksia sessilis Open Heath (BsOH)	*Banksia sessilis* and *Templetonia retusa* open heath over *Acacia rostellifera* and mixed grasses and herbs.	

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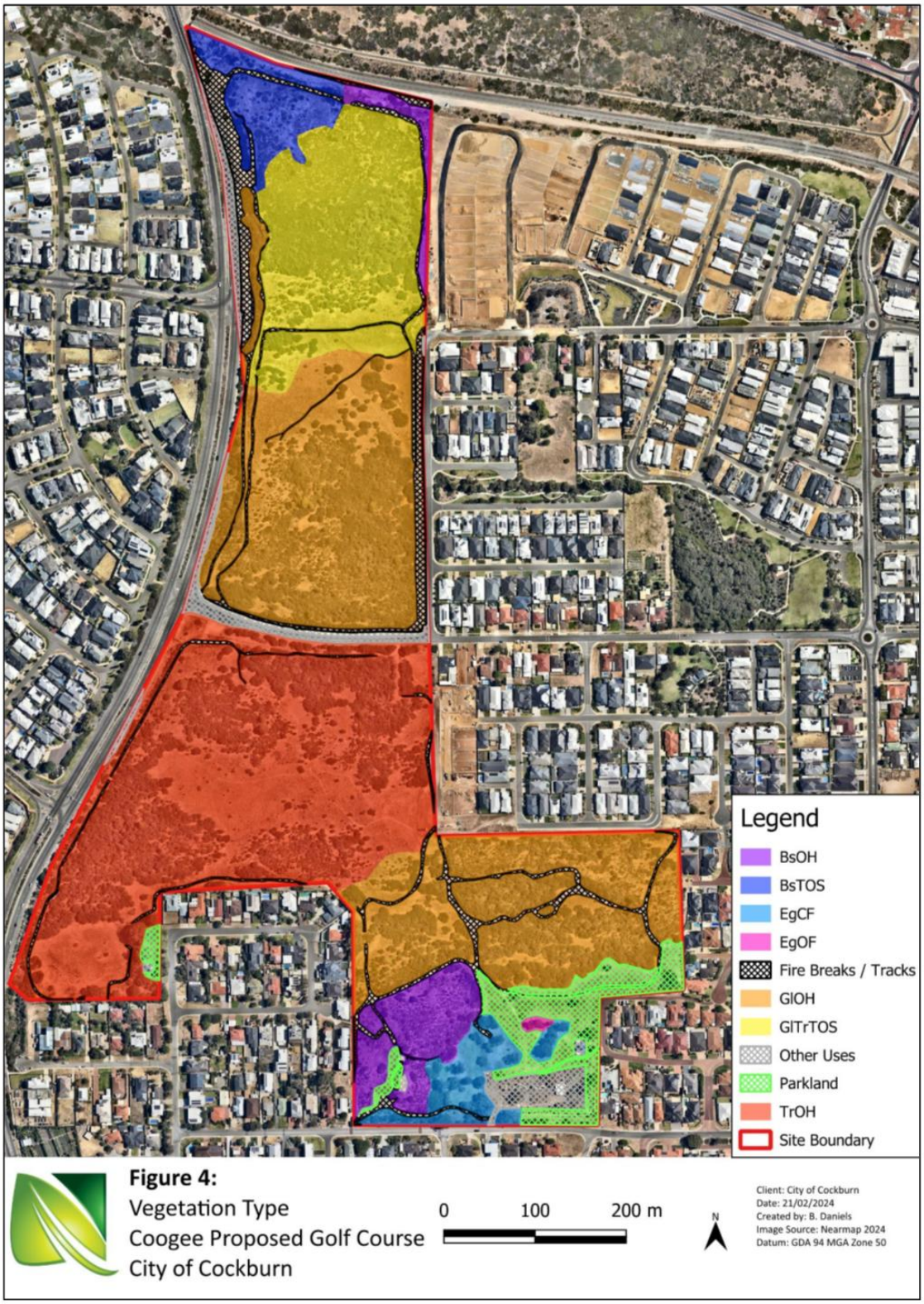


Figure 4:
Vegetation Type
Coogee Proposed Golf Course
City of Cockburn

4.2.2 Vegetation Condition

Vegetation condition deteriorated between the 2013 survey and the 2023 survey (Figure 5). Across site, vegetation condition ranged from Degraded to Completely Degraded (Table 10; Figure 6). Vegetation condition below is inclusive of natural areas only. Firebreaks and tracks totalled 2.47 ha, parkland totalled 1.51 ha and other land uses totalled 1.19 ha.

Potential threats throughout the site included rubbish dumping, burning and construction of structures. Dumped rubbish items included:

- tarpaulins
- timber and construction materials
- basketball hoop
- tools and a tool belt
- plastic and canvas chairs.

In addition to this, a makeshift bar has been constructed, as well as a firepit and a cubby. Evidence of burning was also present at site. A map showing the locations of these disturbances has been provided in Figure 7 and photographs showing the disturbances on site have been provided in Figure 8.

Table 10: Vegetation condition within the Coogee Golf Complex

Vegetation Condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Area (ha)	0	0	0	0	12.68	15.45	28.13
Area (%)	0	0	0	0	45.08	54.92	100

Note: Vegetation condition equals 100 % of mapped natural vegetation and 84.50 % of the whole site. Additional cover categories include:

- Firebreaks and Tracks: 7.42 %
- Parkland: 1.51 %
- Other Uses: 3.57 %.

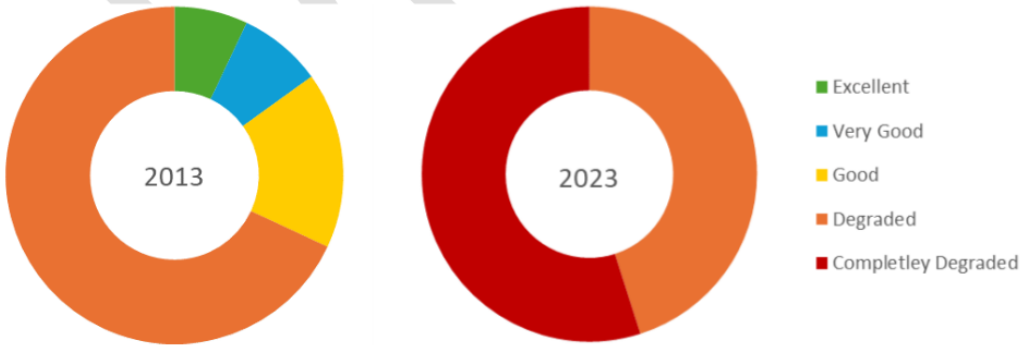


Figure 5: Vegetation condition in 2013 and 2023

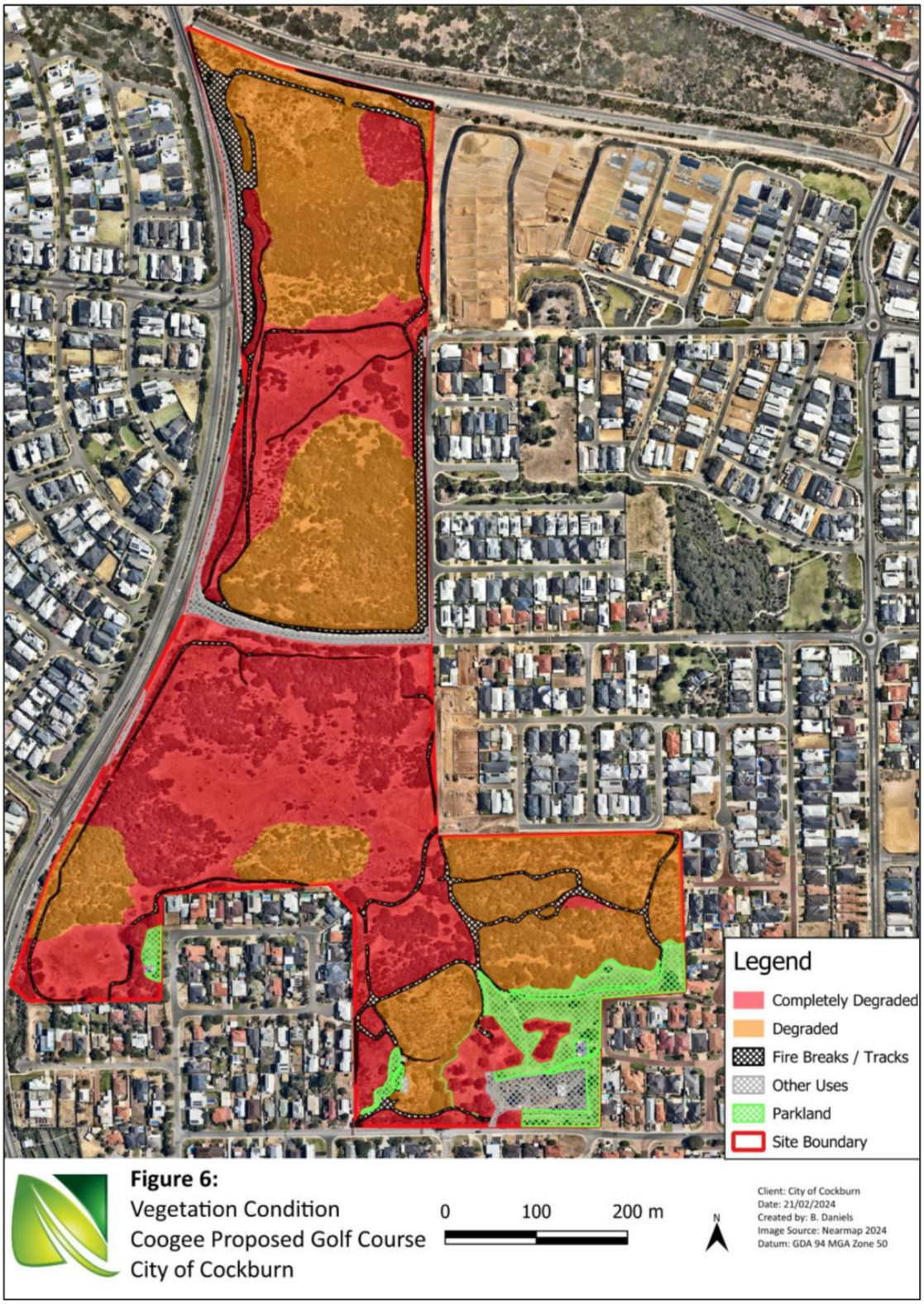


Figure 6:
Vegetation Condition
Coogee Proposed Golf Course
City of Cockburn

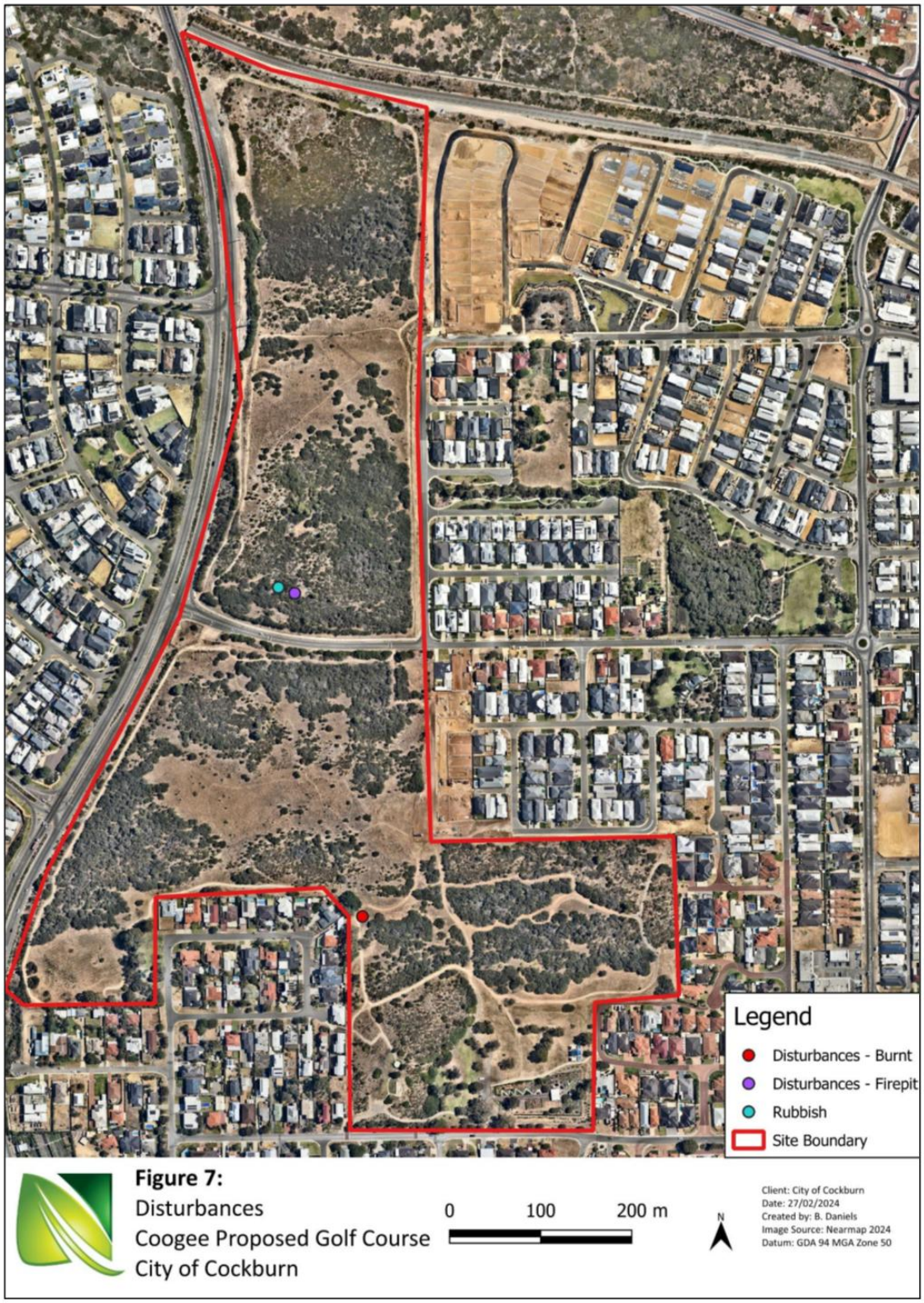


Figure 7:
Disturbances
Coogee Proposed Golf Course
City of Cockburn





Rubbish Dumping



Makeshift Bar



Cubby



Fire Pit and Chairs



Burnt Area

Figure 8: Evidence of illicit activities at site.

4.2.3 Flora

A total of 110 flora species (taxa) were recorded from 41 families during the field survey, comprised of 72 introduced (weeds), four dubious species and 34 native species. Examples of native flora species are shown in Figure 9 and weed species in Figure 10. A complete flora species list is provided in Appendix 5. The Poaceae family was the most represented family with 19 species present, followed by Fabaceae with 14 and Myrtaceae with 13 species present. One Priority species (*Grevillea olivacea* (P3)) was present on site. This species was present in the southeastern section of site, between the parkland area and housing (Figure 11).

Two Declared Pest and Weed of National Significance (WoNS) were recorded; Bridal Creeper (**Asparagus asparagoides*) and African Boxthorn (**Lycium ferocissimum*), the locations are shown within the weed maps produced in Section 6.0: Weed Mapping. Declared pests are listed on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management Act 2007* (WA). This classification requires the landowner/land manager to control the population to limit damage as a result of the presence of these species (DPIRD, 2024b).



Agonis flexuosa (Peppermint)



Xanthorrhoea preissii (Grass tree)



Banksia sessilis (Parrot Bush)



Templetonia retusa (Cockies Tongues)

Figure 9: Examples of native flora species recorded



Morning Glory (*_Ipomoea indica_)



Century Plant (*_Agave americana_)



African Lovegrass (*_Eragrostis curvula_)



Castor Oil Plant (*_Ricinus communis_)

Figure 10: Examples of introduced flora species recorded.

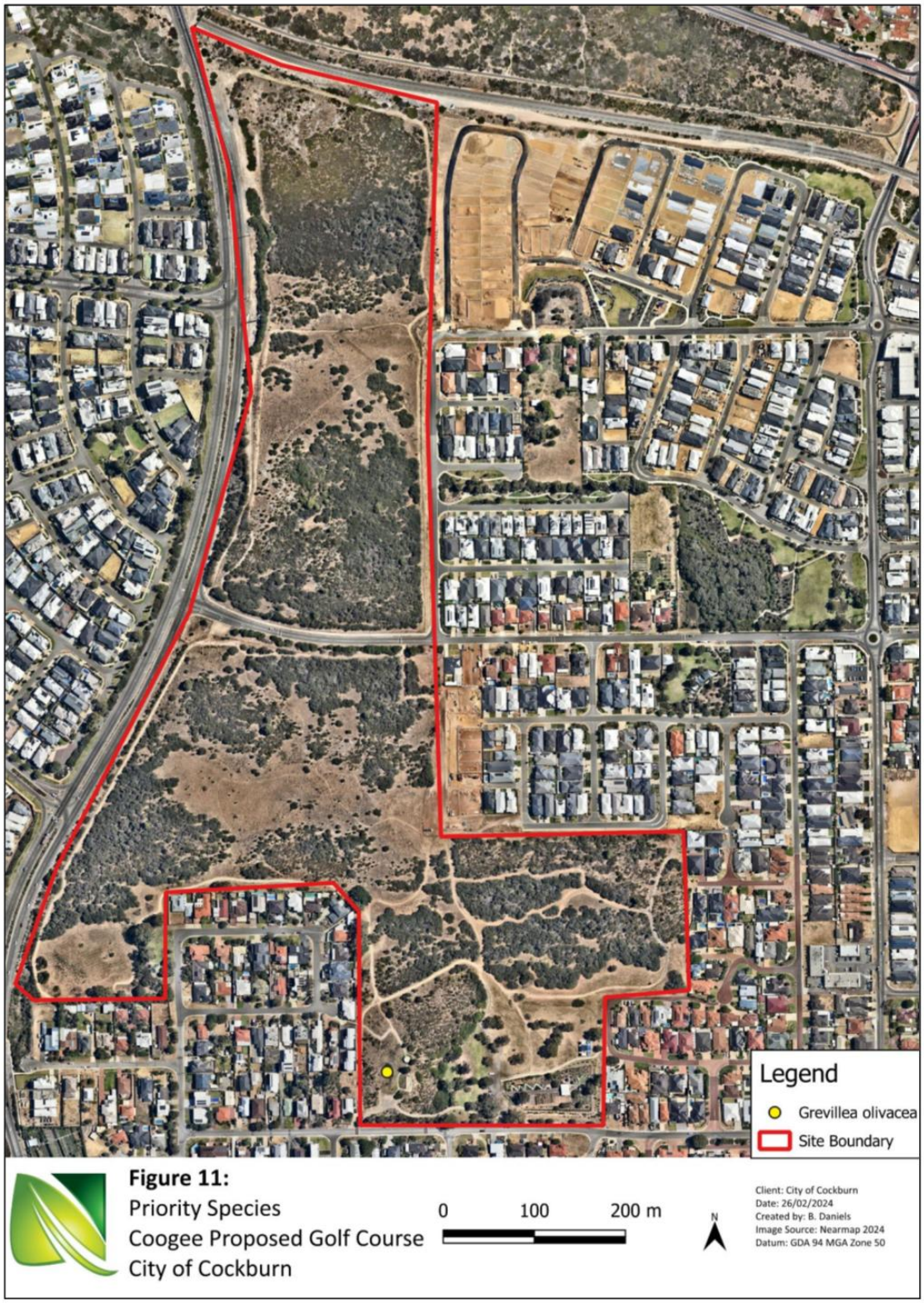


Figure 11:
Priority Species
Coogee Proposed Golf Course
City of Cockburn

4.2.4 Threatened and Priority Communities

There were five threatened ecological communities that were identified during the desktop survey as likely to occur within the survey area. Of these communities it was found that one community possibly occurs within site (highlighted green) (Table 11).

Table 11: Threatened Ecological Communities and their possibility of occurring on site

Threatened Ecological Community	Occurrence	Rationale
Banksia Woodlands of the Swan Coastal Plain	Not likely to occur on site.	The site lies within the Swan Coastal Plain and on the Spearwood sand system however, key diagnostic species of Banksia (*Banksia attenuata* and *Banksia menziesii)* are not present (Department of the Environment and Energy (DOEE), 2016).
Empodisma peatlands of southwestern Australia	Not likely to occur on site.	The site lies within the Swan Coastal Plain however, is not on an organosol soil. The species at site do not align with the indicator species outlined in the approved conservation advice (DCCEEW, 2023a).
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion (also known as *Melaleuca huegelii - M. systena* shrublands of limestone ridges (floristic community type 26a as originally described in Gibson et al. 1994))	Not likely to occur on site.	The site lies within the Swan Coastal Plain on top of a limestone ridge. While some of the key diagnostic species were found on site, *Melaleuca huegelii* and *Melaleuca systena* were not dominant within any of the vegetation recorded on site (DCCEEW, 2023b).
Subtropical and Temperate Coastal Saltmarsh	Not likely to occur on site.	The site occurs along the west coast of Australia south of Shark Bay however the site is not associated with any tidal connection. The site does occur on sandy soils however, the dominant species are not saltmarsh species (Department of Sustainability, Environment, Water, Populations and Communities, 2013).
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Likely to occur on site.	The site does occur on the Swan Coastal Plain on the Spearwood dune system. Areas of the site meet the minimum requirement of two Tuart trees with less than 60 m between the edges of the canopies. The Tuart communities on site do not have a native understory present due to disturbance (cleared for parkland). The patch sizes are less than 5 ha but more than 2 ha (DOEE, 2019). This site is likely to be

Threatened Ecological Community	Occurrence	Rationale
		a priority ecological community but not nationally recognised.
Callitris preissii (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson et al. 1994)	Not likely to occur on site.	The site occurs between Trigg and Point Peron and typically occur on the Quindalup dune system. While one of the indicator species (*Callitris preissii)* for this community does occur on site (Department of Parks and Wildlife (DPaW), 2014), it is not dominant throughout any of the vegetation types on site. *Melaleuca lanceolata (*key indicator species) was not recorded within site.
Northern Spearwood shrublands and woodlands	Not likely to occur on site.	The site does not occur on the Cottesloe complex. While some of the typical species occur on site, the key diagnostic species of Banksia (*Banksia attenuata* and *Banksia menziesii)* are not present (DOEE, 2016).

4.2.4.1 Tuart (*Eucalyptus gomphocephala)* Woodlands and Forests of the Swan Coastal Plain

The Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community has characteristics represented throughout the site. The potential habitat was assessed against the Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain Ecological Community (DAWE, 2019) (Table 12).

Table 12: Key diagnostic characteristics of Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain

Key Diagnostic Characteristics	Meets/ Doesn't Meet	Site Specifics
Occurs in the Swan Coastal Plain Bioregion, Western Australia	Meets Diagnostic Characteristics	Site occurs in the Swan Coastal Plain Bioregion
Primarily occurs on the Spearwood and Quindalup dune systems but can also occur on the Bassendean dunes and Pinjarra Plain. It can occur on the banks of rivers and wetlands	Meets Diagnostic Characteristics	The site occurs within the within EnvGeol LS1 phase and EnvGeol S7 phase which the community does not typically occur on.
The presence of at least two living, established (DBH ≥15 cm) Tuart trees within the upper canopy, with a gap of ≤60 m between the canopy edges of adjacent Tuart trees	Meets Diagnostic Characteristics	More than two Tuart trees were present
The presence of an understorey of native species, often modified by disturbance	Doesn't Meets Diagnostic Characteristics	No native understorey is present in the patch. Evidence of disturbances is present.

Key Diagnostic Characteristics	Meets/ Doesn't Meet	Site Specifics
		However, it does *have Agonis flexuosa* present.
A patch size of at least 0.5 ha	Meets Diagnostic Characteristics	The patch size is greater than 0.5 ha.

The defined survey area was determined to be greater than 2 ha, however not greater than 5 ha. Specific condition categories and thresholds for patches of this size are described in Table 13. In order to assess a site by the biotic thresholds provided in the Conservation Advice (DAWE, 2019), the native proportion of understory cover must be identified. Across the three quadrats surveyed, no (0%) native groundcover species was recorded. This means that while the survey area is not known to be nationally protect ecological community (Tuart (*Eucalyptus gomphocephala)* Woodlands and Forests of the Swan Coastal Plain). However, it still meets all the criteria to be priority ecological community under state level.

Table 13: Condition and Biotic Thresholds of Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain

Condition	Biotic Thresholds (must meet one)	Patch size	
		≥2 ha <5 ha	≥0.5 ha <2 ha
Very High	≥80 % of all understorey vegetation cover is native At least 12 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Part of the protected ecological community	Part of the protected ecological community
High	≥60 % of all understorey vegetation cover is native At least 8 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Part of the protected ecological community	AND has an important landscape role (≤100 m to native vegetation) OR has a habitat role (≥2 very large trees per 0.5 ha) OR shows regeneration (≥15 seedlings and/or saplings per 0.5 ha) Part of the protected ecological community
Moderate	≥50 % of all understorey vegetation cover is native At least 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	AND That either: have an important landscape role (≤100 m to native vegetation)* OR have a habitat role (≥2 very large trees per 0.5 ha)*	Not part of the protected ecological community (but may be a focus for local protection or restoration)

Condition	Biotic Thresholds (must meet one)	Patch size	
		≥2 ha <5 ha	≥0.5 ha <2 ha
		OR show regeneration (≥15 seedlings and/or saplings per 0.5 ha)* Part of the protected ecological community	
Poor	<50 % of all understorey vegetation cover is native# Less than 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Not part of the protected ecological community	Not part of the protected ecological community

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5.0 Weed Mapping

5.1 Results

A total of 72 weed species from 32 families were recorded across the whole site:

- two Declared Pests (DP) or Weeds of National Significance (WoNS)
- five bulbous species
- 15 grass species
- 22 woody species
- 28 other species.

Of these, there were 22 species listed by the City of Cockburn (Table 4) present on site. The DP and WoNS observed on site were Bridal Creeper (**Asparagus asparagoides*) and African Boxthorn (**Lycium ferocissimum).* Bridal Creeper (**Asparagus asparagoides*) was found across most of the site, usually in the vegetated areas while a few populations of African Boxthorn (**Lycium ferocissimum)* found in the southwest of the site in an open grassland area.

Weed load was noted as being high across site, with a high level of weed diversity. The number of weed species (72) outweighed the number of native (34) and dubious (4) species. Weed density across site was categorised as > 61 % with pockets of lower density areas (31 – 60 %) scattered across site. Bulbous weeds ranged from a density of < 5 % to 6 – 30 % and were present throughout site. Grassy weeds were prominent throughout site, with most species ranging from < 5 % density to > 61 % density. Woody weeds were found throughout site, with the Coast Teatree (**Gaudium laevigatum*) in high densities (31 – 60 % to > 61 %) throughout site. Weeds in the Other category were spread throughout site at densities between < 5 % to > 61 %.

The location and densities of the weed species listed by the City and all Declared Pests and WoNs have been provided in Appendix 6. A density table outlining the density value of the listed weeds has been provided in Table 14.

Table 14: Mapped weed densities

Scientific Name	Common Name	Density			
		1	2	3	4
Declared Pests and Weeds of National Significance					
**Asparagus asparagoides*	Bridal Creeper	X			
**Lycium ferocissimum*	African Boxthorn	X			
Bulbous					
**Gladiolus caryophyllaceus*	Wild Gladiolus	X			
**Trachyandra divaricata*		X	X		
Grass					
**Cenchrus setaceus*	Fountain Grass	X	X	X	X

Scientific Name	Common Name	Density			
		1	2	3	4
**Cynodon dactylon*	Couch	X		X	X
**Ehrharta calycina*	Perennial Veldt Grass	X		X	X
**Eragrostis curvula*	African Lovegrass	X		X	
**Hyparrhenia hirta*	Tambookie Grass			X	
**Stenotaphrum secundatum*	Buffalo Grass	X	X		
Woody					
**Acacia longifolia*		X		X	
**Ficus carica*	Common Fig	X			
**Gaudium laevigatum*	Coast Teatree	X		X	X
**Olea europaea*	Olive	X	X		
**Retama raetam*		X		X	X
**Ricinus communis*	Castor Oil Plant	X		X	
**Schinus terebinthifolia*		X	X		X
Other					
**Carpobrotus edulis*	Hottentot Fig	X		X	
**Euphorbia terracina*	Geraldton Carnation Weed	X	X		X
**Foeniculum vulgare*	Fennel	X			
**Fumaria capreolata*	Whiteflower Fumitory	X			
**Lupinus cosentinii*		X	X		
**Pelargonium capitatum*	Rose Pelargonium	X	X		
**Vicia sativa*	Common Vetch		X		

5.2 Weed Prioritisation

The Weed Prioritisation Process for the Swan Region (DBCA, 2016) was used as a tool to determine the ecological impact and invasiveness of each weed species. These results can be used to determine weed treatment and maintenance recommendations, and to develop strategies for the treatment of each weed. Weed invasiveness and impact for each species has been summarised in Table 15.

Table 15: Number of weed species within the survey site based on the ecological impact and invasiveness rating

	Ecological Impact				Invasiveness			
	High	Medium	Low	Unknown	Slow	Moderate	Rapid	Unknown
Number of Species	34	5	5	19	7	12	38	5

Of all the weed species recorded on site, nine have not had an ecological impact or invasiveness rating allocated by DBCA:

- **Araucaria heterophylla*
- **Bougainvillea sp.*
- **Ficus macrophylla*
- **Ficus rubiginosa*
- **Melaleuca quinquenervia*
- **Prunus dulcis*
- **Tamarindus indica*
- **Tecoma stans*
- **Yucca aloifolia*

5.3 Management Recommendations

The characteristics of each species determines the most appropriate management method and can be typically found on FloraBase (Western Australian Herbarium, 2024). Recommended weed treatment types and methodologies are outlined in Table 16.

Any herbicide treatments should be undertaken by appropriately licensed personnel (holders of appropriate and valid Pest Management Technician Licenses). All chemical applications of herbicide should be undertaken with the appropriate dilution of chemical in accordance with the manufacturers label and any requirements noted in the Safety Data Sheet (SDS). Herbicide application can be used to target multiple weed species at once, provided they require the same type and methodology of treatment.

Under the *Biosecurity and Agricultural Management Act 2007* (WA), Declared Pests and Weeds of National Significance are required to be removed by the landowner/ manager, due to their impact on the surrounding vegetation (DPIRD, 2024c).

Table 16: Weed treatment types, target species and methodologies

Treatment Number	Treatment Type	Targeted Species	Application Method and Comments
1	Non-selective (Glyphosate/ Biactive Glyphosate)	Annual and perennial grass and broadleaf weeds	Spot spray target species
2	Grass selective (e.g. Fusilade)	Annual and perennial grasses	Spot spray - selective grass spray (will affect native grass species)
3	Selective (Metsulfuron)	Annual broadleaf weeds and bulbs	Spot spray – semi selective
4	Wick wipe (Glyphosate wipe)	One-leaf Cape Tulip	Wipe leaves with sponge prior to or just on flowering
5	Woody weeds (Triclopyr, Picloram, or Glyphosate)	Woody weeds and trees	Cut and paint, basal bark or drill and fill (method is species dependant as some

Treatment Number	Treatment Type	Targeted Species	Application Method and Comments
			are prone to suckering e.g. Schinus terebinthifolia)
6	Manual removal/hand weeding	Carnation weeds (Euphorbia sp.), Fleabane (Erigeron sp.) and other similar species including woody weed seedlings when small	Gloves required due to caustic sap of Carnation weeds. Manual removal can also include slashing
7	Selective (Triasulfuron)	Carnation weeds (Euphorbia sp.), Fleabane (Erigeron sp.) and other similar species including woody weed seedlings when small	Spot spray target species

Source: Brown and Brooks, 2002; Western Australian Herbarium, 2024

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6.0 Black Cockatoo Habitat Assessment Results

6.1 Desktop Survey

A desktop search of NatureMap database (DBCA, 2024d) and the Protected Matters Search Tool (DCCEEW, 2024) indicated the potential for all three species of black cockatoo; *Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris* to occur within the survey area (Table 17).

Table 17: Black Cockatoo species listed by NatureMap and PMST

Species Name	Cons Code	Nature Map	PMST	DBCA	Presence
Calyptorhynchus banksii naso	VU	X	X	X	Species or species habitat known to occur within area
Zanda baudinii	EN	X			
Zanda latirostris	EN	X	X	X	Breeding known to occur within area

6.2 Field Survey

A total of 27 potential habitat trees (DBH ≥ 500 mm) were recorded during the survey (Figure 12). The DBH of each tree ranged from 500 mm to 1048 mm. Data of all potential habitat trees have been provided in Appendix 7. None of the potential habitat trees had visible hollows at the time of the survey. Species of potential habitat trees included:

- **Eucalyptus botryoides*
- **Schinus molle*
- *#Eucalyptus camaldulensis*
- *Agonis flexuosa*
- *Allocasuarina fraseriana*
- *Corymbia calophylla*
- *Eucalyptus gomphocephala.*

Several potential foraging species according to the *Referral Guideline for 3 WA Threatened Black Cockatoo Species* were found on site (DAWE, 2022). However, no evidence of foraging was observed at the time of the survey. Potential black cockatoo foraging species found on site listed in the *Referral Guideline for 3 WA Threatened Black Cockatoo Species* (DAWE, 2022) include:

- **Pinus halepensis*
- *#Eucalyptus camaldulensis*
- *#Eucalyptus lehmannii*
- *Allocasuarina fraseriana* (Rock Sheoak)
- *Banksia sessilis* (Parrot Bush)
- *Corymbia calophylla* (Marri)
- *Eucalyptus gomphocephala* (Tuart).

As the site contains potential black cockatoo foraging species and is larger than 1 ha, the Black Cockatoo Foraging Scoring Tool was applied (DAWE, 2022) (Table 18). The Black Cockatoo Foraging Scoring Tool has been provided in Table 19.

Table 18: Black Cockatoo Foraging Tool score for the Coogee Golf Complex

Attribute	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red Tailed Black Cockatoo	Appraisal
Starting Score	10	10	-	Site has native eucalypts and proteaceous (*Banksia*) heath. Marri, *Allocasuarina fraseriana* and #*Eucalyptus camaldulensis* were also present on site. However, the site is not Jarrah or Marri forest, and is not on the edge of a Karri forest and does not have Wandoo or Blackbutt present.
Foraging Potential	(-2) 8	(-2) 8	-	No evidence of feeding was observed on site at the time of the survey.
Connectivity	8	8	-	The site is within 12 km of other potential foraging habitat (DBCA, 2024g)
Proximity to Breeding	(-2) 6	(-2) 6	-	The site is not within 12 km of confirmed breeding sites (DBCA, 2024h). There were no suitable hollows visible on site at the time of the survey.
Proximity to Roosting	6	6	-	A confirmed roosting site intersects with the northern section of site (DBCA, 2024b)
Impact from Significant Plant Disease	6	6	-	No evidence of plant disease was observed on site at the time of the survey.
Total Foraging Score	6	6	-	The factors considered above determine the foraging habitat present on site does have a significant foraging value (score of > 4) for Baudin's and Carnaby's black cockatoo species (DAWE, 2022). However, due to a lack of appropriate vegetation type on site, the tool could not be applied to Forest Red Tail Black Cockatoos. It is therefore likely the site is not foraging habitat for the Forest Red Tail cockatoos.

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Table 19: Black Cockatoo Foraging Scoring Tool template

Starting Score	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red Tailed Black Cockatoo
10	Start at a score of 10 if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. This tool only applies to sites equal to or larger than 1 hectare in size.
Attribute	**Sub-tractions**	**Context adjustor (attributes reducing functionality of foraging habitat)**	
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity	-2	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	-1	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	-1	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of

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

Source: DAWE, 2022

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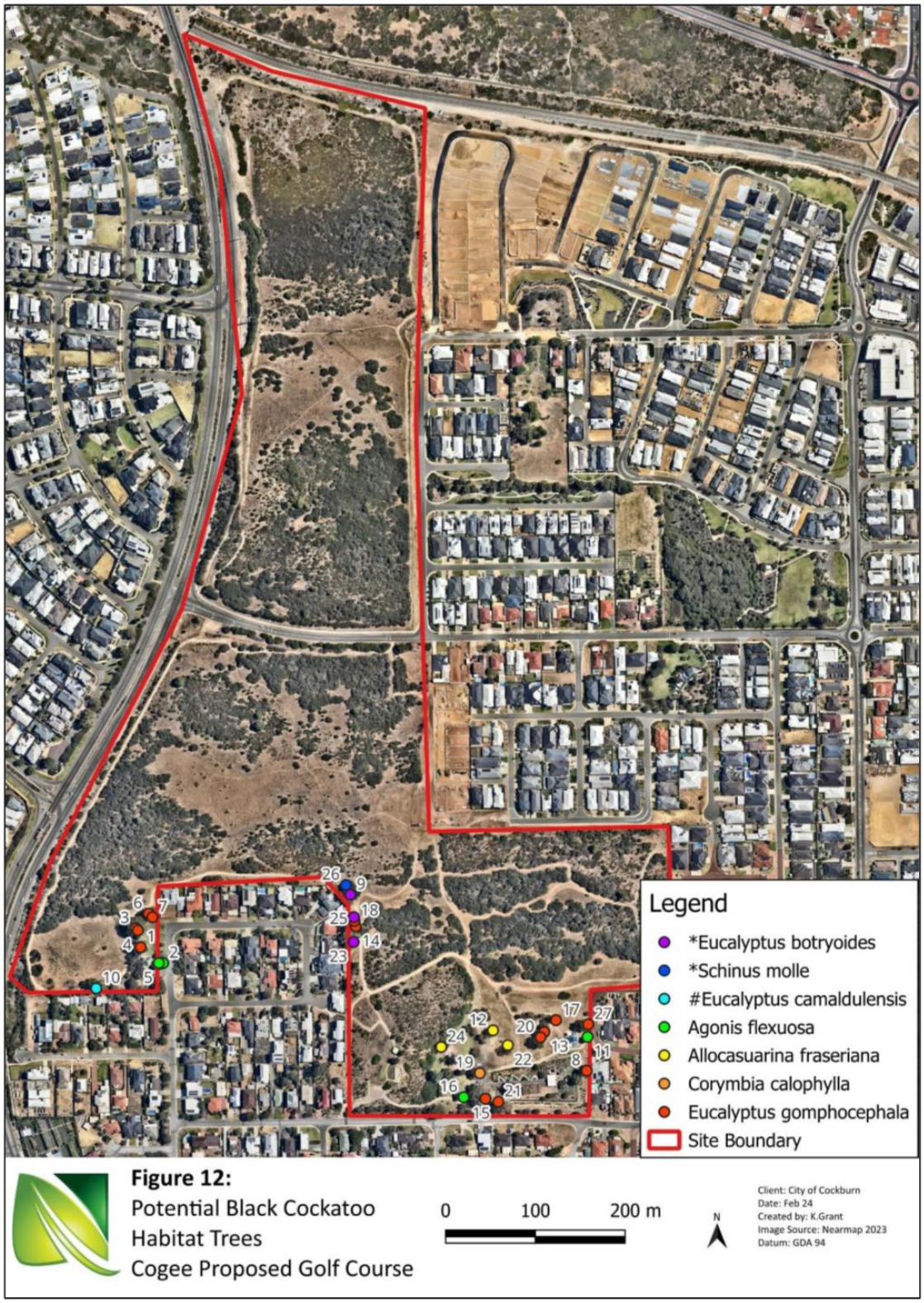


Figure 12:
Potential Black Cockatoo Habitat Trees
Cogee Proposed Golf Course

7.0 Implications of Results

7.1 Flora and Vegetation

The vegetation present on site was found to be in degraded to completely degraded condition. Native flora diversity was lower than weed diversity with 30.91 % of species being native and 65.45 % of species being weeds. The remainder (3.64 %) of species were dubious species (native to WA however, not native in the Swan Coastal Plain). Two Declared Pests and Weeds of National Significance were recorded within site; Bridal Creeper (**Asparagus asparagoides*) and African Boxthorn (**Lycium ferocissimum).*

Weeds were prevalent across site, with combined density being > 61 % across the majority of site. Pockets of weeds had a density of 31 – 60 % and were spread throughout site. All categories of weeds were found throughout site. Coast Teatree (**Gaudium laevigatum*) was found in low (< 5 %) to high (> 61 %) densities throughout site and dominated the vegetation type in some areas.

7.2 Significant Flora

One significant flora species identified as likely to occur during the desktop assessment was found on site (*Grevillea olivacea*). *Grevillea olivacea* is a Priority 3 (P3) species, meaning it is poorly known and not likely under imminent threat (DBCA, 2020a). This species was found in a population of one individual in the southern section of the site near the parkland area. None of the remainder of the significant flora identified as likely occurring on site during the desktop survey were observed on site at the time of the survey.

7.3 Threatened Ecological Communities

The site was assessed for presence and absence of Threatened Ecological Communities (TEC's). Preliminary investigations determined there was a possibility of the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain TEC occurring on site. Further investigation determined that no TEC's were present on site, however the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain TEC, while it did not meet the requirements to be a nationally recognised ecological community, it does meet the criteria to be a state recognised Priority Ecological Community. The Tuart PEC is listed as a Priority 3 ecological community (DBCA, 2023). Priority 3 communities are third priority for survey and definition (DBCA, 2023).

7.4 Black Cockatoo Habitat

There were 27 potential black cockatoo habitat trees that met the minimum size requirement (> 500 mm DBH) however, no hollows were observed within the trees at the time of the survey. Thick foliage and position of the tree in the landscape can make hollows difficult to observe from the ground. Additionally, telescopic cameras are required to view the internal structures of the hollows to determine with certainty whether the hollow is appropriate for use by black cockatoos.

Feeding habitat tree species were observed on site. The black cockatoo foraging tool developed by DAWE (2022) was applied to the site, with the site scoring a six for Baudin's (*Zanda baudinii*) and Carnaby's (*Zanda latirostris*) black cockatoos. This is considered a significant foraging habitat score (score of > 4) (DAWE, 2022). The site could potentially be a significant feeding ground for these two species. The tool could not be applied to the Forest Red Tailed Black Cockatoo (*Calyptorhynchus banksii naso*) as the site did not host a

Jarrah (*Eucalyptus marginata*) or Marri (*Corymbia calophylla*) forest vegetation type, nor were any Wandoo (*Eucalyptus wandoo*) or Blackbutt (*Eucalyptus pilularis*) species recorded on site. This likely concludes the site does not host good quality feeding habitat for the Forest Red Tailed Black Cockatoos, however the species may still use the site for other purposes such as roosting, as the site is in close proximity to roosting and foraging habitat (DBCA, 2024b; DBCA, 2024g).

7.5 Recommended Management Practices

Due to the degraded nature of the site and the intended land use (golf course) management recommendations include weed control and rubbish collection. A weed control program should be implemented throughout the site to reduce the weed load and control Declared Pests and Weeds of National Significance. Weed prioritisation and management recommendations have been outlined in Tables 15 and 16. High weed loads of grasses can be a fire hazard during summer months. Landowners/ managers are required to control any Declared Pests or Weeds of National Significance under the *Biosecurity and Agriculture Management Act* (2007) (DPIRD, 2024c). Rubbish should be removed from site, including dismantling and removal of structures and fire pits. Dismantling structures and removing rubbish and could potentially discourage illicit activities from being undertaken within the reserve.

As the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain PEC occurs within parkland cleared area of site, it is recommended continued maintenance of these areas occur, to prevent any decline in quality of this PEC.

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Appendix 1: PMST Report 10 km

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Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 14-Feb-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	65
Listed Migratory Species:	73

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	86
Commonwealth Heritage Places:	1
Listed Marine Species:	107
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	18
Regional Forest Agreements:	None
Nationally Important Wetlands:	4
EPBC Act Referrals:	83
Key Ecological Features (Marine):	None
Biologically Important Areas:	12
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties			[Resource Information]
Name	State	Legal Status	Buffer Status
Australian Convict Sites (Fremantle Prison)	WA	Declared property	In buffer area only

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Historic			
Fremantle Prison (former)	WA	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Forrestdale and thomsons lakes	Within Ramsar site	In feature area

Listed Threatened Ecological Communities			[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In feature area
Empodisma peatlands of southwestern Australia	Endangered	Community may occur within area	In buffer area only
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community likely to occur within area	In feature area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species			[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
FISH			
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
MAMMAL			
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In feature area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
PLANT			
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area	In feature area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area	In feature area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area	In feature area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area	In feature area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area	In feature area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat may occur within area	In buffer area only
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area	In feature area

Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area	In feature area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Marine Species			
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eubalaena australis as Balaena glacialis australis			
Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area
Lamna nasus			
Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae			
Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Mobula alfredi as Manta alfredi			
Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
Mobula birostris as Manta birostris			
Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Orcinus orca			
Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Phalaropus lobatus Red-necked Phalarope [838]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Tringa totanus Common Redshank, Redshank [835]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - ARTILLERY BARRACKS - FREMANTLE [50155]	WA	In buffer area only
Defence - EAST FREMANTLE SMALL CRAFT BASE [50118]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50152]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50151]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50154]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50153]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50148]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50149]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50147]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50146]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50150]	WA	In buffer area only
Defence - PRESTON POINT TRAINING DEPOT [50173]	WA	In buffer area only
Defence - PRESTON POINT TRAINING DEPOT [50172]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Defence - PRESTON POINT TRAINING DEPOT [50174]	WA	In buffer area only
Unknown		
Commonwealth Land - [50670]	WA	In buffer area only
Commonwealth Land - [50672]	WA	In feature area
Commonwealth Land - [51116]	WA	In buffer area only
Commonwealth Land - [51115]	WA	In buffer area only
Commonwealth Land - [50779]	WA	In buffer area only
Commonwealth Land - [50782]	WA	In buffer area only
Commonwealth Land - [50781]	WA	In buffer area only
Commonwealth Land - [50789]	WA	In buffer area only
Commonwealth Land - [51143]	WA	In buffer area only
Commonwealth Land - [50666]	WA	In feature area
Commonwealth Land - [50786]	WA	In buffer area only
Commonwealth Land - [50749]	WA	In buffer area only
Commonwealth Land - [50787]	WA	In buffer area only
Commonwealth Land - [50741]	WA	In buffer area only
Commonwealth Land - [50669]	WA	In buffer area only
Commonwealth Land - [50785]	WA	In buffer area only
Commonwealth Land - [50676]	WA	In buffer area only
Commonwealth Land - [50677]	WA	In buffer area only
Commonwealth Land - [50745]	WA	In buffer area only
Commonwealth Land - [50740]	WA	In buffer area only
Commonwealth Land - [50671]	WA	In buffer area only
Commonwealth Land - [51412]	WA	In feature area
Commonwealth Land - [51414]	WA	In buffer area only
Commonwealth Land - [51413]	WA	In buffer area only
Commonwealth Land - [50736]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50735]	WA	In buffer area only
Commonwealth Land - [51417]	WA	In buffer area only
Commonwealth Land - [51416]	WA	In buffer area only
Commonwealth Land - [50732]	WA	In buffer area only
Commonwealth Land - [51900]	WA	In buffer area only
Commonwealth Land - [51901]	WA	In buffer area only
Commonwealth Land - [50734]	WA	In buffer area only
Commonwealth Land - [51128]	WA	In buffer area only
Commonwealth Land - [50733]	WA	In buffer area only
Commonwealth Land - [51126]	WA	In buffer area only
Commonwealth Land - [50517]	WA	In buffer area only
Commonwealth Land - [50516]	WA	In buffer area only
Commonwealth Land - [51122]	WA	In buffer area only
Commonwealth Land - [51125]	WA	In buffer area only
Commonwealth Land - [50731]	WA	In buffer area only
Commonwealth Land - [50730]	WA	In buffer area only
Commonwealth Land - [51895]	WA	In buffer area only
Commonwealth Land - [51894]	WA	In buffer area only
Commonwealth Land - [50795]	WA	In buffer area only
Commonwealth Land - [51899]	WA	In buffer area only
Commonwealth Land - [50790]	WA	In buffer area only
Commonwealth Land - [51144]	WA	In buffer area only
Commonwealth Land - [50756]	WA	In buffer area only
Commonwealth Land - [50707]	WA	In buffer area only
Commonwealth Land - [50755]	WA	In buffer area only
Commonwealth Land - [50683]	WA	In buffer area only
Commonwealth Land - [50687]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50686]	WA	In buffer area only
Commonwealth Land - [50685]	WA	In buffer area only
Commonwealth Land - [50684]	WA	In buffer area only
Commonwealth Land - [50751]	WA	In buffer area only
Commonwealth Land - [51438]	WA	In buffer area only
Commonwealth Land - [50710]	WA	In buffer area only
Commonwealth Land - [50725]	WA	In buffer area only
Commonwealth Land - [50729]	WA	In buffer area only
Commonwealth Land - [50722]	WA	In buffer area only
Commonwealth Land - [50721]	WA	In buffer area only
Commonwealth Land - [51494]	WA	In buffer area only
Commonwealth Land - [51147]	WA	In buffer area only
Commonwealth Land - [50788]	WA	In buffer area only
Commonwealth Land - [50708]	WA	In buffer area only
Commonwealth Land - [50688]	WA	In buffer area only
Commonwealth Land - [50761]	WA	In buffer area only
Commonwealth Land - [50780]	WA	In buffer area only
Commonwealth Land - [50763]	WA	In buffer area only
Commonwealth Land - [50762]	WA	In buffer area only
Commonwealth Land - [50784]	WA	In buffer area only

Commonwealth Heritage Places			[Resource Information]
Name	State	Status	Buffer Status
Historic			
Artillery Barracks	WA	Listed place	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area	In feature area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area	In feature area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa limosa Black-tailed Godwit [845]	Endangered	Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area	In feature area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Phalaropus lobatus Red-necked Phalarope [838]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area	In feature area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa brevipes as Heteroscelus brevipes			
Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Tringa glareola			
Wood Sandpiper [829]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis			
Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Tringa totanus			
Common Redshank, Redshank [835]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Xenus cinereus			
Terek Sandpiper [59300]	Vulnerable	Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Fish			
Acentronura australe			
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In feature area
Campichthys galei			
Gale's Pipefish [66191]		Species or species habitat may occur within area	In feature area
Heraldia nocturna			
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In feature area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area	In feature area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In feature area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In feature area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In feature area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In feature area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In feature area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In feature area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In feature area
Reptile			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Aipysurus pooleorum Shark Bay Sea Snake [66061]		Species or species habitat may occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area	In feature area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Whales and Other Cetaceans		[Resource Information]	
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Alfred Cove	Nature Reserve	WA	In buffer area only
Canning River	Management Area	WA	In buffer area only
Carnac Island	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Cottesloe Reef	Fish Habitat Protection Area	WA	In buffer area only
Harry Waring Marsupial Reserve	Nature Reserve	WA	In buffer area only
Keanes Point Reserve	5(1)(g) Reserve	WA	In buffer area only
Swan Estuary - Alfred Cove	Marine Park	WA	In buffer area only
Swan River	Management Area	WA	In buffer area only
Thomsons Lake	Nature Reserve	WA	In buffer area only
Unnamed WA39584	Conservation Park	WA	In buffer area only
Unnamed WA39752	Conservation Park	WA	In buffer area only
Unnamed WA42469	Nature Reserve	WA	In buffer area only
Unnamed WA44414	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA48291	Conservation Park	WA	In buffer area only
Unnamed WA49220	Conservation Park	WA	In feature area
Unnamed WA49561	Conservation Park	WA	In buffer area only
Unnamed WA53313	Conservation Park	WA	In buffer area only
Unnamed WA53632	Conservation Park	WA	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Booragoon Swamp	WA	In buffer area only
Gibbs Road Swamp System	WA	In buffer area only
Swan-Canning Estuary	WA	In buffer area only
Thomsons Lake	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
119 Hammond Road Residential Development	2023/09541		Completed	In buffer area only
Beale Park Redevelopment	2022/09297		Assessment	In feature area
Cockburn Surf Park	2022/09267		Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Fremantle District Police Complex Project	2022/09345		Completed	In buffer area only
Jandakot Airport Expansion, Commercial Development and Clearing of Vegetation	2009/4796		Approval	In buffer area only
Jandakot Horse Agistment	2022/09280		Assessment	In buffer area only
Kwinana Alumina Refinery ? Future Residue Storage Area	2023/09454		Referral Decision	In buffer area only
Land clearing for limestone quarry	2023/09558		Completed	In buffer area only
Residential Development, Wattleup Road, Hammond Park, WA	2021/8933		Post-Approval	In buffer area only
Controlled action				
Alcoa Bauxite Residue Storage Area Extension	2011/5878	Controlled Action	Further Information Request	In buffer area only
Clearing of Lots 2 and 10 Rowley Road, Mandogalup WA	2018/8182	Controlled Action	Assessment Approach	In buffer area only
Construction of a Deepwater, General Container Port	2009/5178	Controlled Action	Proposed Decision	In buffer area only
Construction of Fiona Stanley Hospital	2008/3970	Controlled Action	Post-Approval	In buffer area only
Development of Kwinana Quay port facility	2008/4387	Controlled Action	Completed	In buffer area only
Extension of Beeliar Drive between the junction of Mayor and Fawcett Roads an...	2003/1029	Controlled Action	Completed	In buffer area only
Hammond Park Secondary School development, WA	2016/7741	Controlled Action	Post-Approval	In buffer area only
Latitude 32-industrial development of various lots, Ashley and Sayer Roads, Hope Valley, WA	2016/7695	Controlled Action	Post-Approval	In buffer area only
Lots 13, 14 & 18 Barfield Rd & Lots 48-51 Rowley Rd, Hammond Park	2012/6524	Controlled Action	Post-Approval	In buffer area only
Residential developmnt, Lots 11 and 74 Beenyup Road, Banjup, WA	2017/7923	Controlled Action	Post-Approval	In buffer area only
Residential Estate Development, Lot 682 Rowley Road,	2014/7126	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Mandogalup, Western Australia				
Roe Highway extension, Kwinana Freeway to Stock Road, WA	2009/5031	Controlled Action	Post-Approval	In buffer area only
Roe Hwy Extension	2003/972	Controlled Action	Post-Approval	In buffer area only
Shark Hazard Mitigation Drum Line Program, WA	2014/7174	Controlled Action	Completed	In buffer area only
Shenton Park Subdivision	2004/1479	Controlled Action	Completed	In buffer area only
Thornlie-Cockburn Link Project, WA	2018/8188	Controlled Action	Post-Approval	In buffer area only
Vegetation clearing (Cwlth land), Jandakot Airport, Cockburn, WA	2013/7032	Controlled Action	Post-Approval	In buffer area only
Warders Hotel, Block 1 Warders Cottages, Fremantle, WA	2018/8144	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
'Looping 10' gas transmission pipeline from Kwinana to Hopelands	2005/2212	Not Controlled Action	Completed	In buffer area only
Armadale Road Duplication - Tapper to Anstey Road	2017/7972	Not Controlled Action	Completed	In buffer area only
Armadale Road to North Lake Road Bridge development, Jandakot, WA	2018/8284	Not Controlled Action	Completed	In buffer area only
Bibra Lake Aboriginal Cultural Centre Development	2020/8642	Not Controlled Action	Completed	In buffer area only
Calleya Residential Development, Banjup, WA	2016/7708	Not Controlled Action	Completed	In buffer area only
Clearing and development of 220 and 234 Wattleup Rd, Wattleup, WA	2016/7738	Not Controlled Action	Completed	In buffer area only
Clearing of Native Vegetation, Hammond Park, WA	2011/6041	Not Controlled Action	Completed	In buffer area only
Construction and operation of an 8 turbine wind farm at Rous Head Harbour, Frema	2003/933	Not Controlled Action	Completed	In buffer area only
Construction of Hammond Road Primary School, Hammond Park, WA	2012/6619	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Development of Lots 100-101 Sayer Road, Hope Valley, WA	2019/8399	Not Controlled Action	Completed	In buffer area only
Disposal of residential properties, Fremantle, WA	2019/8593	Not Controlled Action	Completed	In buffer area only
Eradication of the European House Borer, Perth metropolitan area, WA	2009/5027	Not Controlled Action	Completed	In buffer area only
Expansion of berthing facilities at Kwinana Bulk Terminal	2006/2509	Not Controlled Action	Completed	In buffer area only
Expansion of existing Ammonium Nitrate Production Facility	2005/1941	Not Controlled Action	Completed	In buffer area only
Frankland Parks Oval project, Hammond Park, WA	2018/8369	Not Controlled Action	Completed	In buffer area only
Fremantle Ports Inner Harbour Capital Dredging Proposal	2005/2477	Not Controlled Action	Completed	In buffer area only
Gas-fired Power Station	2005/2213	Not Controlled Action	Completed	In feature area
Hammond West Urban Development, Hammond Park, WA	2017/7917	Not Controlled Action	Completed	In buffer area only
Hazard reduction and site access, Lot 682 Rowley Road, Mandogalup, WA	2018/8186	Not Controlled Action	Completed	In buffer area only
High Street Upgrade, Fremantle, WA	2018/8315	Not Controlled Action	Completed	In buffer area only
Hope Valley-Wattleup Redevelopment Project	2020/8644	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Industrial development 105 Sayer Road, Hope Valley, WA	2014/7261	Not Controlled Action	Completed	In buffer area only
Industrial Development Lot 64 Ashley Road, Hope Valley, WA	2014/7238	Not Controlled Action	Completed	In buffer area only
Jandakot Road Widening, Solomon Road to Berrigan Drive, Jandakot, WA	2020/8728	Not Controlled Action	Completed	In buffer area only
Kwinana Fwy southbound widening Roe Hwy to Armadale Rd and construction of farrington Rd off-ramp	2013/7062	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Kwinana Gas-Fired Power Station	2005/2101	Not Controlled Action	Completed	In feature area
Latitude 32 industrial development 6A, Cockburn, WA	2018/8193	Not Controlled Action	Completed	In buffer area only
Lot 170 Hope Valley Road, Hope Valley	2020/8830	Not Controlled Action	Completed	In buffer area only
Lots 12, 13 and 18 Hammond Road, Lot 80 Beeliar Drive and Lot 500 Hird Road	2012/6576	Not Controlled Action	Completed	In buffer area only
Murdoch University Sports Precinct, Melville, WA	2016/7823	Not Controlled Action	Completed	In buffer area only
Perth Desalination Plant 2	2019/8454	Not Controlled Action	Completed	In buffer area only
Perth Seawater Desalination Project: Thomsons Lake to Kogolup Pipeline	2005/1971	Not Controlled Action	Completed	In buffer area only
Redevelopment of Purvis Street school site, Hamilton Hill, WA	2018/8255	Not Controlled Action	Completed	In buffer area only
Residential Development, Lot 12 Lyon Road, Aubin Grove, WA	2013/6852	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 13 Lyon Road, Aubin Grove, WA	2014/7151	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 33 Barfield Road, Hammond Park, WA	2015/7548	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 74 Wattleup Road, Hammond Park, WA	2018/8273	Not Controlled Action	Completed	In buffer area only
Residential development, Lots 124 and 125, Wattleup Road, Hammond Park, WA	2015/7519	Not Controlled Action	Completed	In buffer area only
Residential Development Lot 4225 North Lake Road, Kardinya, WA	2015/7505	Not Controlled Action	Completed	In buffer area only
Residential Development of Lots 76 and 107 Wattleup Road, Hamond Park	2020/8865	Not Controlled Action	Completed	In buffer area only
Residential development on part of Lot 2 Fanstone Avenue, Beeliar, WA	2016/7726	Not Controlled Action	Completed	In buffer area only
Roe Highway - Karel Avenue to Hope Road Bridge Project	2005/2061	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
South Metropolitan Crop Research Hub, Murdoch WA	2018/8201	Not Controlled Action	Completed	In buffer area only
Stages 2-5 of primary school and assoc facilities development, Hammond Park, WA	2015/7407	Not Controlled Action	Completed	In buffer area only
Urban development, Lot 109 Wattleup Road, Hammond Park, WA	2015/7425	Not Controlled Action	Completed	In buffer area only
Urban development of Lot 107 Wattleup Road, Hammond Park, WA	2017/7890	Not Controlled Action	Completed	In buffer area only
Warders' Cottages Block 2 'W2'	2022/9148	Not Controlled Action	Completed	In buffer area only
Warders' Cottages W2 minor works, Fremantle, WA	2018/8185	Not Controlled Action	Completed	In buffer area only
Wentworth West residential development, Bartram Road, Success, WA	2014/7245	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
City of Cockburn Sporting Facilties	2005/2139	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Extension of Spearwood Ave, from Barrington Rd to Miguel Rd	2009/5140	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
Rezoning of Crown Reserve 39181 to facilitate future residential development	2005/2096	Referral Decision	Completed	In buffer area only

Biologically Important Areas			
Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			

Scientific Name	Behaviour	Presence	Buffer Status
Ardenna carneipes Flesh-footed Shearwater [82404]	Aggregation	Known to occur	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur	In feature area
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In feature area
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In feature area
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range	In feature area
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In feature area
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In feature area
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur	In feature area
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In feature area
Seals			
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In feature area
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

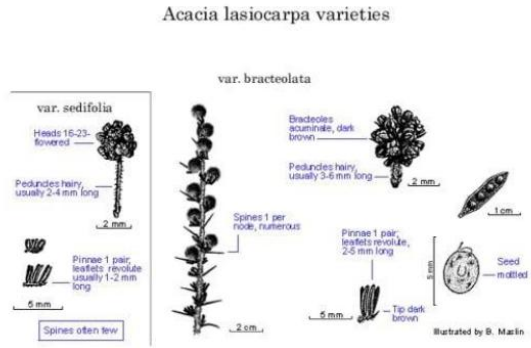
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix 2: Significant Species Guide

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Acacia lasiocarpa var. *bracteolata* long peduncle variant 		Shrub, 0.4-1.5 m high. Fl. Yellow.	May or Aug.	Grey or black sand over clay. Swampy areas, winter wet lowlands.	P1	N	Habitat unsuitable
		Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple.	Sep to Nov.	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	T	N	Habitat unsuitable

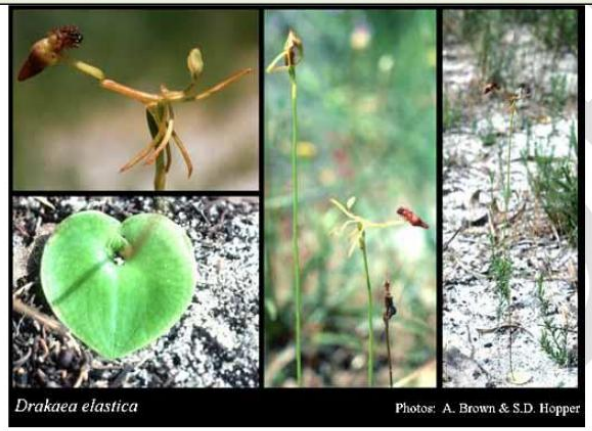
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Angianthus micropodioides		Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white, Nov to Dec or Jan to Feb.		Saline sandy soils. River edges, saline depressions, claypans.	3	N	Habitat unsuitable
Austrostipa mundula		Perennial grass. 20 – 60 cm high.		Low heath, Exposed limestone. Small isolated coastal populations.	3	Y	Habitat suitable
 *Banksia mimica* Photos: A.P. Brown & S. Patrick	Summer Honeypot	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown.	Jan to Feb.	White or grey sand over laterite, sandy loam. Grows on flat to gentle slopes in grey and white sand in open woodlands	T	N	Location and habitat not suitable.

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
 *Beyeria cinerea* subsp. *cinerea* Photos: G. Cockerton & M. Kealley		Shrub. 30 cm high. Pale yellow male flowers.		Growing on coastal dunes and limestone. Sand over limestone.	3	Y	Soil type suitable
 *Caladenia huegelii* Photos: I. & M. Greeve & J.L. Robson	Grand Spider Orchid	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red.	Sep to Oct.	Grey or brown sand, clay loam. In low mixed woodlands of Coast *Banksia attenuata* and B. *menziesii.*	T	N	Habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Cyathochaeta teretifolia		Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown.		Grey sand, sandy clay. Swamps, creek edges	P3	N	Habitat unsuitable
Dampiera triloba		Erect perennial, herb or shrub, to 0.5 m high. Fl. blue	Aug to Dec	Damp peat/loam soil.	P3	N	Habitat unsuitable
 *Diuris drummondii* Photos: A. P. Brown and I & M Greeve	Tall Donkey Orchid	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow,	Nov to Dec or Jan.	Low-lying depressions, swamps	T	N	Habitat unsuitable

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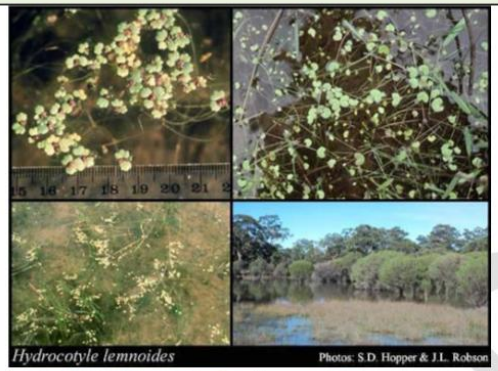
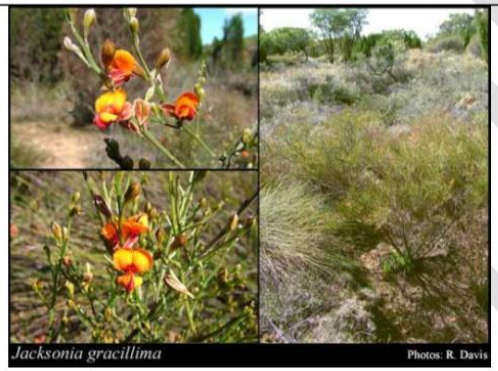
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown.	Sep to Oct.	Brown loamy clay. Winter-wet swamps, in shallow water.	T	N	Habitat unsuitable
	Purdie's Donkey Orchid	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow.	Sep to Oct.	Grey-black sand, moist. Winter-wet swamps.	T	N	Habitat unsuitable

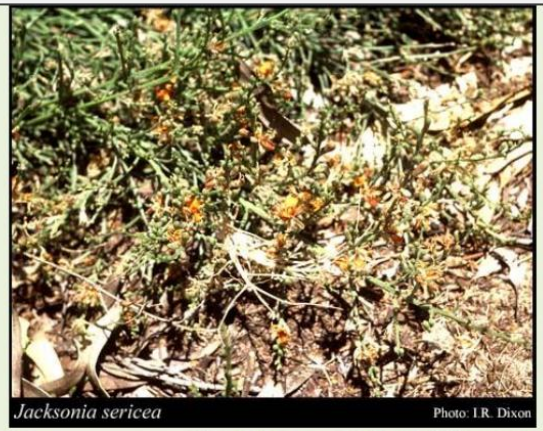
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Hackett's Hopbush	Erect shrub or tree, 1-5 m high. Fl. yellow-green/red, mainly	Jul to Oct	Sand. Outcropping limestone.	P4	Y	Habitat suitable
	Glossy-leaved Hammer Orchid	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow.	Oct to Nov.	White or grey sand. Low-lying situations adjoining winter-wet swamps. The species grows o in low-lying areas alongside winter-wet swamps, typically in banksia thicket vegetation	T	N	Soil and habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Dwarf Hammer Orchid	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow.	Sep to Oct.	White-grey sand. Occurs in infertile grey sands, in Jarrah and Common Sheoak woodland or forest associated with Banksia species	T	N	Habitat unsuitable
		Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. Green.	Aug to Nov.	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	T	N	Habitat unsuitable

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Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Eucalyptus foecunda subsp. *foecunda*	Fremantle Mallee	Mallee. 1 m high.		Shallow soil over limestone	4	Y	Soil suitable
	Olive Grevillea	Erect, non – lignotuberous shrub. 1 – 4.5 m high. Flower red/ red – pink.	Jun - Sept	White or grey sand	4	Y	Habitat suitable
	Spider Net Grevillea	Spreading, lignotuberous shrub, 0.3-1.5 m high. Fl. pink-red.	May to Nov.	Sand, sandy clay. Winter-wet low-lying flats.	T	N	Habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Hibbertia leptotheca		Erect spreading shrub. 0.2 – 0.5 m high. Yellow flowers.	Jul - Oct	Sand near coastal limestone ridges, cliffs and outcrops.	3	Y	Habitat suitable
 *Hydrocotyle lemnoides* Photos: S.D. Hopper & J.L. Robson	Aquatic Pennywort	Aquatic float annual herb. Purple flowers.	Aug - Oct	Swamps	P4	N	Habitat unsuitable
 *Jacksonia gracillima* Photos: R. Davis		Spreading shrub up to 1.5m high and 2m high. Flowers orange.	Oct - Nov	Damp soil	P3	N	Habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
 *Jacksonia sericea* Photo: I.R. Dixon	Waldjumi	Low spreading shrub, to 0.6 m high. Fl. Orange.	Dec or Jan to Feb	Calcareous & sandy soils.	P4	Y	Habitat suitable
 *Macarthuria keigheryi* Photos: G.J. Keighery		Erect or spreading perennial, herb or shrub, 0.2-0.4 m high, 0.3-0.6 m wide.	Sep to Dec or Feb to Mar.	Found in low-lying winter-wet damp, grey/white sands and grows in open patches with low tree canopy cover among heathland,	T	N	Habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Microtis quadrata	South Coast Mignonette Orchid	0.03 – 0.08 m high. Yellow – green flowers.	Jan - Dec	Seasonally wet depression, swampy mounds near coastal areas	P4	N	Habitat unsuitable
 *Phlebocarya pilosissima* subsp. *pilosissima* Photo: G.J. Keighery		Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white.	Aug to Oct.	White or grey sand, lateritic gravel.	P3	N	Soil type unsuitable.
 *Pimelea calcicola* Photos: I.R. Dixon	Coastal Banjine	Erect – spreading shrub. 0.2 – 1 m high. Pink flowers	Sept - Nov	Sand & coastal limestone ridges	P3	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
 *Stylidium longitubum* Photos: M. Hislop and P.G. Armstrong	Jumping Jacks	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink,	Oct to Dec.	Sandy clay, clay. Seasonal wetlands.	P4	N	Habitat unsuitable
 *Stylidium maritimum* Photos: K.C. Richardson	Coastal Triggerplant	Caespitose perennial herb. 0.3 – 0.7 m high. Fl. White/ purple.	Sept – Nov	Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	P3	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Stylidium paludicola		Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular.	Oct to Dec.	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	P3	N	Habitat unsuitable
Styphelia filifolia		Erect shrubs to 0.9 m high, 0.7 m wide, Fl white	March-May	Sandy soils of the coastal plain (with one known occurrence from the northern Darling Scarp), usually in Banksia or Jarrah woodland and in low-lying situations.	P3	N	Habitat unsuitable

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Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
 *Synaphea* sp. Fairbridge Farm (D. Papenfus 696) Photos: R. Butcher		Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. Yellow.	Oct.	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	T	N	Habitat unsuitable
 *Thelymitra stellata* Photos: A.P. Brown & I. & M. Greeve	Star Orchid	Tuberous perennial herb. 0.15 – 0.25 m high. Yellow – brown flowers.	Oct - Nov	Sand ,gravel lateritic loam	T	N	Habitat unsuitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Queen of Sheba	Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink.	Jun to Sep.	Sandy clay, sand, laterite.	P2	N	Soil type unsuitable.
Tripterococcus sp. Brachylobus (A.S. George 14234)		Slender erect mutli-stemmed herb to 0.6 m high. Flowers orange/yellow.		Moist sandy flat. Winter wet flats, peaty sand over clay.	P4	N	Habitat unsuitable

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Appendix 3: Conservation Codes

Western Australia

Conservation Code	Name	Description
T	Threatened	Flora or fauna that is rare or likely to become extinct, ranked according to their level of threat using IUCN Red List criteria (Schedules 1-3 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
CR	Critically endangered	Species considered to be facing an extremely high risk of extinction within the wild in the immediate future
EN	Endangered	Species considered to be facing a very high risk of extinction in the wild in the near future
VU	Vulnerable	Species considered to be facing a high risk of extinction in the wild in the medium-term future
EX	Extinct Species	Species where 'there is no reasonable doubt that the last member of the species has died (Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
EW	Extinct in the Wild	Species that are known to only survive in cultivation, in captivity, or as a naturalised population well outside its past range; and it has not been recorded in its known or expected habitat at appropriate seasons anywhere in its past range, despite surveys over a timeframe appropriate to its life cycle and form
MI	Migratory Species	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 (Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice)
CD	Conservation Dependent	Species of special conservation interest (conservation dependent fauna), being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice)
OS	Specially Protected	Fauna otherwise in need of special protection to ensure their conservation (Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice)
P	Priority Species	Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or

Conservation Code	Name	Description
		flora. 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.
P1	Priority One	Poorly known species – 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, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation.
2	Priority Two	Poorly known species – 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, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar.
3	Priority Three	Poorly known species – 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
4	Priority Four	Rare or near threatened and other species in need of monitoring.

(Source: Department of Biodiversity, Conservation and Attractions, 2020a)

Commonwealth

Category	Description
Critically Endangered	Species facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Species facing a very high risk of extinction in the wild in the near future
Vulnerable	Species facing a high risk of extinction in the wild in the medium term

(Source: Department of Biodiversity, Conservation and Attractions, 2019)

Appendix 4: Quadrat Data

Quadrat No.:	Q1
Survey Date:	16/11/2023
Personnel:	KG, KE
Easting:	383772.500
Northing:	6447272.659
Topography:	Mid
Aspect:	NE
Slope:	3 – 5 %
Soil:	Brown Sand
Gravel:	0%
Rock:	25 %
Leaf Litter:	5 %
Bare Ground:	5%
Drainage:	Well
Condition:	Completely Degraded



Notes: **Gaudium laevigatum* and *Templetonia retusa* open heath over **Lagurus ovatus* and mixed herb.

Native Species	Cover (%)	Height (m)	Weed Species	Cover (%)	Height (m)
Acacia rostellifera	1	0.50	**Gaudium laevigatum*	70	1.80
Templetonia retusa	5	1.00	**Lagurus ovatus*	40	0.20
			**Lupinus cosentinii*	0.50	0.40
			**Pelargonium capitatum*	1	0.30
			**Romulea rosea*	0.10	0.10
			**Sixalix atropurpurea*	5	0.30

Note: *denotes introduced species.

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Quadrat No.:	Q2
Survey Date:	16/11/2023
Personnel:	KG, KE
Easting:	383855.703
Northing:	6447495.190
Topography:	Mid
Aspect:	SE
Slope:	3 – 5 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	0 %
Leaf Litter:	5 %
Bare Ground:	5 %
Drainage:	Well
Condition:	Degraded



Notes: **Gaudium laevigatum* and *Templetonia retusa* Tall open scrub over **Lagurus ovatus* and mixed herb

Native Species	Cover (%)	Height (m)	Weed Species	Cover (%)	Height (m)
Templetonia retusa	40	3.00	**Asparagus asparagoides*	0.10	0.20
			**Ehrharta calycina*	1	0.40
			**Euphorbia terracina*	1	0.30
			**Gaudium laevigatum*	40	3.00
			**Lagurus ovatus*	50	0.30
			**Olea europaea*	1	0.50

Note: *denotes introduced species.

DRAFT

Quadrat No.:	Q3
Survey Date:	16/11/2023
Personnel:	KG, KE
Easting:	383835.617
Northing:	6447680.302
Topography:	Mid
Aspect:	NE
Slope:	3 – 5 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	5 %
Leaf Litter:	15 %
Bare Ground:	0 %
Drainage:	Well
Condition:	Degraded



Notes: *Banksia sessilis* Tall open scrub and *Xanthorrhoea preissii* over mixed weed grass and herbs.

Native Species	Cover (%)	Height (m)	Weed Species	Cover (%)	Height (m)
Banksia sessilis	80	2.00	**Asparagus asparagoides*	1	0.20
Xanthorrhoea preissii	3	0.80	**Ehrharta calycina*	20	0.50
			**Ehrharta longiflora*	20	0.40
			**Euphorbia terracina*	20	0.50
			**Lagurus ovatus*	5	0.50
			**Olea europaea*	1	0.50
			**Sixalix atropurpurea*	5	0.50

Note: *denotes introduced species.

Quadrat No.:	**Q4**
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	384138.587
Northing:	6446824.370
Topography:	Slight
Aspect:	SW
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	0 %
Leaf Litter:	1 %
Bare Ground:	5 %
Drainage:	Well
Condition:	Completely Degraded



Notes: **Gaudium laevigatum, Templetonia retusa,* and *Rhagodia baccata* open heath over **Ehrharta calycina* and mixed herb weeds.

Native Species	**Cover (%)**	**Height (m)**	**Weed Species**	**Cover (%)**	**Height (m)**
Rhagodia baccata	2	0.50	**Asparagus asparagoides*	0.10	0.20
Templetonia retusa	1	1.00	**Carpobrotus edulis*	1	0.20
			**Ehrharta calycina*	30	0.80
			**Euphorbia terracina*	0.50	0.50
			**Gaudium laevigatum*	70	5.00
			**Lupinus cosentinii*	0.10	0.30
			**Pelargonium capitatum*	1	0.30
			**Trachyandra divaricata*	0.50	0.30

Note: *denotes introduced species.

DRAFT

Quadrat No.:	**Q5**
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	383555.553
Northing:	6446852.062
Topography:	Slight
Aspect:	NW
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	10 %
Leaf Litter:	1 %
Bare Ground:	5 %
Drainage:	Well
Condition:	Degraded



Notes: *Templetonia retusa* and **Gaudium laevigatum* open heath over mixed grass and herb weeds.

Native Species	**Cover (%)**	**Height (m)**	**Weed Species**	**Cover (%)**	**Height (m)**
Templetonia retusa	50	2.00	**Avena barbata*	5	0.5
Spyridium globulosum	3	0.50	**Bromus diandrus*	5	0.40
			**Ehrharta calycina*	0.50	0.50
			**Gaudium laevigatum*	40	2.50
			**Lagurus ovatus*	1	0.30
			**Pelargonium capitatum*	0.10	0.30
			**Romulea rosea*	0.10	0.20

Note: *denotes introduced species.

DRAFT

Quadrat No.:	**Q6**
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	384069.150
Northing:	6446673.674
Topography:	Slight
Aspect:	SE
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	0 %
Leaf Litter:	40 %
Bare Ground:	5 %
Drainage:	Well
Condition:	Completely Degraded



Notes: *Eucalyptus gomphocephala* and *Agonis flexuosa* closed forest over **Cynodon dactylon* and mixed grass weeds.

Native Species	**Cover (%)**	**Height (m)**	**Weed Species**	**Cover (%)**	**Height (m)**
Agonis flexuosa	15	6.00	*#Corymbia ficifolia*	10	6.00
Eucalyptus gomphocephala	8	12.00	**Cynodon dactylon*	40	0.10
			**Ehrharta calycina*	0.1	0.10
			**Lagurus ovatus*	1	0.30

Note: *denotes introduced species.

DRAFT

Quadrat No.:	**Q7**
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	384060.294
Northing:	6446695.676
Topography:	Slight
Aspect:	SE
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	0 %
Leaf Litter:	30 %
Bare Ground:	5 %
Drainage:	Well
Condition:	Completely Degraded



Notes: *Eucalyptus gomphocephala* and *Agonis flexuosa* open forest over mixed grass and herbweeds

Native Species	**Cover (%)**	**Height (m)**	**Weed Species**	**Cover (%)**	**Height (m)**
Agonis flexuosa	40	8.00	**Cynodon dactylon*	1	0.10
Eucalyptus gomphocephala	50	12.00	**Ehrharta calycina*	2	0.20
			**Trifolium campestre*	2	0.10

Note: *denotes introduced species.

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Quadrat No.:	**Q8**
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	384028.440
Northing:	6446589.773
Topography:	Slight
Aspect:	N
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	0 %
Leaf Litter:	5 %
Bare Ground:	10 %
Drainage:	Well
Condition:	Completely Degraded



Notes: *Eucalyptus gomphocephala* and *Agonis flexuosa* closed forest over **Cynodon dactylon*

Native Species	**Cover (%)**	**Height (m)**	**Weed Species**	**Cover (%)**	**Height (m)**
Eucalyptus gomphocephala	90	16.00	**Cynodon dactylon*	5	0.10
Agonis flexuosa	20	6.00			

Note: *denotes introduced species.

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Quadrat No.:	Q9
Survey Date:	17/11/2023
Personnel:	KG, KE
Easting:	383871.043
Northing:	6447700.797
Topography:	Slight
Aspect:	E
Slope:	1 – 3 %
Soil:	Brown Sand
Gravel:	0 %
Rock:	5 %
Leaf Litter:	5 %
Bare Ground:	0 %
Drainage:	Well
Condition:	Degraded



Notes: *Banksia sessilis* and *Templetonia retusa* open heath over *Acacia rostellifera* and mixed grass and herbs

Native Species	Cover (%)	Height (m)	Weed Species	Cover (%)	Height (m)
Acacia rostellifera	5	1.00	**Cenchrus setaceus*	0.1	0.40
Austrostipa flavescens	0.1	0.50	**Ehrharta calycina*	1	0.20
Banksia sessilis	60	2.00	**Ehrharta longiflora*	0.1	0.20
Hardenbergia comptoniana	1	1.00	**Euphorbia terracina*	1	0.30
Templetonia retusa	20	2.00	**Lolium rigidum*	0.1	0.20
			**Reichardia tingitana*	0.4	0.10

Note: *denotes introduced species.

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Appendix 5: Species List

The complete flora list for the site is provided in the table below with flora listed by species. *Denotes introduced species and # denotes species that are native to Western Australia but not to this local region.

Family	Scientific Name	Common Name
Aizoaceae	**Carpobrotus edulis*	Hottentot Fig
Anacardiaceae	**Schinus molle*	
Anacardiaceae	**Schinus terebinthifolia*	
Apiaceae	**Foeniculum vulgare*	Fennel
Araucariaceae	**Araucaria heterophylla*	
Arecaceae	**Washingtonia filifera*	
Asparagaceae	*Acanthocarpus preissii*	
Asparagaceae	**Agave americana*	Century Plant
Asparagaceae	**Asparagus asparagoides*	Bridal Creeper
Asparagaceae	*Lomandra maritima*	Maritime Mat Rush
Asparagaceae	**Yucca aloifolia*	
Asphodelaceae	**Asphodelus fistulosus*	Onion Weed
Asphodelaceae	**Trachyandra divaricata*	
Asteraceae	**Erigeron sumatrensis*	
Asteraceae	**Gazania linearis*	
Asteraceae	**Hypochaeris radicata*	Flat Weed
Asteraceae	**Hypochaeris glabra*	Smooth Cats-ear
Asteraceae	**Lactuca serriola*	Prickly Lettuce
Asteraceae	*Olearia axillaris*	Coastal Daisybush
Asteraceae	**Osteospermum ecklonis*	
Asteraceae	**Reichardia tingitana*	False Sowthistle
Asteraceae	**Sonchus oleraceus*	Common Sowthistle
Bignoniaceae	**Tecoma stans*	
Brassicaceae	**Brassica tournefortii*	Mediterranean Turnip
Caprifoliaceae	**Sixalix atropurpurea*	
Casuarinaceae	*Allocasuarina fraseriana*	Sheoak
Casuarinaceae	**Casuarina cunninghamiana*	
Chenopodiaceae	*Enchylaena tomentosa*	Barrier Saltbush

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Family	Scientific Name	Common Name
Chenopodiaceae	*Rhagodia baccata*	Berry Saltbush
Convolvulaceae	**Ipomoea indica*	Morning Glory
Crassulaceae	**Crassula glomerata*	
Cupressaceae	*Callitris preissii*	Rottnest Island Pine
Ericaceae	*Leucopogon parviflorus*	Coast Beard-heath
Euphorbiaceae	**Euphorbia peplus*	Petty Spurge
Euphorbiaceae	**Euphorbia terracina*	Geraldton Carnation Weed
Euphorbiaceae	**Ricinus communis*	Castor Oil Plant
Fabaceae	*Acacia cyclops*	Costal Wattle
Fabaceae	**Acacia iteaphylla*	
Fabaceae	**Acacia longifolia*	
Fabaceae	*Acacia rostellifera*	Summer-scented Wattle
Fabaceae	*Acacia saligna*	orange wattle
Fabaceae	**Erythrina ×sykesii*	Coral tree
Fabaceae	*Hardenbergia comptoniana*	Native Wisteria
Fabaceae	**Lupinus cosentinii*	
Fabaceae	**Retama raetam*	
Fabaceae	**Tamarindus indica*	Tamarind
Fabaceae	*Templetonia retusa*	Cockies Tongues
Fabaceae	**Trifolium angustifolium*	Narrowleaf Clover
Fabaceae	**Trifolium campestre*	Hop Clover
Fabaceae	**Vicia sativa*	Common Vetch
Geraniaceae	**Pelargonium capitatum*	Rose Pelargonium
Goodeniaceae	*Scaevola crassifolia*	Thick-leaved Fan-flower
Haemodoraceae	*Conostylis candicans*	Grey Cottonhead
Hemerocallidaceae	*Dianella revoluta*	Blueberry Lily
Iridaceae	**Gladiolus caryophyllaceus*	Wild Gladiolus
Iridaceae	**Romulea rosea*	Guildford Grass
Lamiaceae	**Lavandula stoechas*	Italian Lavender
Moraceae	**Ficus macrophylla*	
Moraceae	**Ficus rubiginosa*	
Moraceae	**Ficus carica*	Common Fig

Family	Scientific Name	Common Name
Myrtaceae	*Agonis flexuosa*	Peppermint
Myrtaceae	*Corymbia calophylla*	Marri
Myrtaceae	*#Corymbia ficifolia*	Red-flowering Gum
Myrtaceae	*#Corymbia maculata*	
Myrtaceae	*#Eucalyptus camaldulensis*	River Gum
Myrtaceae	*Eucalyptus gomphocephala*	Tuart
Myrtaceae	*#Eucalyptus lehmannii*	Bushy Yate
Myrtaceae	**Eucalyptus botryoides*	
Myrtaceae	**Gaudium laevigatum*	Coast Teatree
Myrtaceae	*Melaleuca huegelii*	Chenille Honeymyrtle
Myrtaceae	**Melaleuca quinquenervia*	
Myrtaceae	*Melaleuca systena*	Coastal Honeymyrtle
Myrtaceae	*Melaleuca viminalis*	
Nyctaginaceae	**Bougainvillea sp.*	
Oleaceae	**Olea europaea*	Olive
Onagraceae	**Oenothera drummondii*	Beach Evening Primrose
Onagraceae	**Oenothera stricta*	Common Evening Primrose
Orobanchaceae	**Orobanche minor*	Lesser Broomrape
Papaveraceae	**Fumaria capreolata*	Whiteflower Fumitory
Pinaceae	**Pinus halepensis*	Aleppo Pine
Plantaginaceae	**Plantago lanceolata*	Ribwort Plantain
Poaceae	**Arundo donax*	Giant Reed
Poaceae	*Austrostipa compressa*	
Poaceae	*Austrostipa elegantissima*	
Poaceae	*Austrostipa flavescens*	
Poaceae	**Avena barbata*	Bearded Oat
Poaceae	**Briza maxima*	Blowfly Grass
Poaceae	**Briza minor*	Shivery Grass
Poaceae	**Bromus diandrus*	Great Brome
Poaceae	**Cenchrus clandestinus*	Kikuyu Grass
Poaceae	**Cenchrus setaceus*	Fountain Grass
Poaceae	**Cynodon dactylon*	Couch

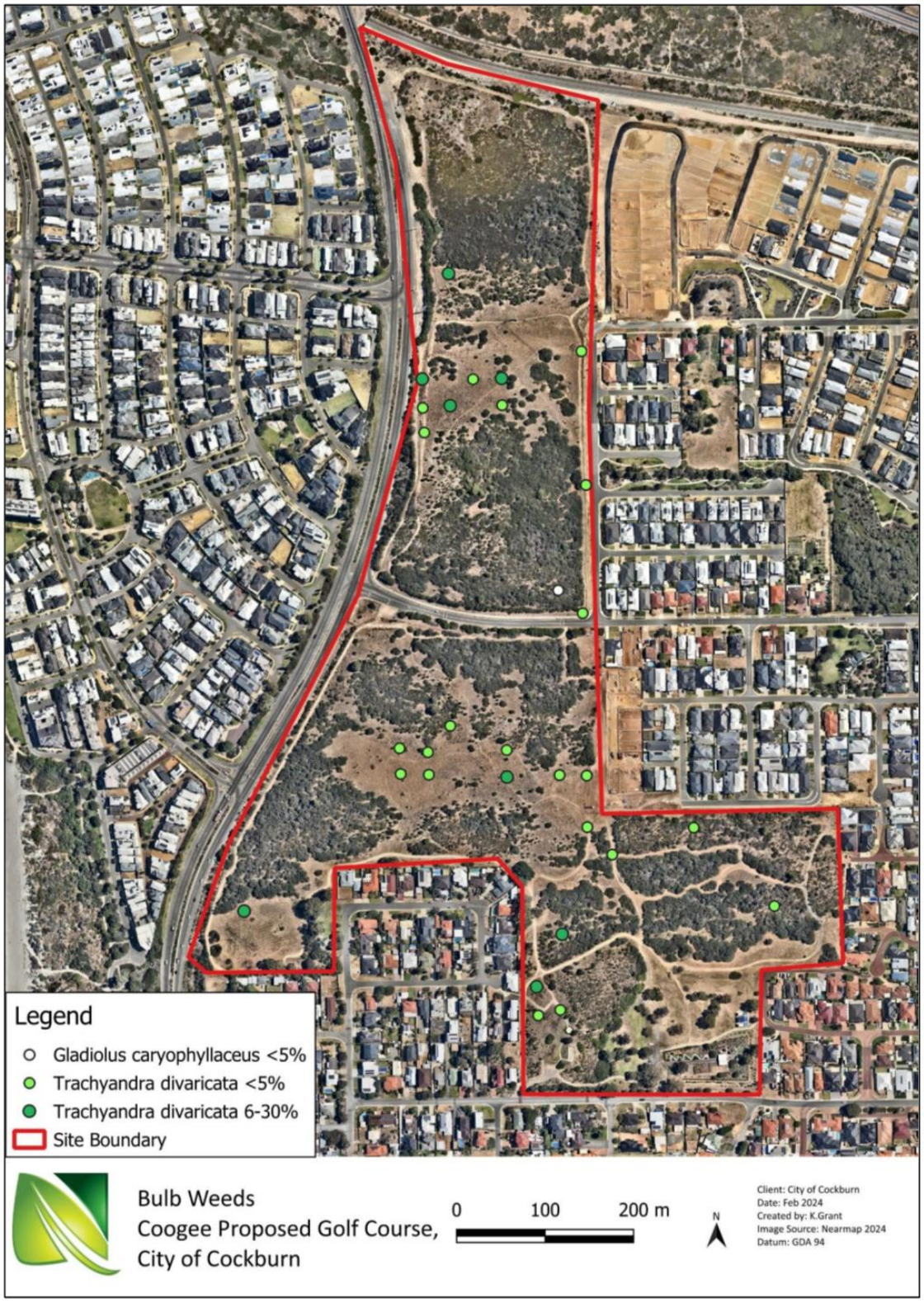
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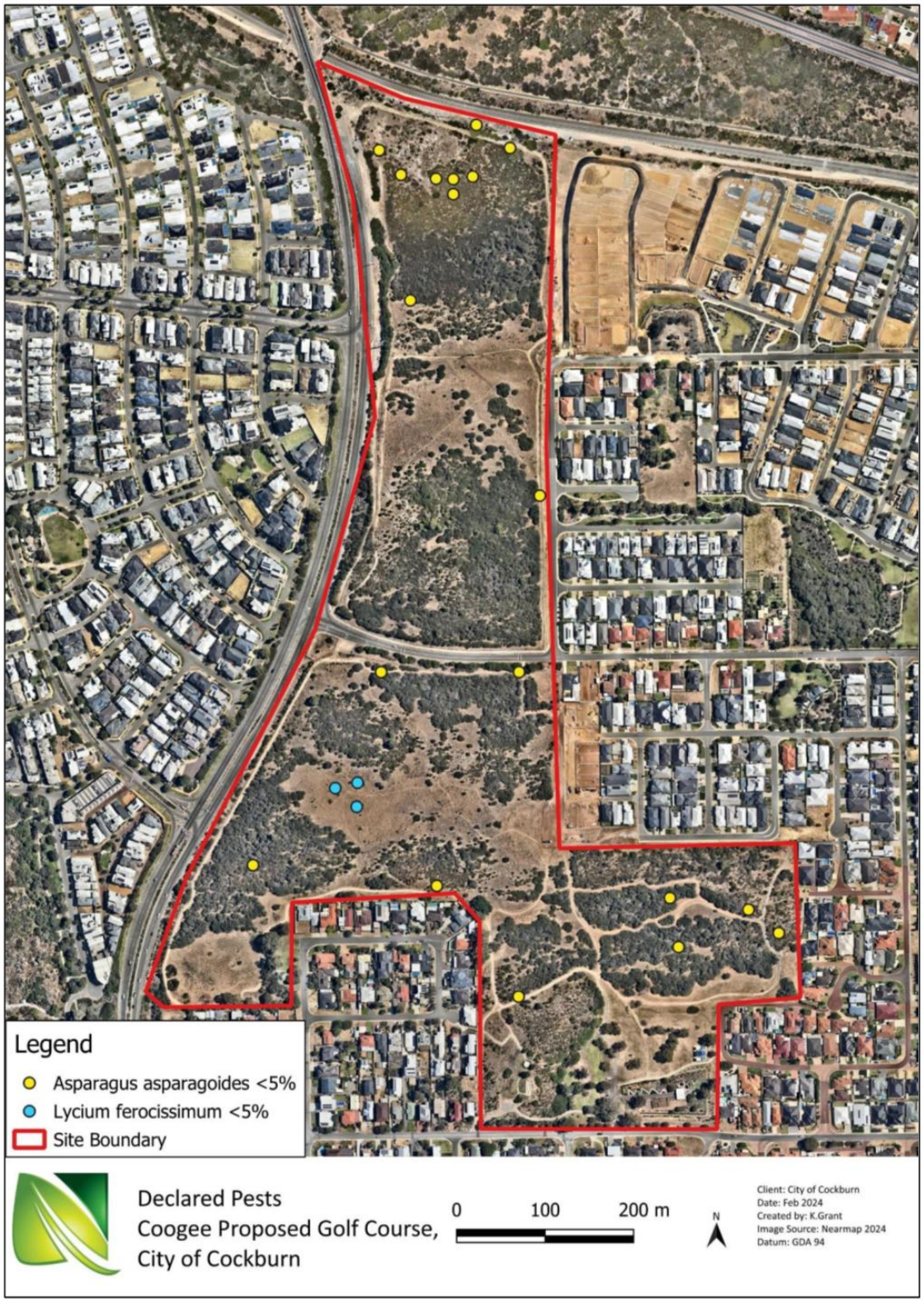
Family	Scientific Name	Common Name
Poaceae	**Ehrharta calycina*	Perennial Veldt Grass
Poaceae	**Ehrharta longiflora*	Annual Veldt Grass
Poaceae	**Eragrostis curvula*	African Lovegrass
Poaceae	**Hyparrhenia hirta*	Tambookie Grass
Poaceae	**Lagurus ovatus*	Hare's Tail Grass
Poaceae	**Lolium rigidum*	Wimmera Ryegrass
Poaceae	**Stenotaphrum secundatum*	Buffalo Grass
Poaceae	*Themeda triandra*	
Proteaceae	*Banksia sessilis*	Parrot Bush
Proteaceae	*Grevillea olivacea*	Olive Grevillea
Proteaceae	*Grevillea preissii*	
Proteaceae	*Grevillea leucopteris*	White Plume Grevillea
Proteaceae	*Hakea prostrata*	Harsh Hakea
Ranunculaceae	*Clematis linearifolia*	Slender Clematis
Rhamnaceae	*Spyridium globulosum*	Basket Bush
Rosaceae	**Prunus dulcis*	
Solanaceae	**Lycium ferocissimum*	African Boxthorn
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass tree

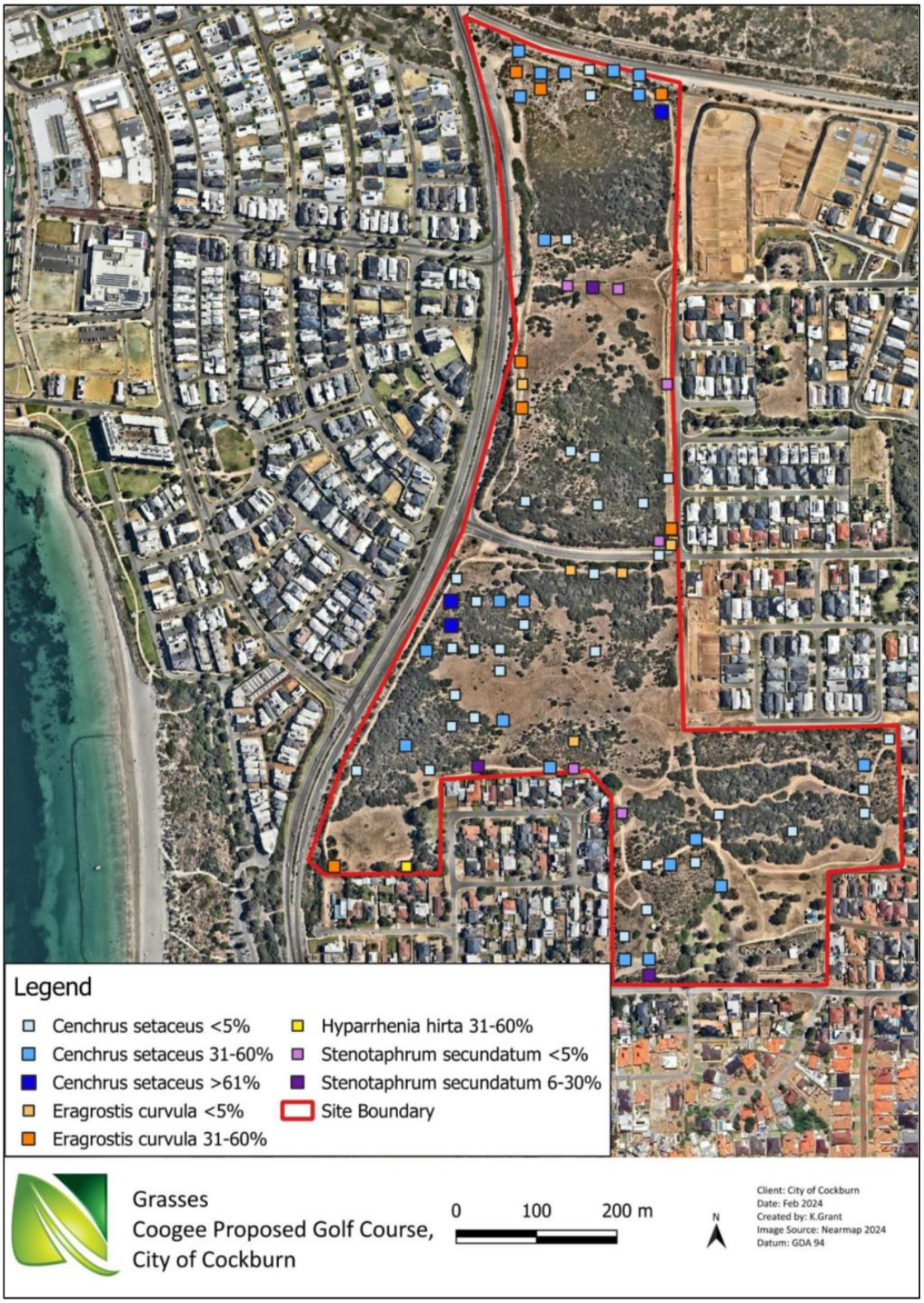
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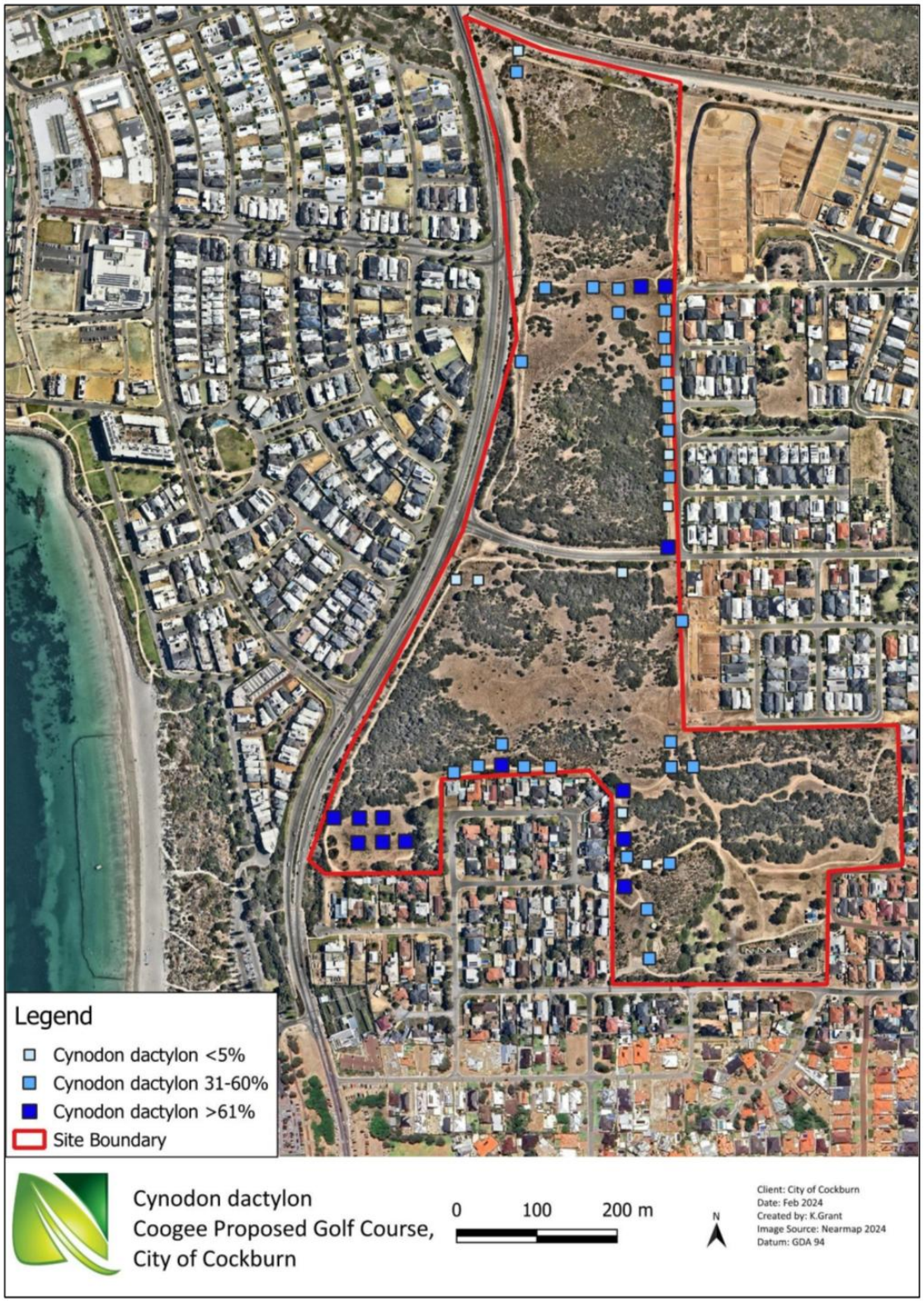
Appendix 6: Weed Mapping

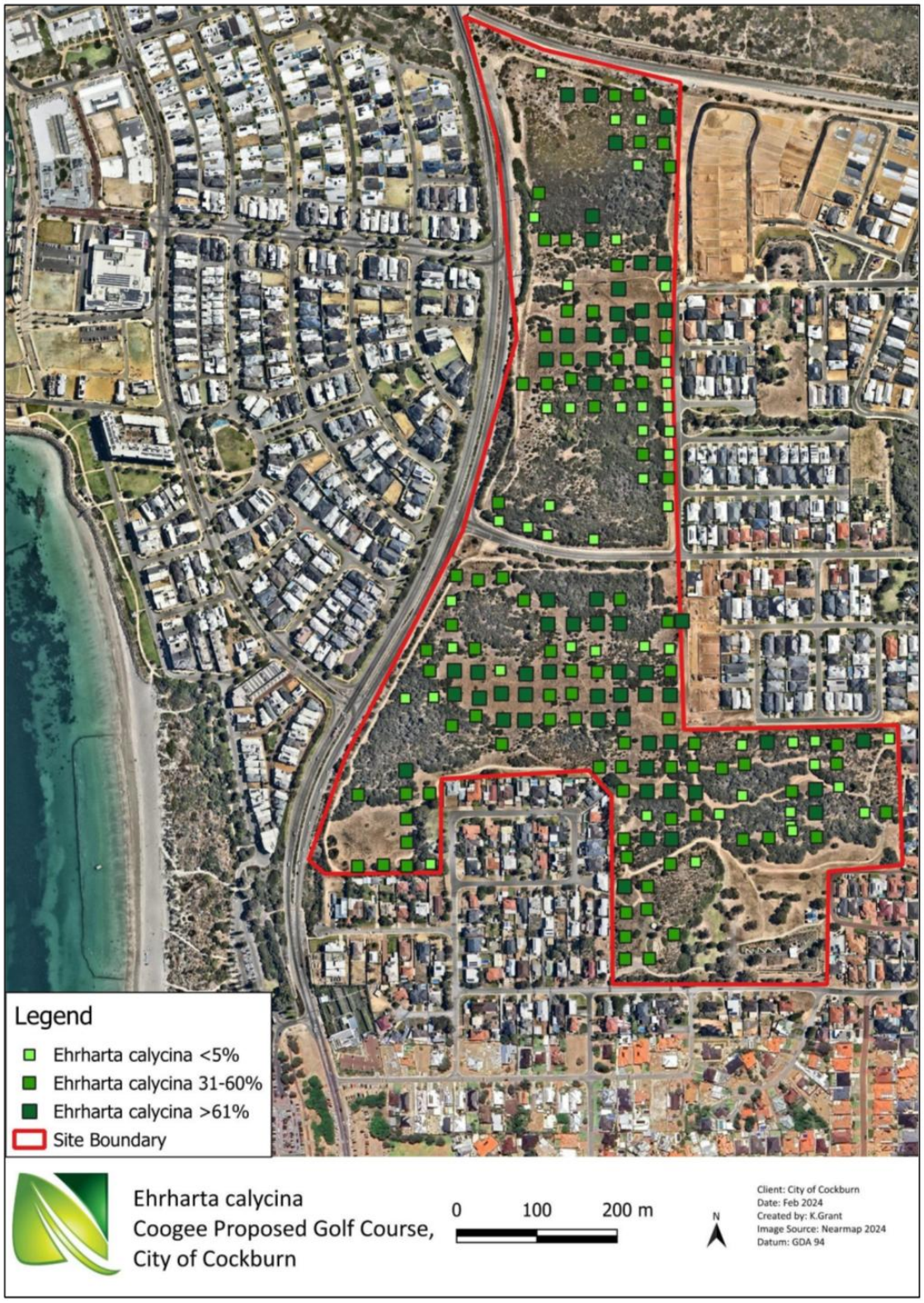
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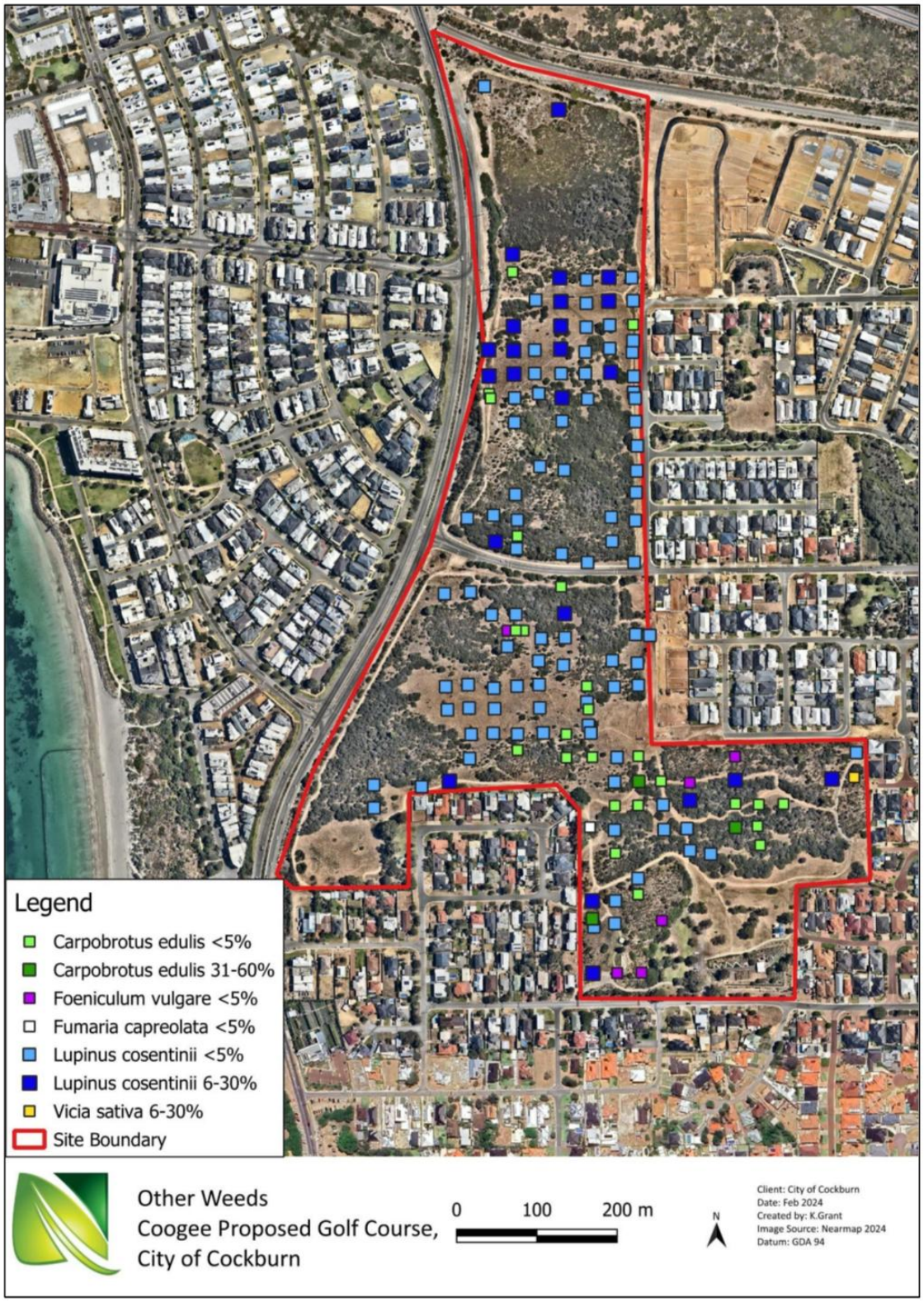

Legend
Gladiolus caryophyllaceus <5%
Trachyandra divaricata <5%
Trachyandra divaricata 6-30%
Site Boundary
Bulb Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

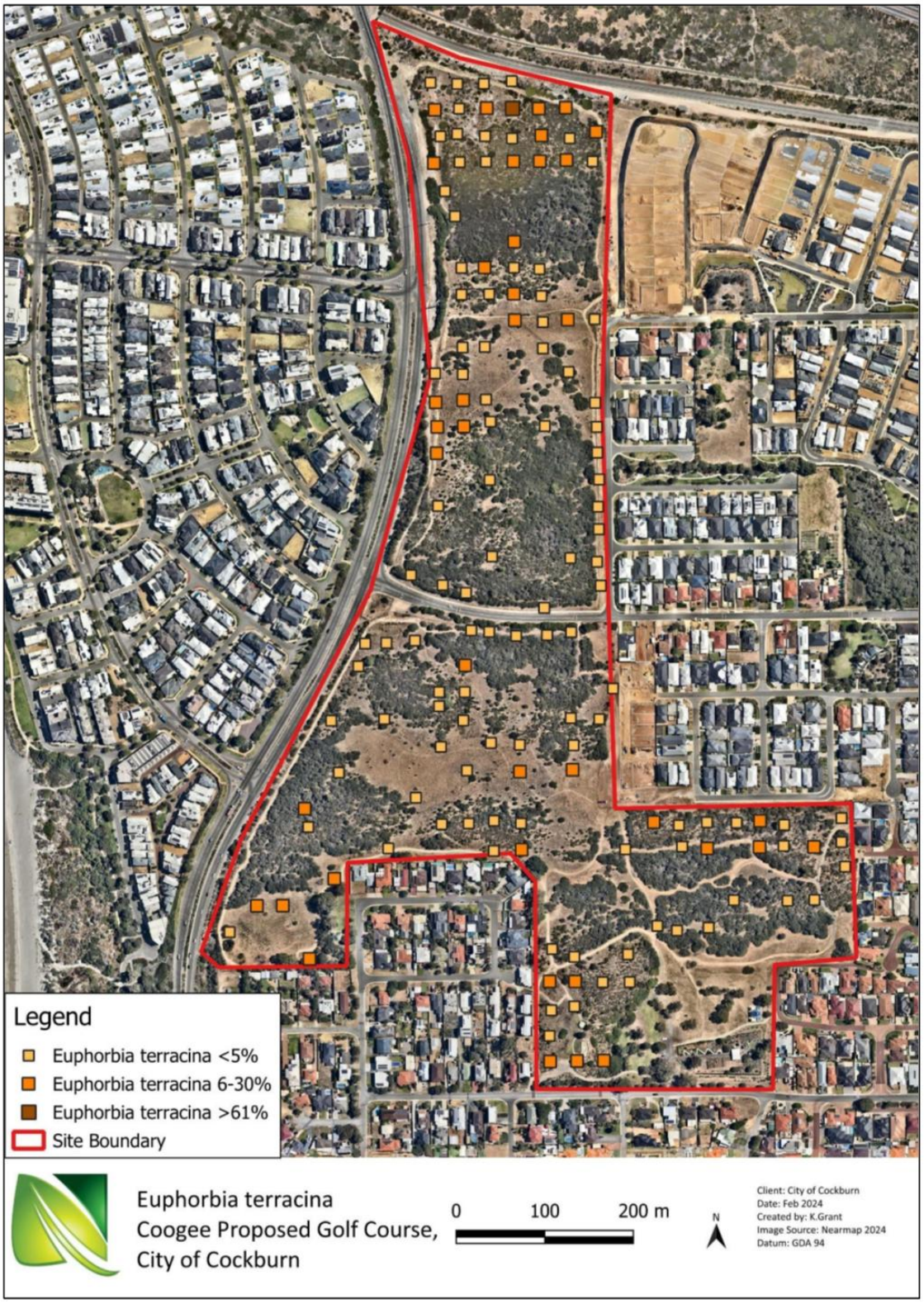

Legend
Asparagus asparagoides <5%
Lycium ferocissimum <5%
Site Boundary
Declared Pests
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

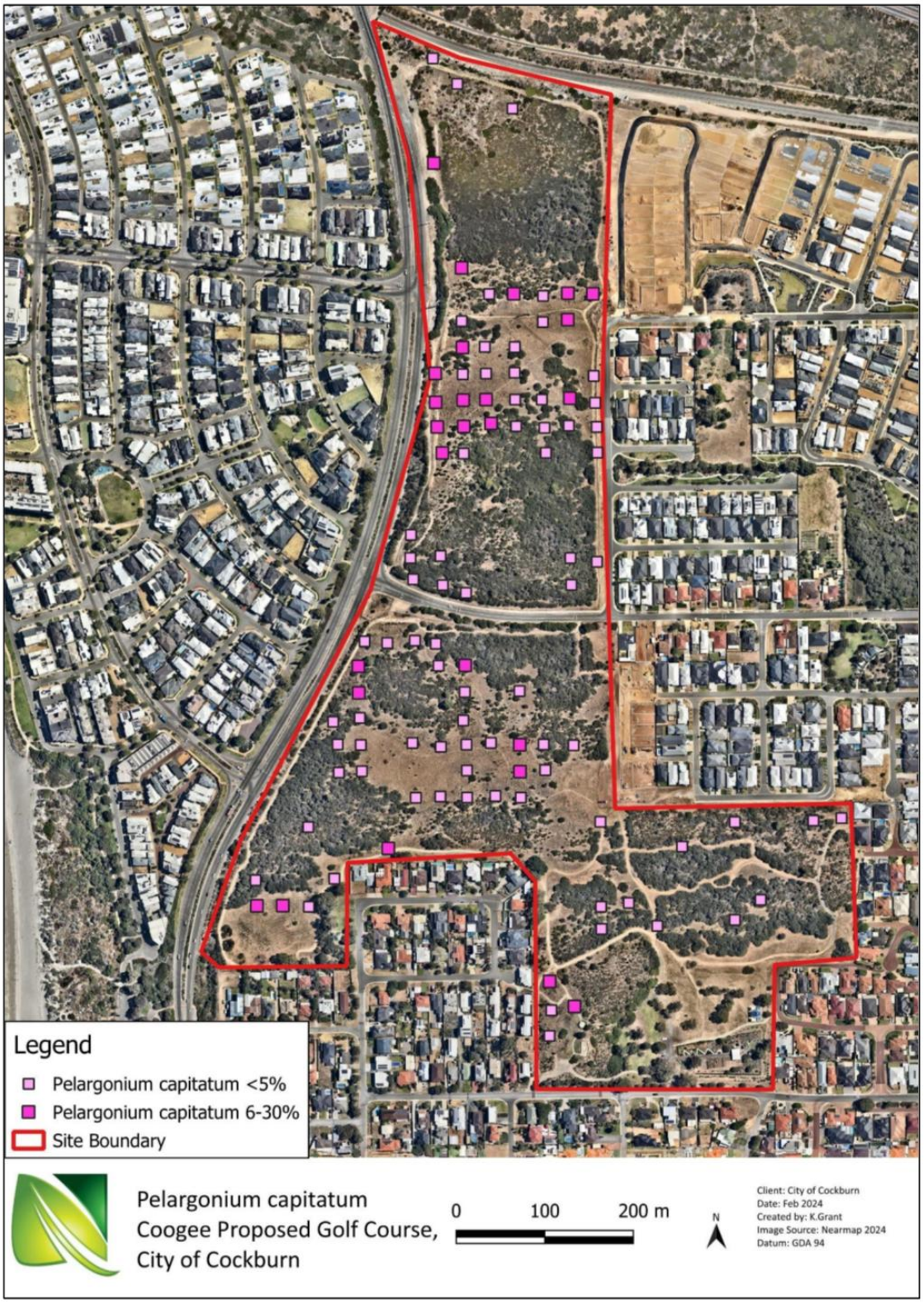

Legend
Cenchrus setaceus <5%
Cenchrus setaceus 31-60%
Cenchrus setaceus >61%
Eragrostis curvula <5%
Eragrostis curvula 31-60%
Hyparrhenia hirta 31-60%
Stenotaphrum secundatum <5%
Stenotaphrum secundatum 6-30%
Site Boundary
Grasses
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

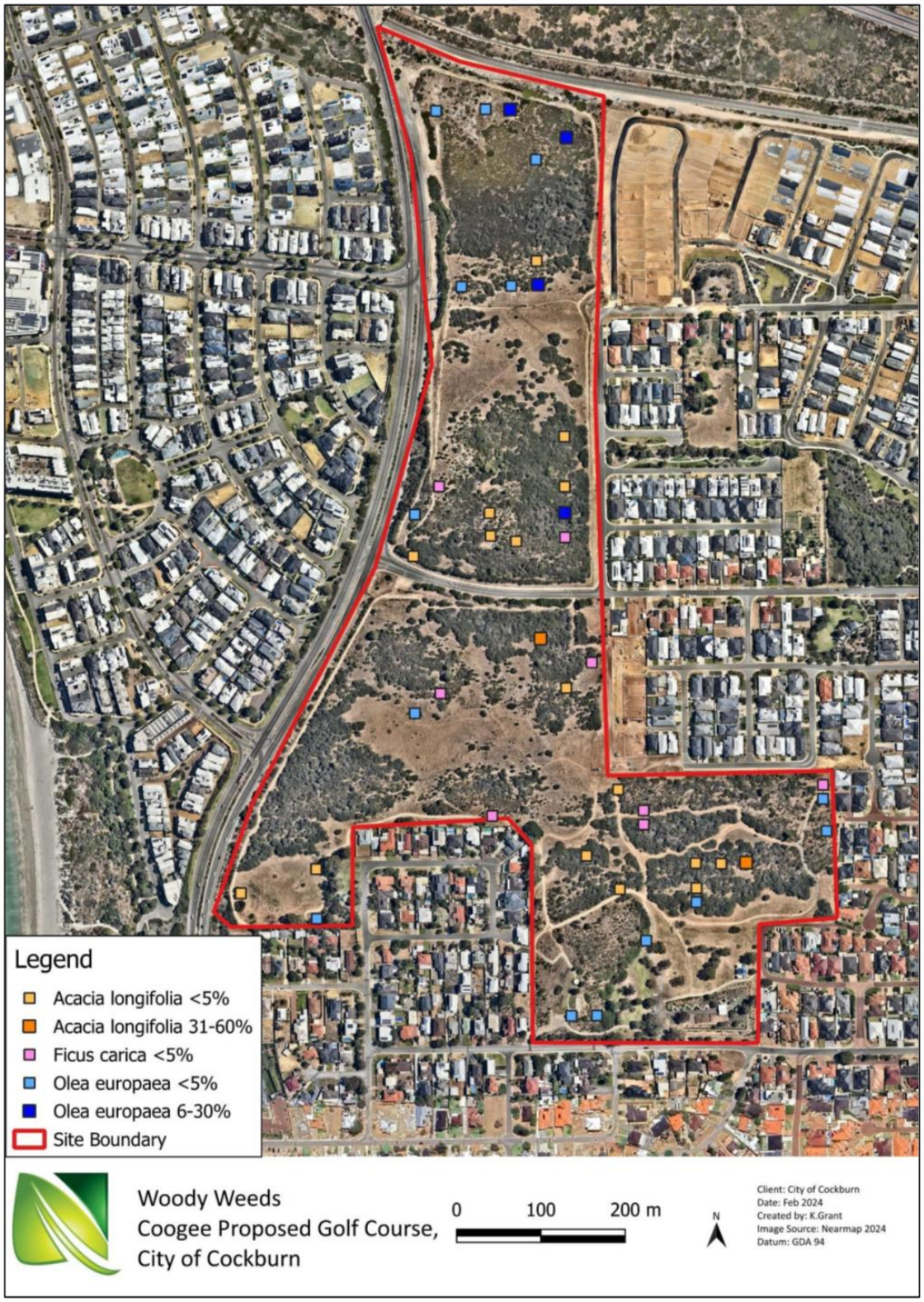

Legend
Cynodon dactylon <5%
Cynodon dactylon 31-60%
Cynodon dactylon >61%
Site Boundary
Cynodon dactylon
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

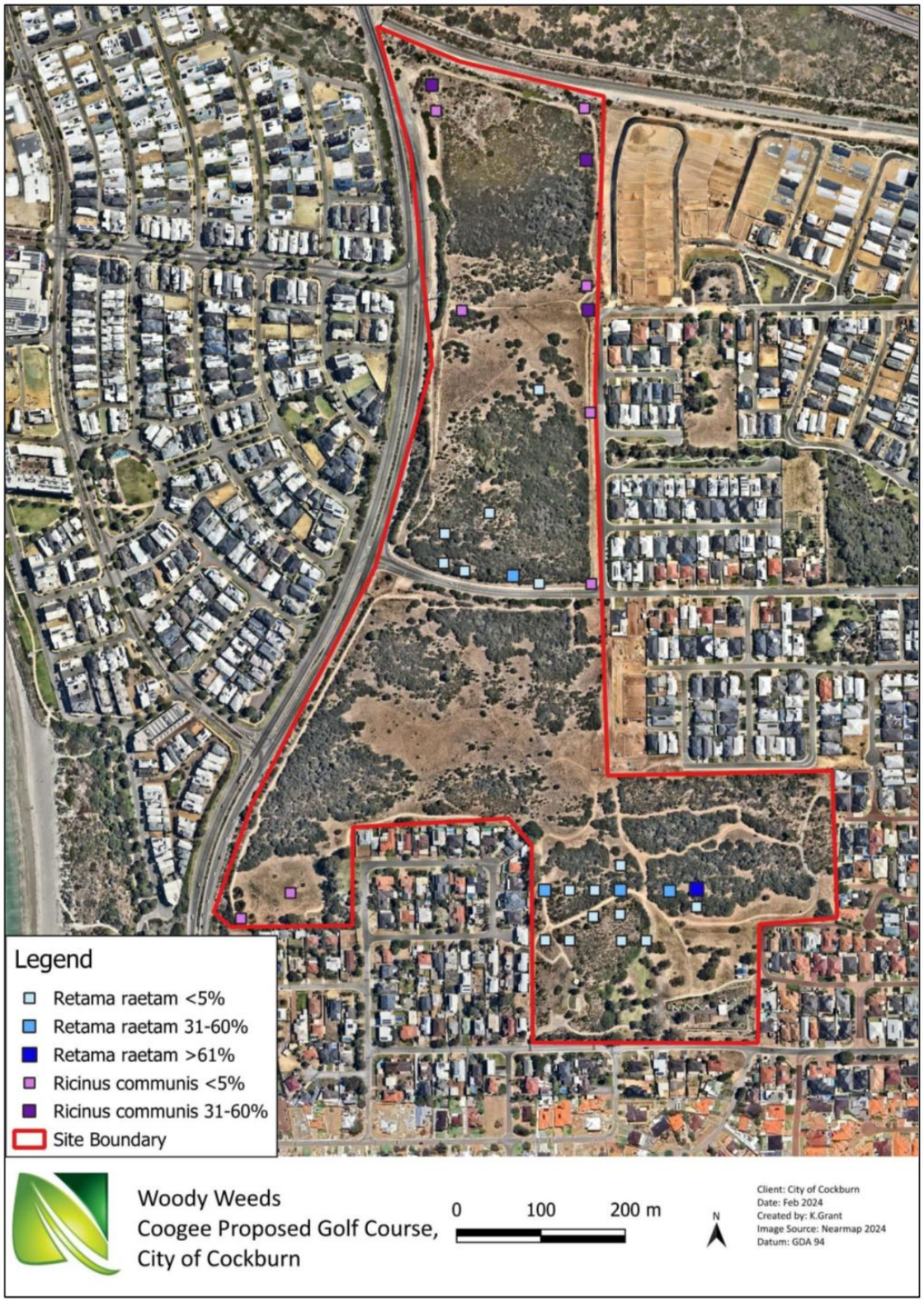

Legend
Ehrharta calycina <5%
Ehrharta calycina 31-60%
Ehrharta calycina >61%
Site Boundary
Ehrharta calycina
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

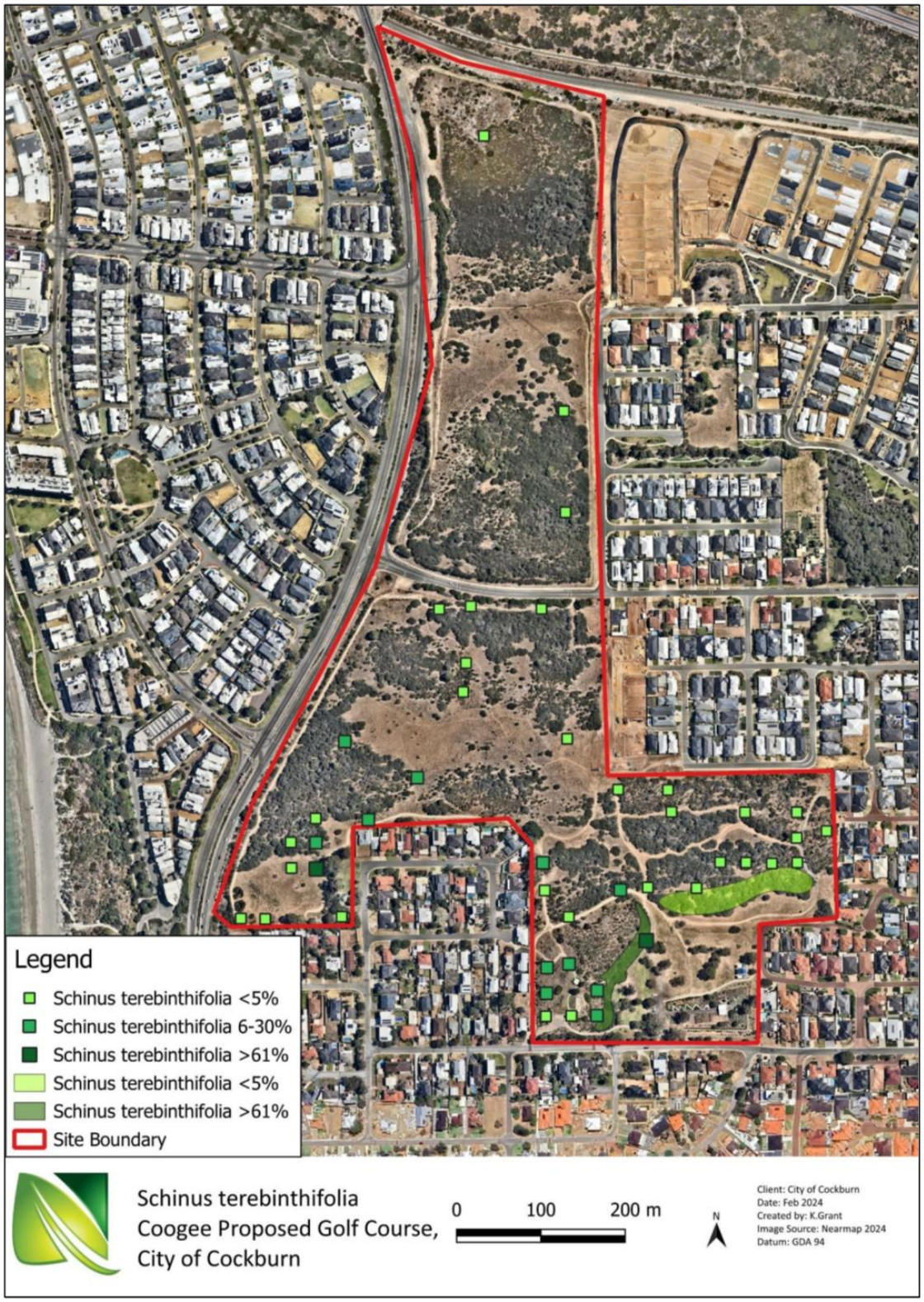

Legend
Carpobrotus edulis <5%
Carpobrotus edulis 31-60%
Foeniculum vulgare <5%
Fumaria capreolata <5%
Lupinus cosentinii <5%
Lupinus cosentinii 6-30%
Vicia sativa 6-30%
Site Boundary
Other Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

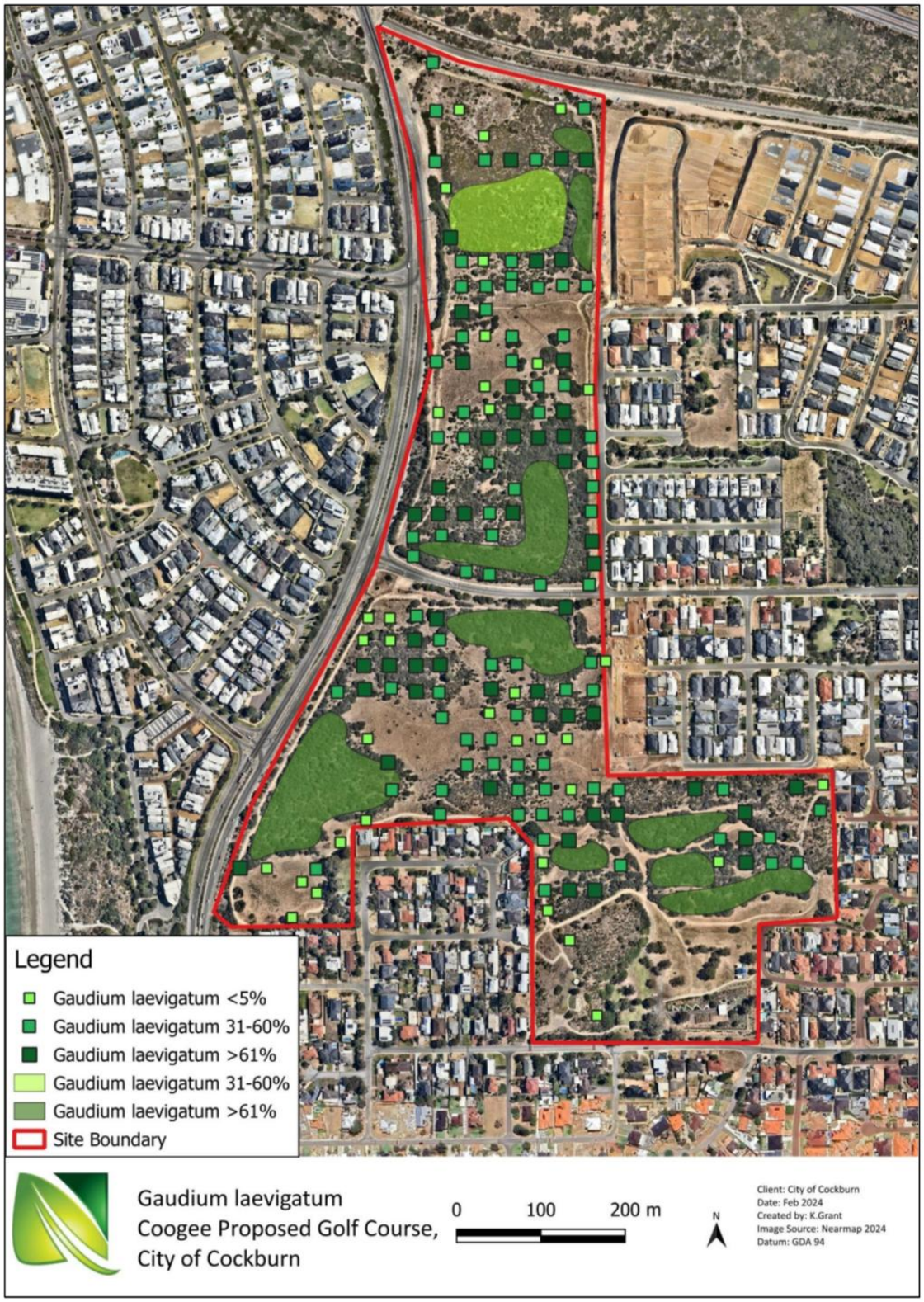

Legend
Euphorbia terracina <5%
Euphorbia terracina 6-30%
Euphorbia terracina >61%
Site Boundary
Euphorbia terracina
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

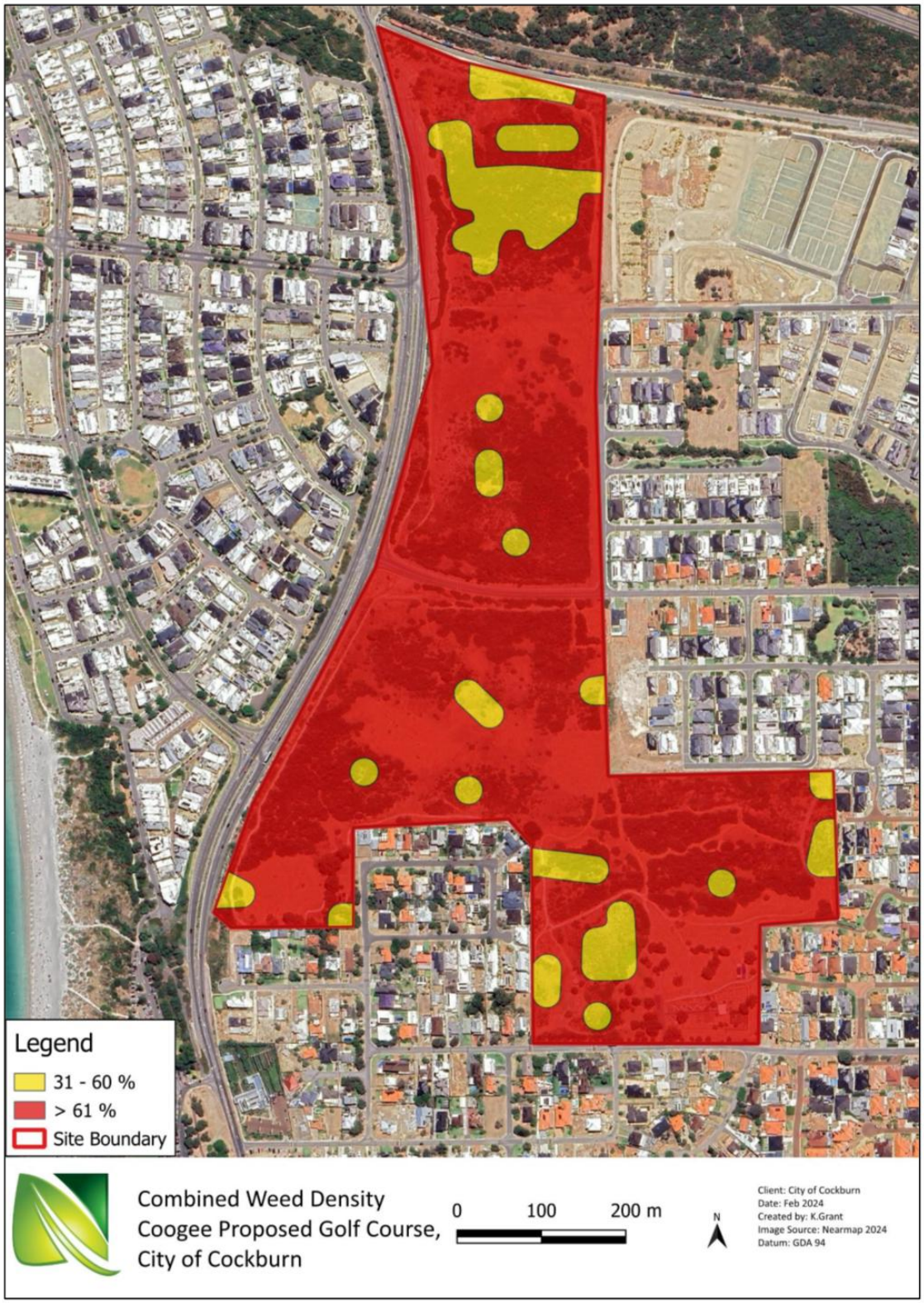

Legend
Pelargonium capitatum <5%
Pelargonium capitatum 6-30%
Site Boundary
Pelargonium capitatum
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Acacia longifolia <5%
Acacia longifolia 31-60%
Ficus carica <5%
Olea europaea <5%
Olea europaea 6-30%
Site Boundary
Woody Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Retama raetam <5%
Retama raetam 31-60%
Retama raetam >61%
Ricinus communis <5%
Ricinus communis 31-60%
Site Boundary
Woody Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Schinus terebinthifolia <5%
Schinus terebinthifolia 6-30%
Schinus terebinthifolia >61%
Schinus terebinthifolia <5%
Schinus terebinthifolia >61%
Site Boundary
Schinus terebinthifolia
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Gaudium laevigatum <5%
Gaudium laevigatum 31-60%
Gaudium laevigatum >61%
Gaudium laevigatum 31-60%
Gaudium laevigatum >61%
Site Boundary
Gaudium laevigatum
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
31 - 60 %
> 61 %
Site Boundary
Combined Weed Density
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

Appendix 7: Black Cockatoo Habitat Assessment Data

Data collected during the black cockatoo habitat assessment is presented below, including the species of each tree, DBH, height and number of hollows.

Tree No	Species	DBH (mm)	Height (m)	Number of Hollows
1	*Eucalyptus gomphocephala*	832	10	1
2	*Agonis flexuosa*	615	5	2
3	*Eucalyptus gomphocephala*	1048	10	3
4	*Eucalyptus gomphocephala*	645	10	4
5	*Agonis flexuosa*	848	5	5
6	*Eucalyptus gomphocephala*	500	950	6
7	*Eucalyptus gomphocephala*	880	10	7
8	*Eucalyptus gomphocephala*	715	14	8
9	**Eucalyptus botryoides*	604.8	8	9
10	*#Eucalyptus camaldulensis*	955	12	10
11	*Agonis flexuosa*	505	8	11
12	*Allocasuarina fraseriana*	634	12	12
13	*Eucalyptus gomphocephala*	653	15	13
14	*Eucalyptus gomphocephala*	986.8	15	14
15	*Eucalyptus gomphocephala*	705	16	15
16	*Agonis flexuosa*	535	8	16
17	*Eucalyptus gomphocephala*	500	14	17
18	*Eucalyptus gomphocephala*	732.1	14	18
19	*Corymbia calophylla*	615	14	19
20	*Eucalyptus gomphocephala*	624	14	20
21	*Eucalyptus gomphocephala*	986.8	17	21
22	*Allocasuarina fraseriana*	545	8	22
23	**Eucalyptus botryoides*	636.6	16	23
24	*Allocasuarina fraseriana*	738	10	24
25	**Eucalyptus botryoides*	595.2	10	25

DRAFT

Tree No	Species	DBH (mm)	Height (m)	Number of Hollows
26	**Schinus molle*	783	8	26
27	*Eucalyptus gomphocephala*	680	15	27

DRAFT

Natural Area
CONSULTING MANAGEMENT SERVICES

City of Cockburn

2024 Flora and Vegetation Survey, Weed Mapping and Black Cockatoo Assessment - Mapping

Natural Area Holdings Pty Ltd
Whadjuk Country
57 Boulder Road, Malaga WA 6090
Ph: (08) 9209 2767
info@naturalarea.com.au
www.naturalarea.com.au



Acknowledgement of Country

Ngala kaaditj Noongar moort keyen kaadak nidja boodja.
Natural Area acknowledges the Traditional Owners of the lands on which we operate, and recognises their continuing connection to lands, waters and communities.

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System Certifications

Environmental management system registered to ISO 14001:2015
Quality management system registered to ISO 9001:2015
Occupational health and safety management system registered to ISO 45001:2018

Document Title	2024 Flora and Vegetation Survey, Weed Mapping and Black Cockatoo Assessment - Mapping
Location	City of Cockburn/RFQ CIP - 02 2023 Flora and Veg Survey - Coogee/Report/CoC-R 2024 Flora and Vegetation Survey, Weed Mapping and Black Cockatoo Assessment - Mapping.docx

Draft/Version No.	Date	Changes	Prepared by	Approved by	Status
D1	27/02/2024	New Document	BD	KG	Draft

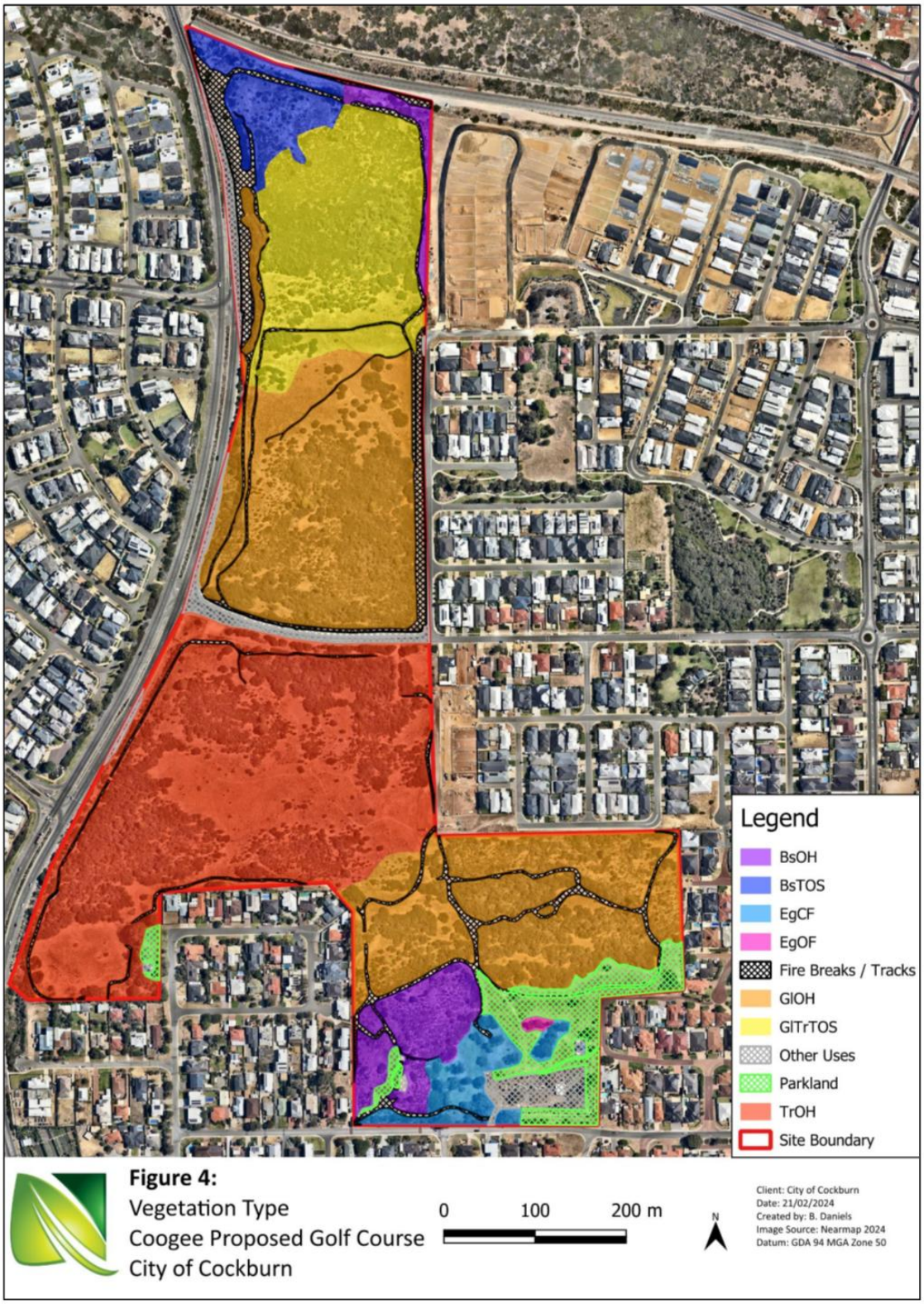


Figure 4:
Vegetation Type
Coogee Proposed Golf Course
City of Cockburn

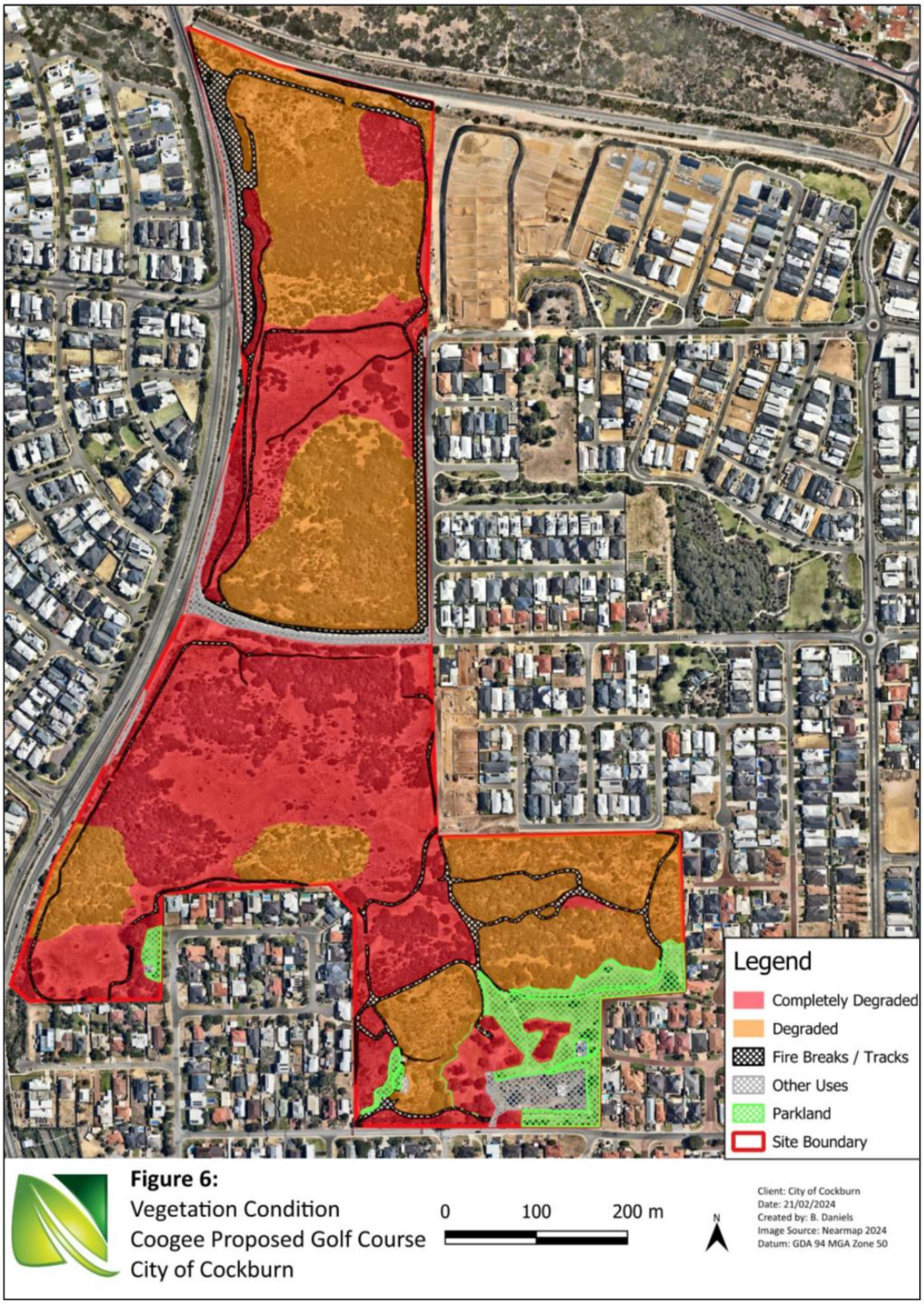


Figure 6:
Vegetation Condition
Coogee Proposed Golf Course
City of Cockburn

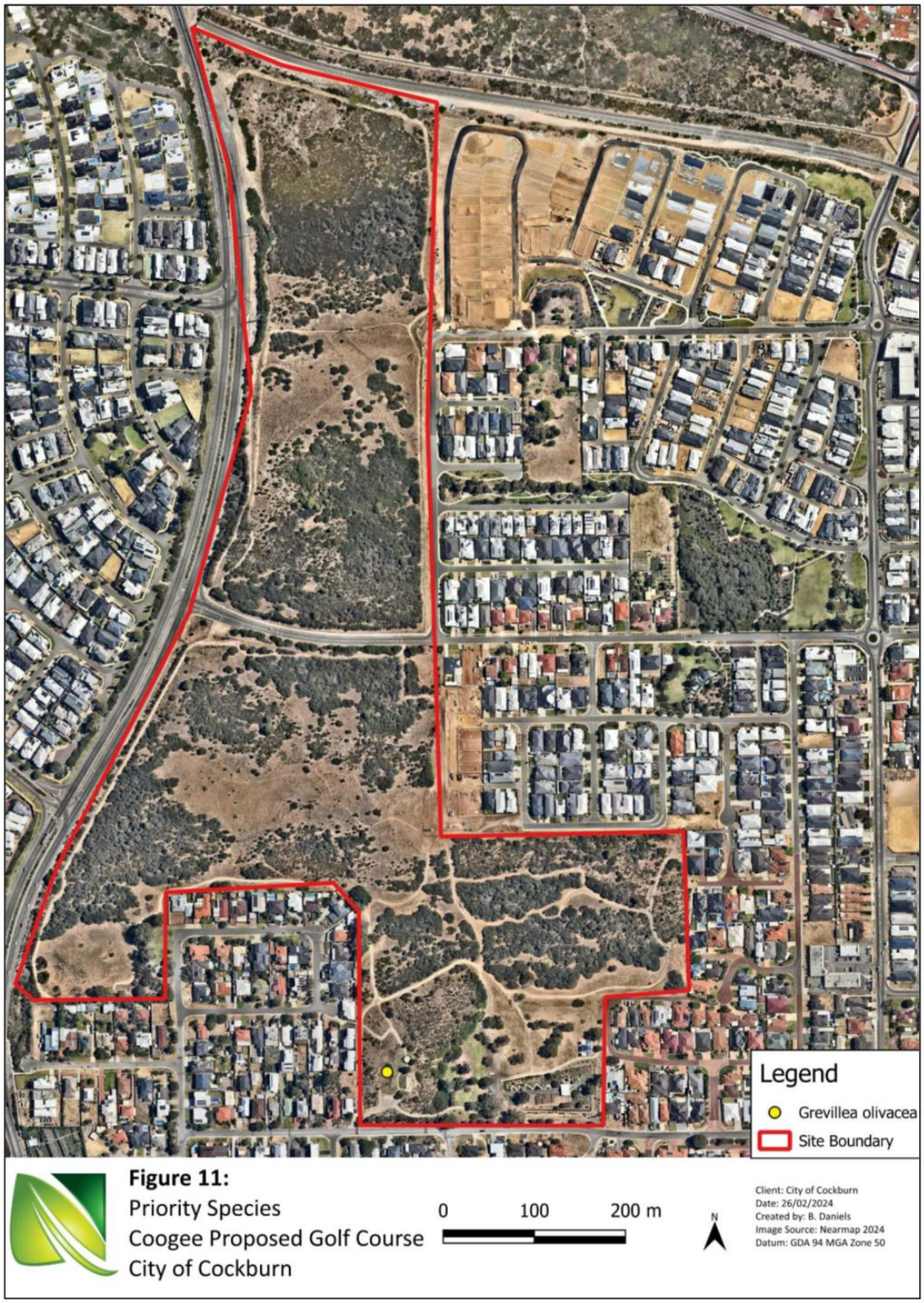
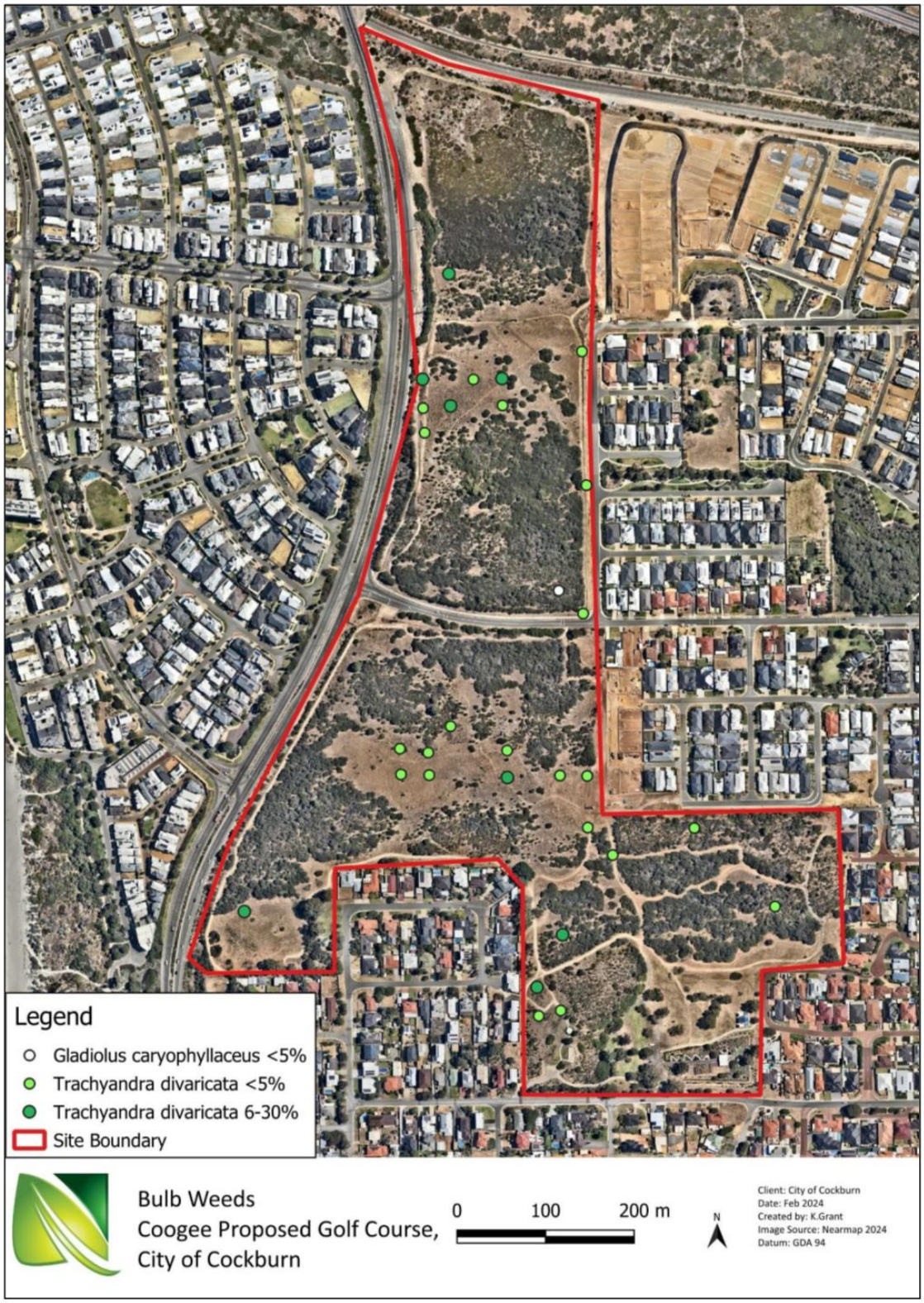
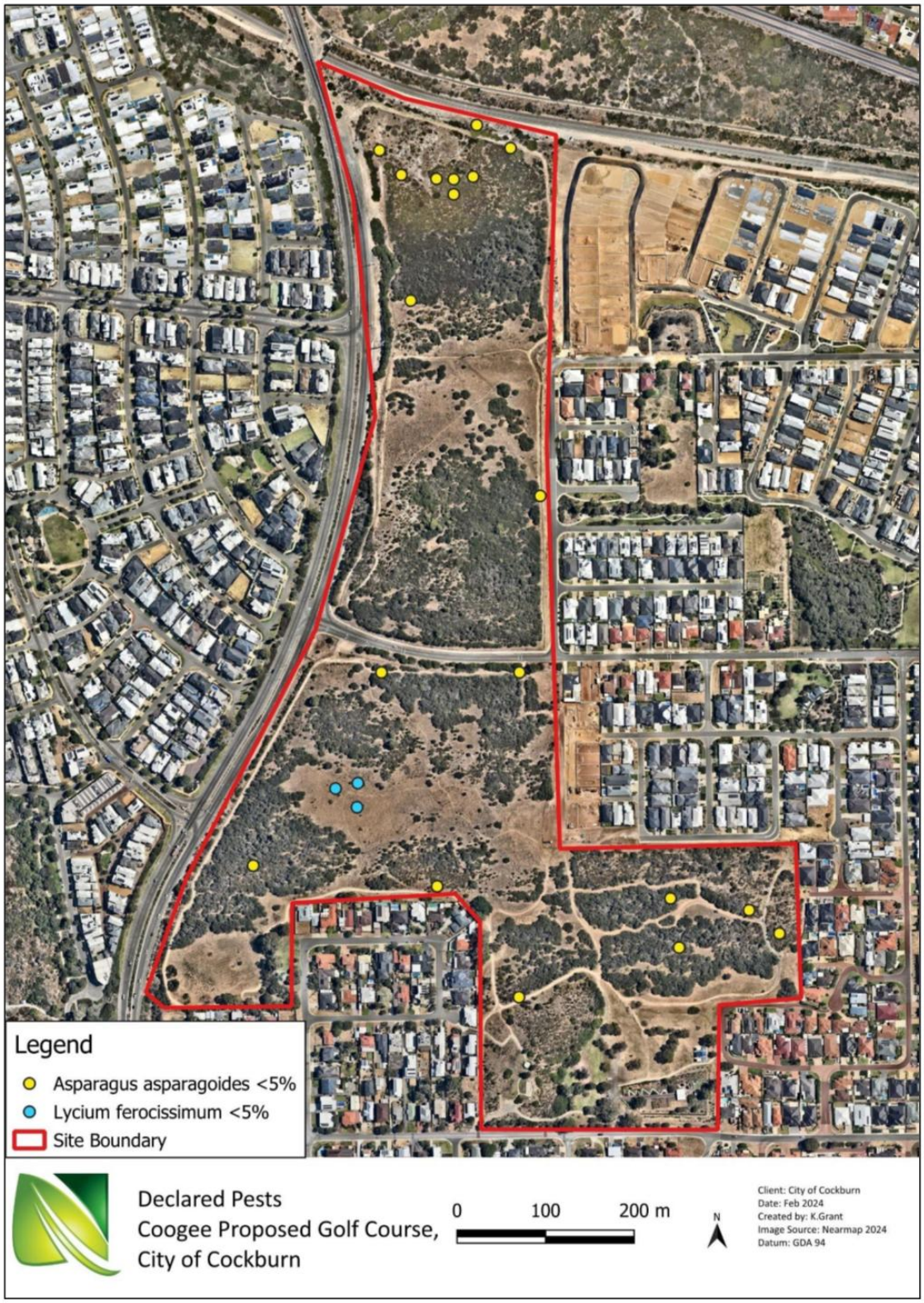
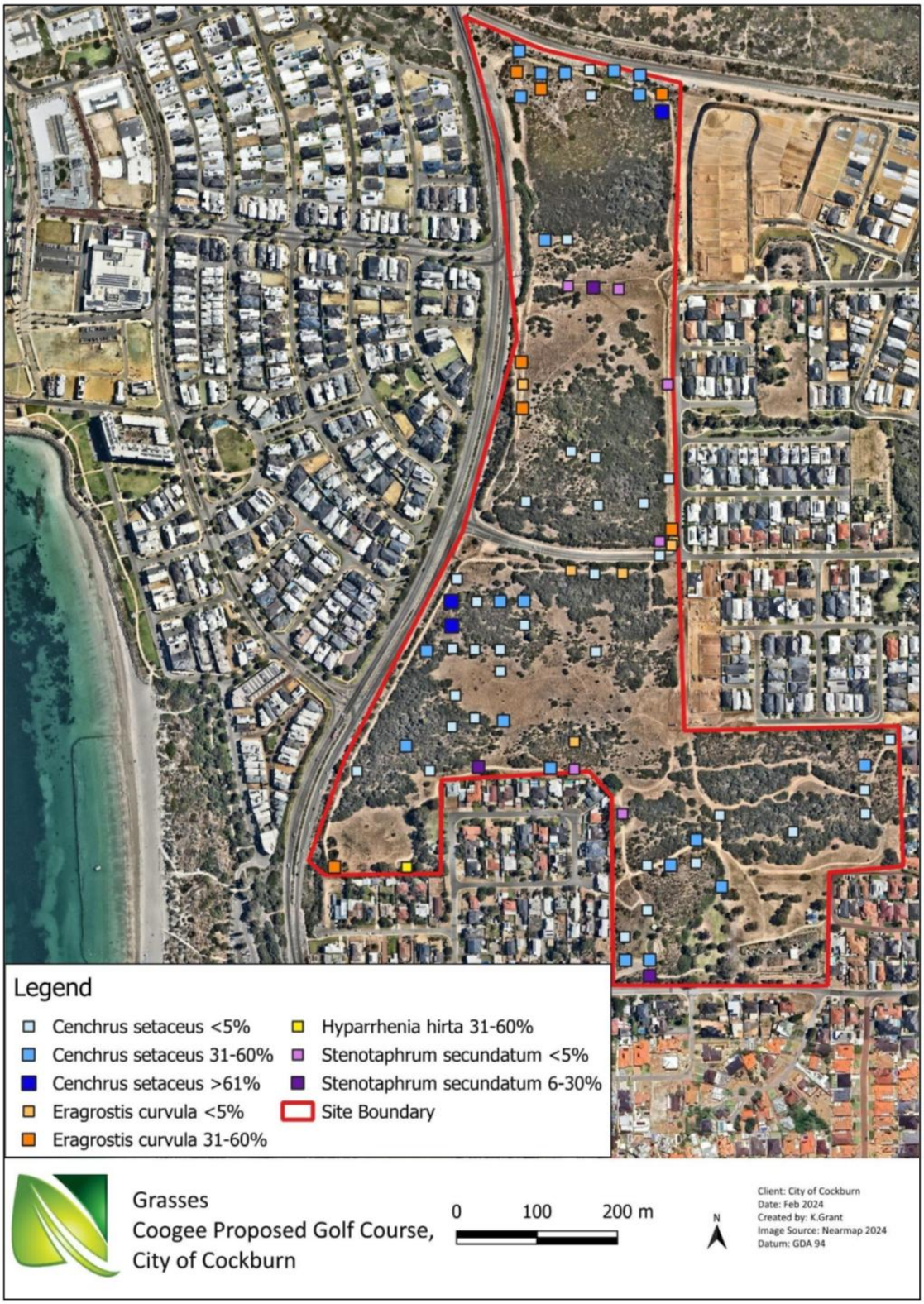
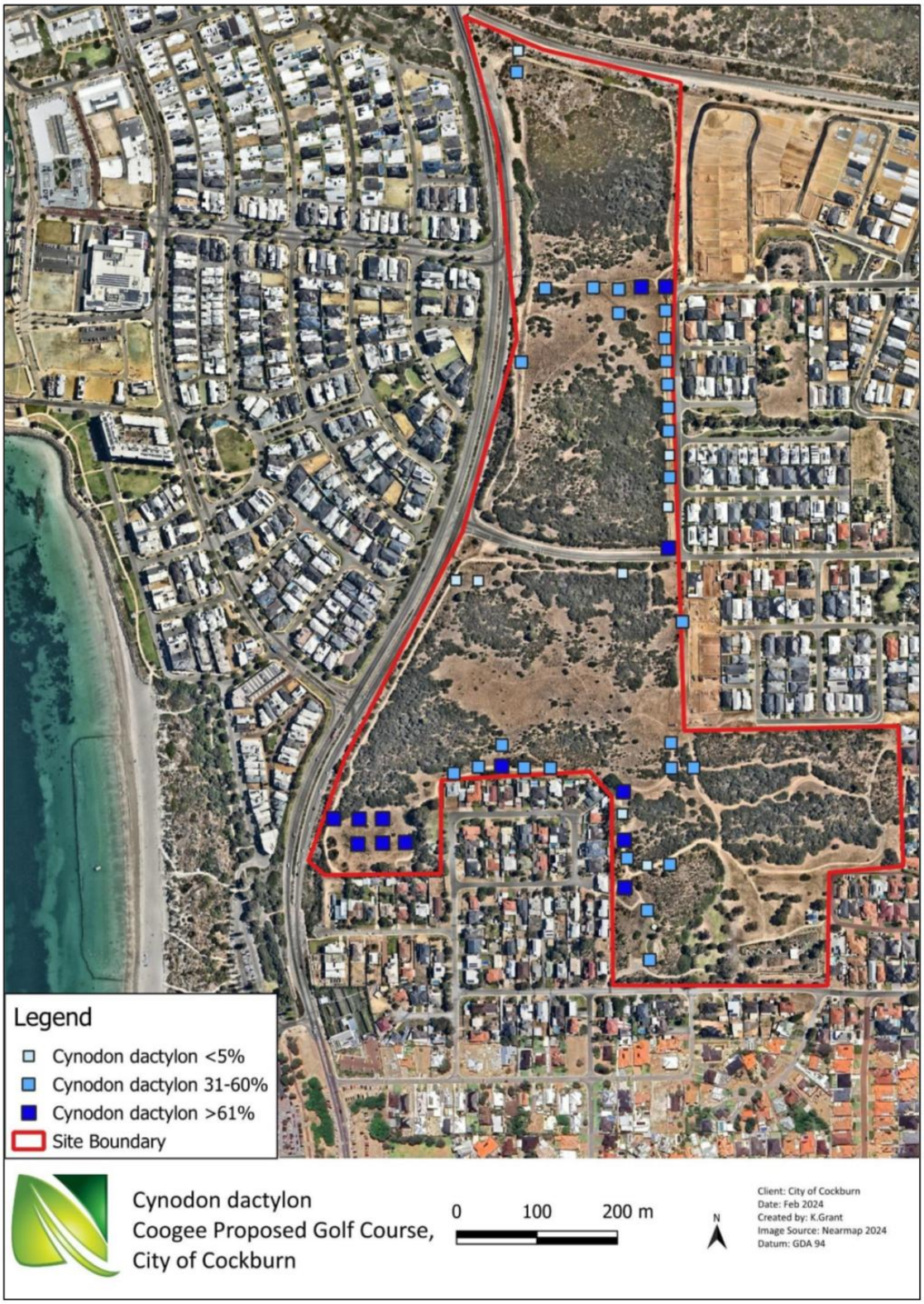


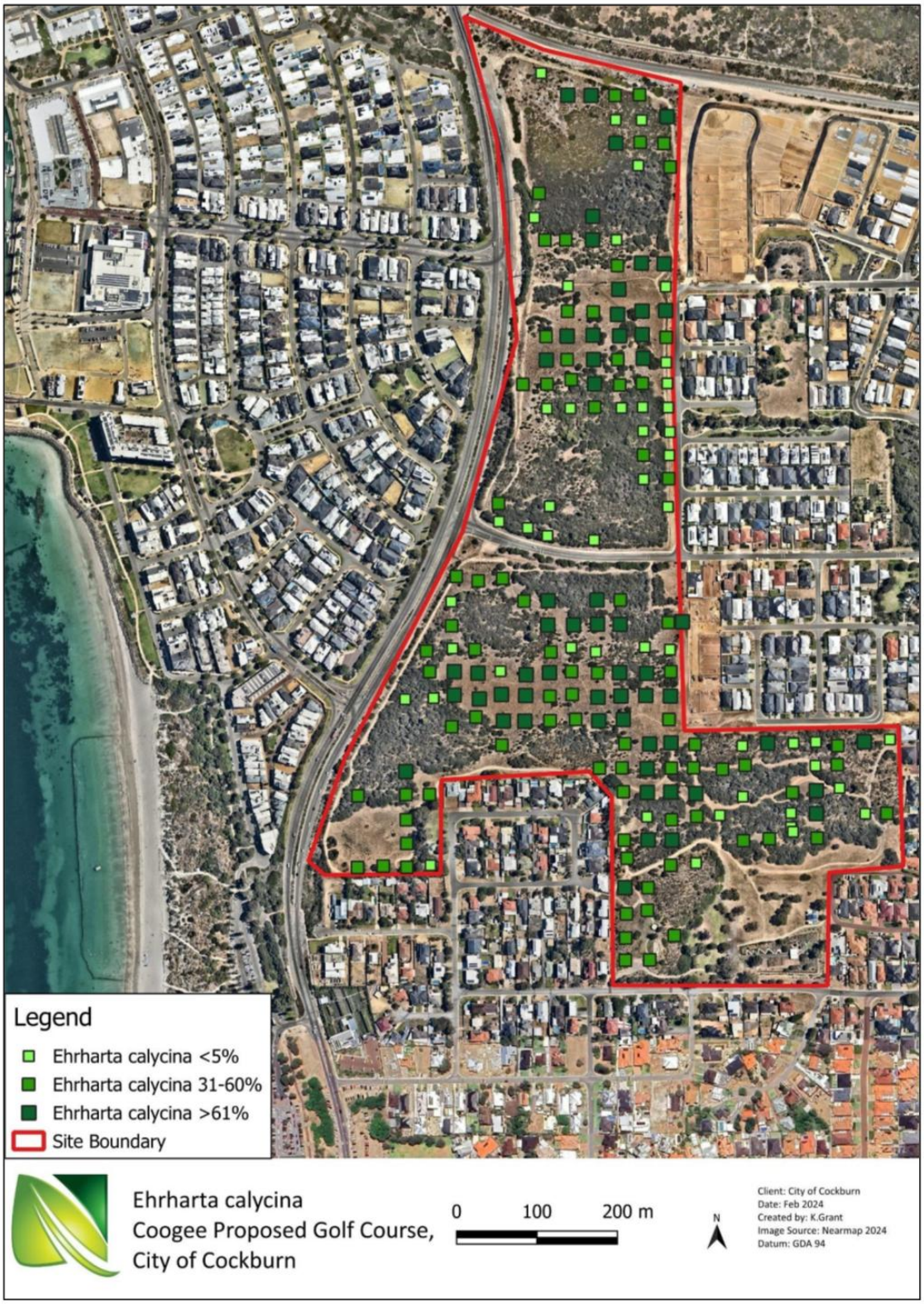
Figure 11:
Priority Species
Coogee Proposed Golf Course
City of Cockburn

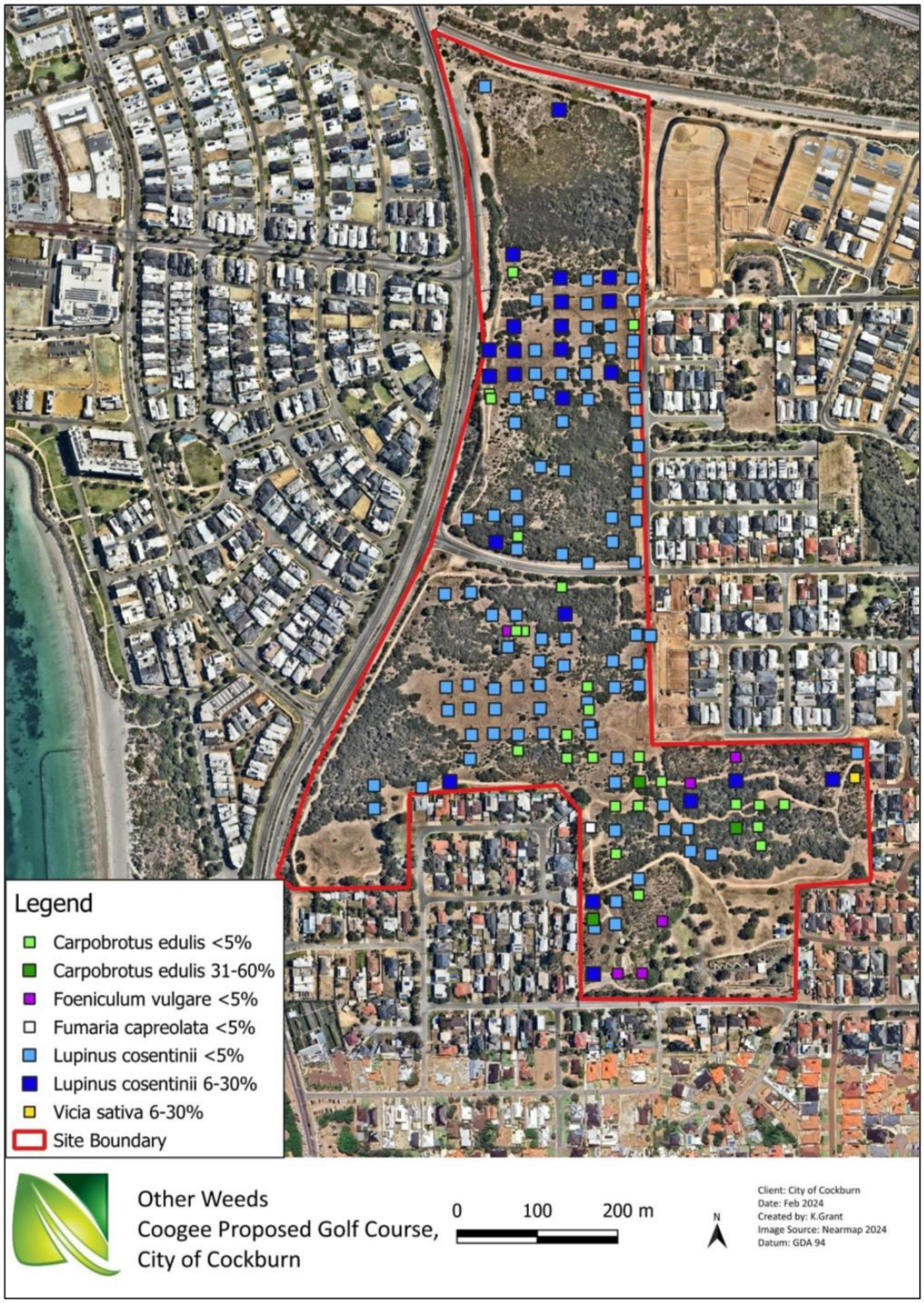

Legend
Gladiolus caryophyllaceus <5%
Trachyandra divaricata <5%
Trachyandra divaricata 6-30%
Site Boundary
Bulb Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

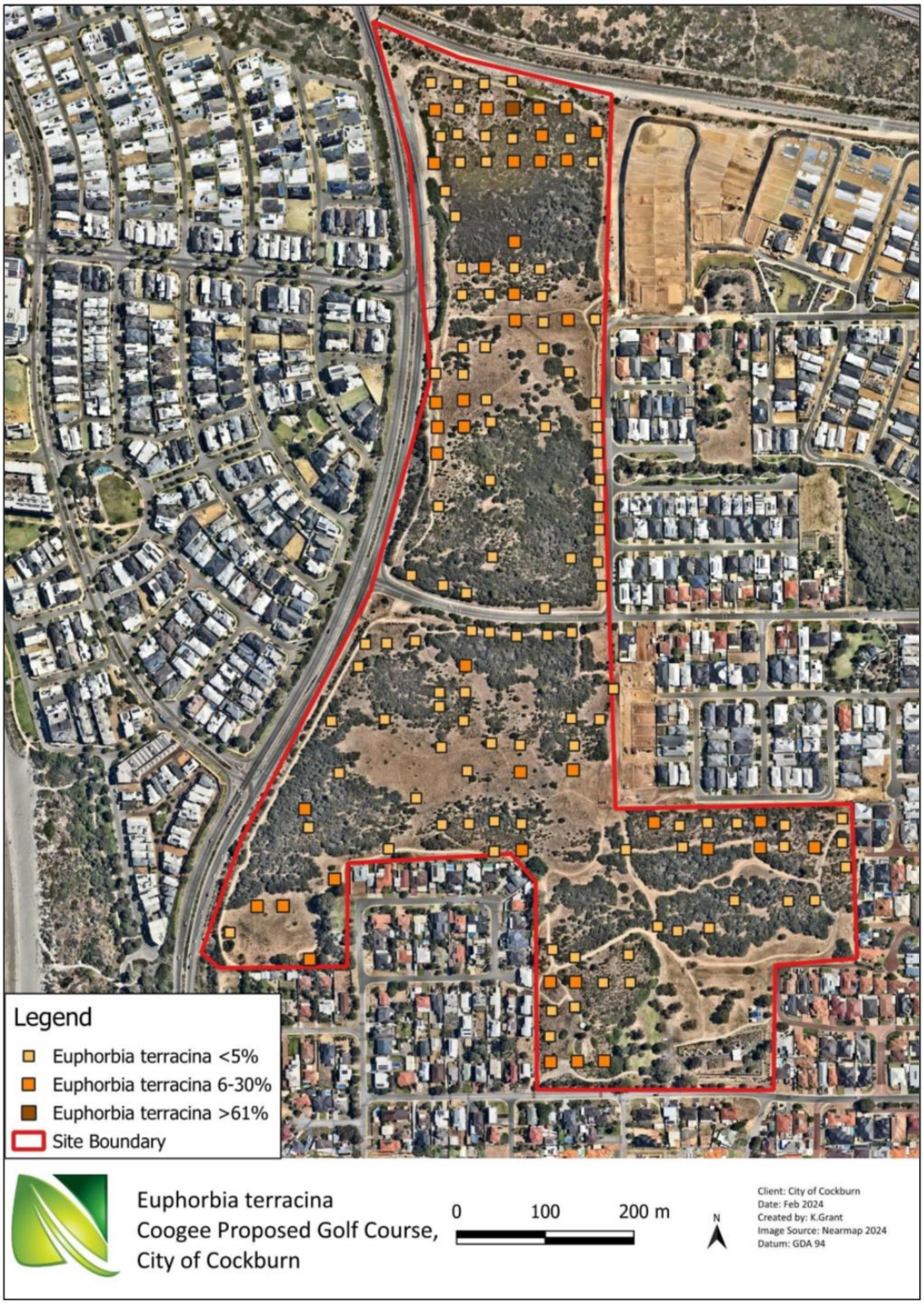

Legend
Asparagus asparagoides <5%
Lycium ferocissimum <5%
Site Boundary
Declared Pests
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
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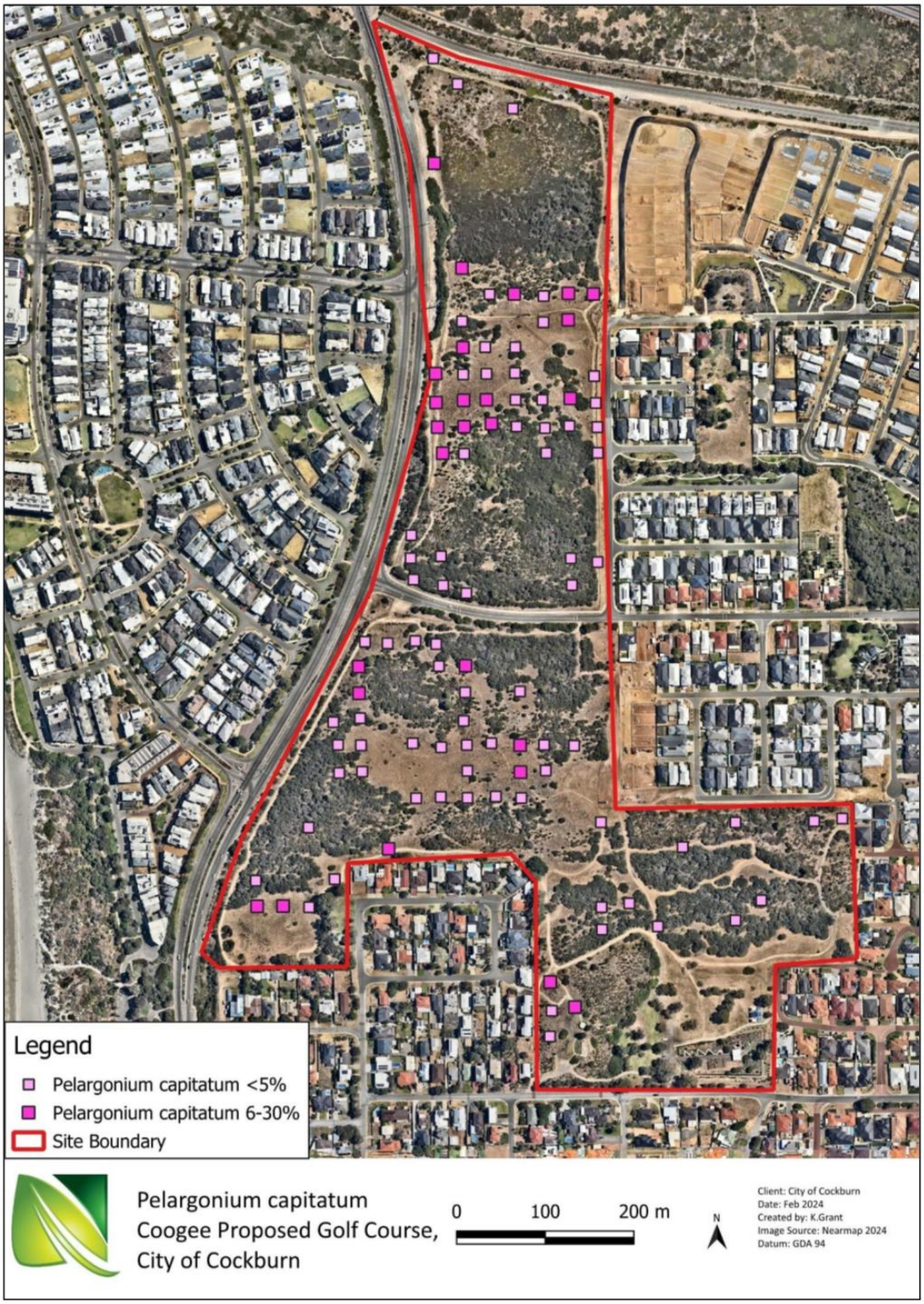

Legend
Cenchrus setaceus <5%
Cenchrus setaceus 31-60%
Cenchrus setaceus >61%
Eragrostis curvula <5%
Eragrostis curvula 31-60%
Hyparrhenia hirta 31-60%
Stenotaphrum secundatum <5%
Stenotaphrum secundatum 6-30%
Site Boundary
Grasses
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Cynodon dactylon <5%
Cynodon dactylon 31-60%
Cynodon dactylon >61%
Site Boundary
Cynodon dactylon
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
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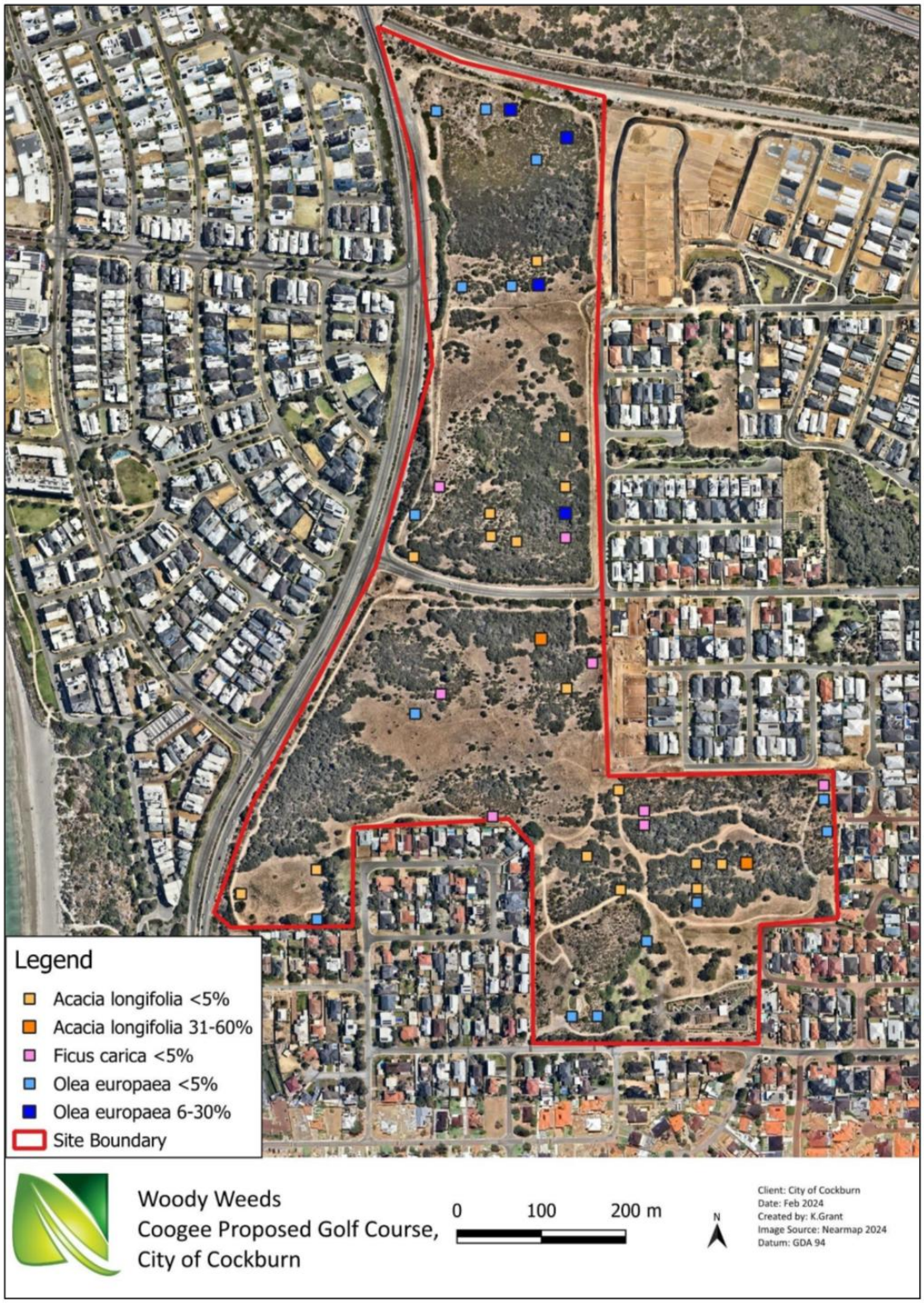

Legend
Ehrharta calycina <5%
Ehrharta calycina 31-60%
Ehrharta calycina >61%
Site Boundary
Ehrharta calycina
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
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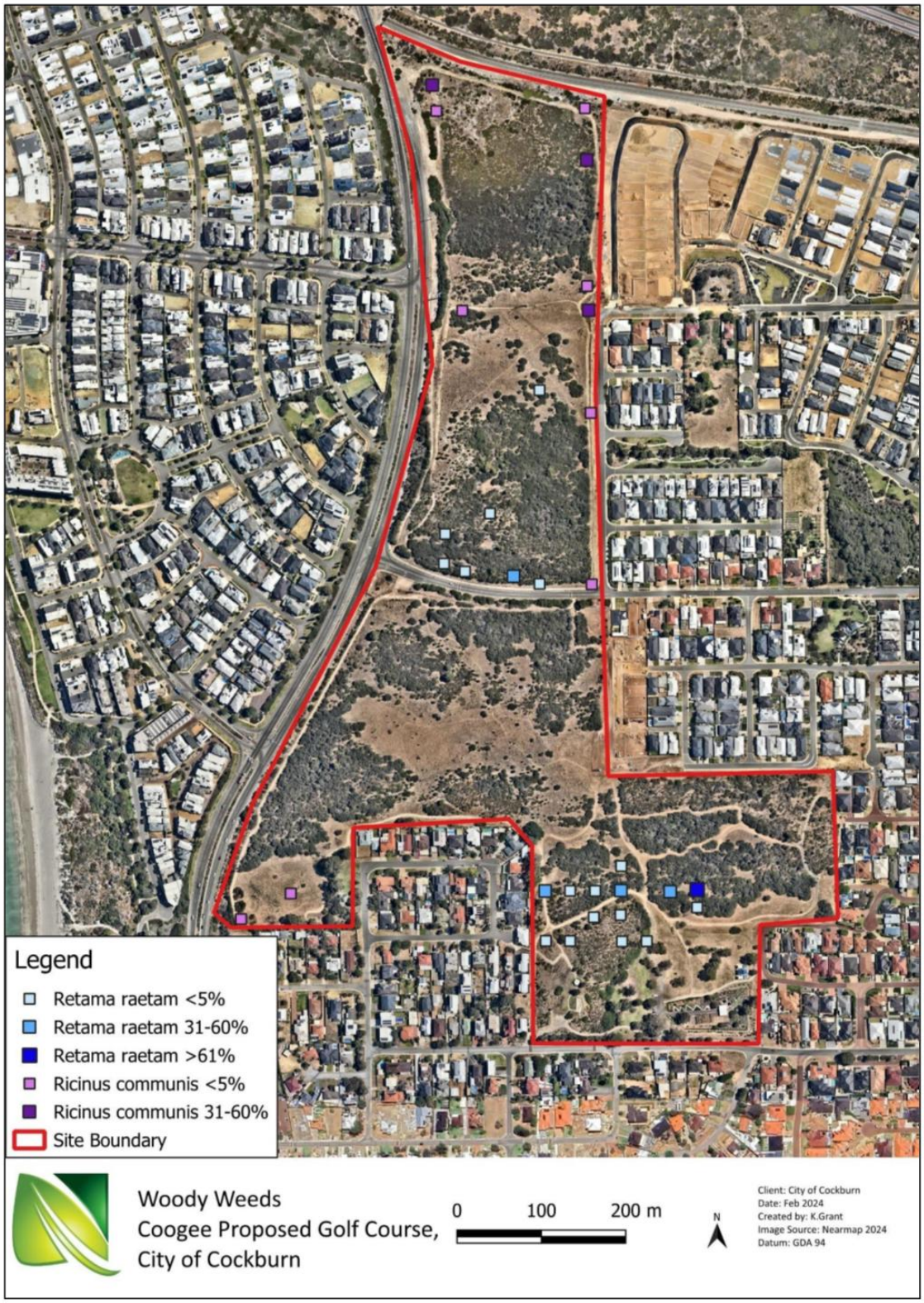

Legend
Carpobrotus edulis <5%
Carpobrotus edulis 31-60%
Foeniculum vulgare <5%
Fumaria capreolata <5%
Lupinus cosentinii <5%
Lupinus cosentinii 6-30%
Vicia sativa 6-30%
Site Boundary
Other Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94

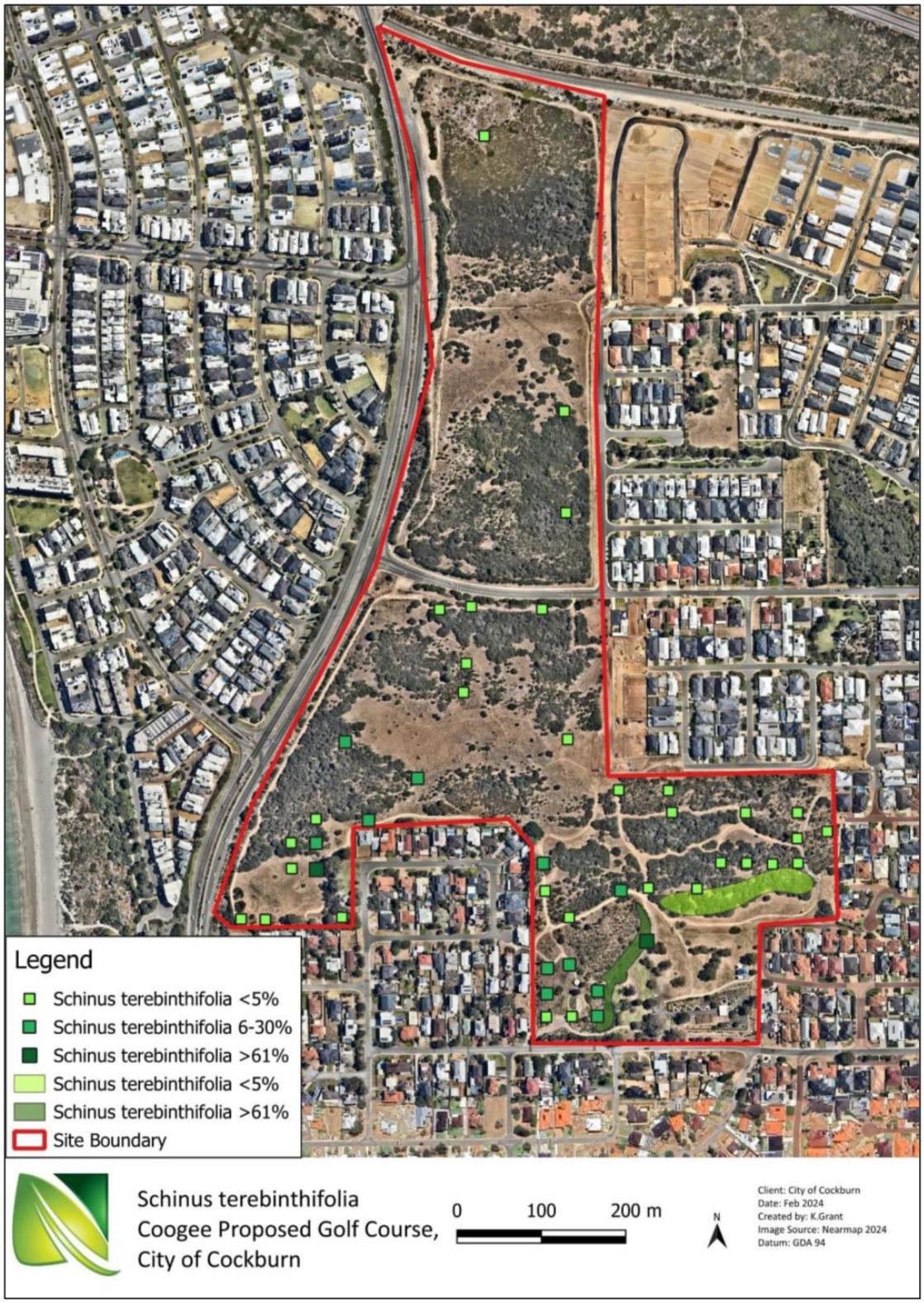

Legend
Euphorbia terracina <5%
Euphorbia terracina 6-30%
Euphorbia terracina >61%
Site Boundary
Euphorbia terracina
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
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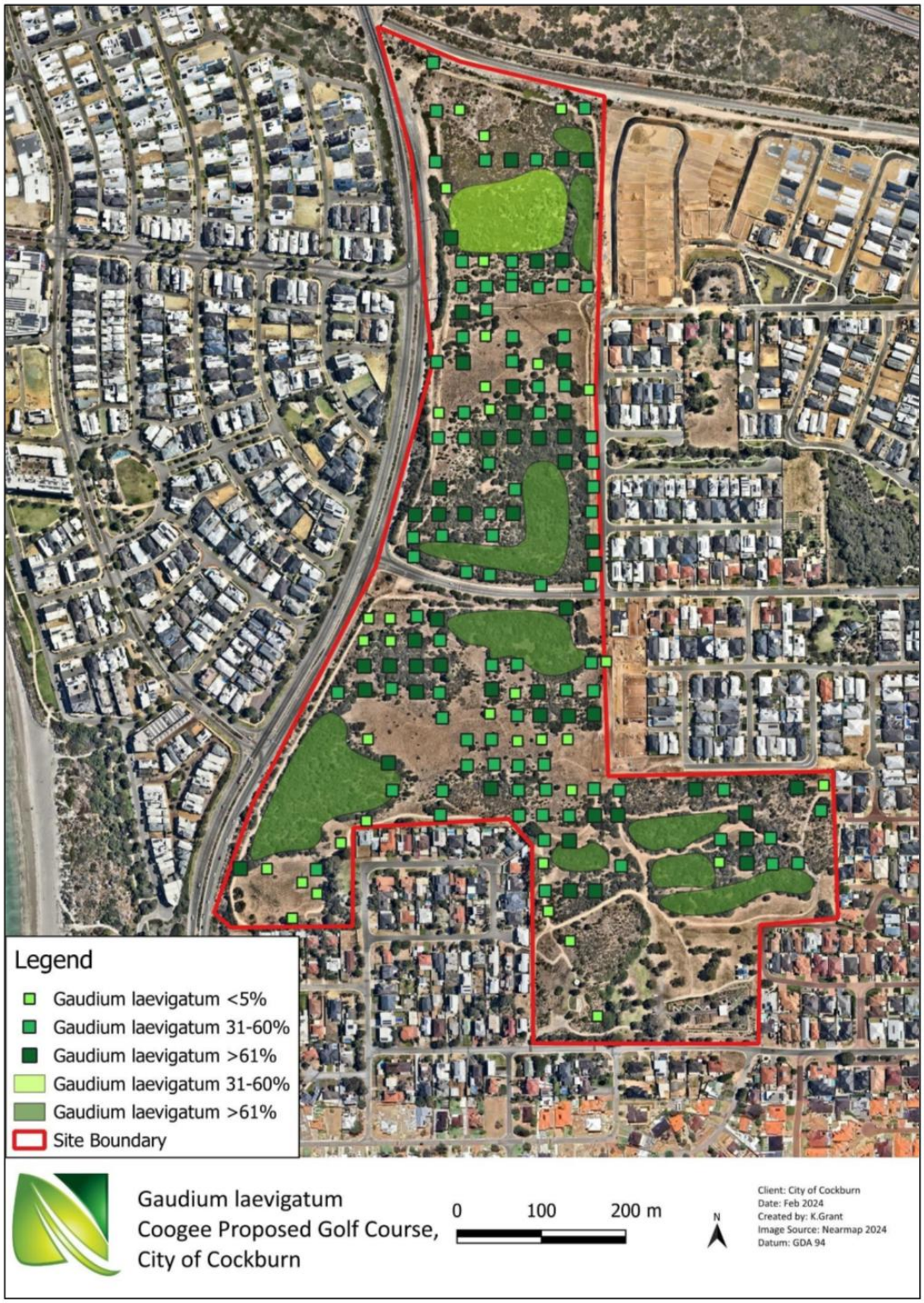

Legend
Pelargonium capitatum <5%
Pelargonium capitatum 6-30%
Site Boundary
Pelargonium capitatum
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
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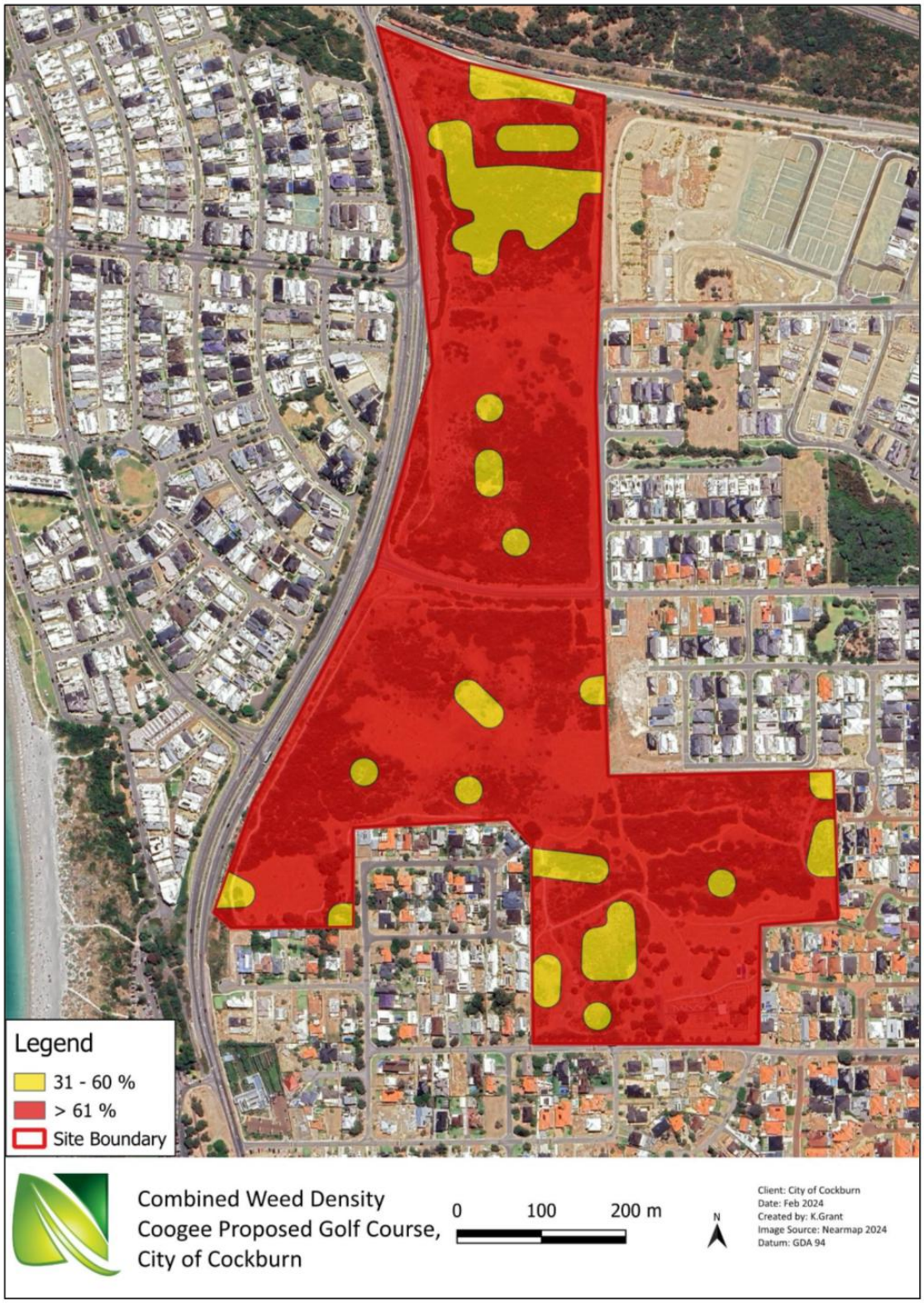
City of Cockburn
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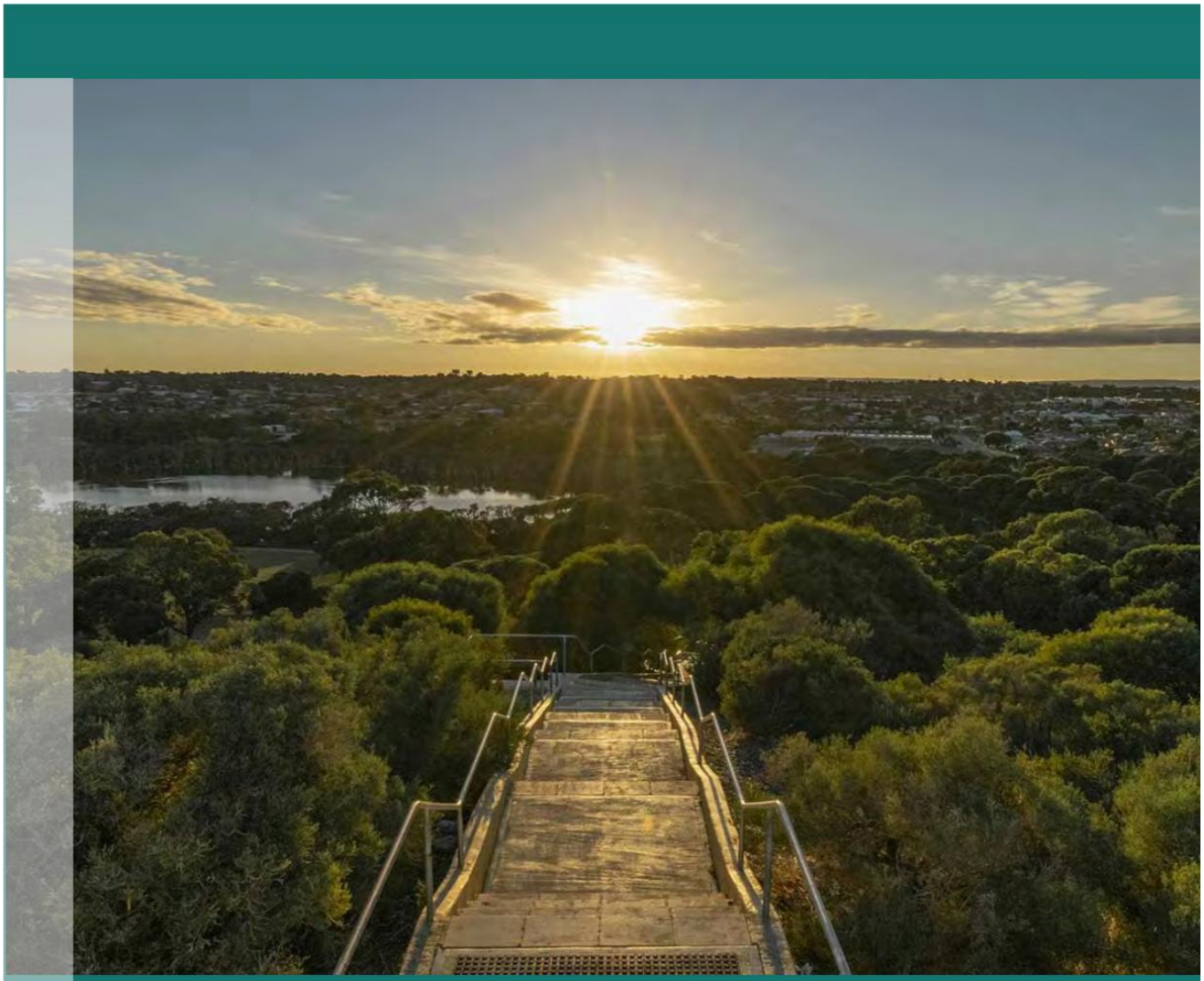



Legend
Retama raetam <5%
Retama raetam 31-60%
Retama raetam >61%
Ricinus communis <5%
Ricinus communis 31-60%
Site Boundary
Woody Weeds
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Schinus terebinthifolia <5%
Schinus terebinthifolia 6-30%
Schinus terebinthifolia >61%
Schinus terebinthifolia <5%
Schinus terebinthifolia >61%
Site Boundary
Schinus terebinthifolia
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
Gaudium laevigatum <5%
Gaudium laevigatum 31-60%
Gaudium laevigatum >61%
Gaudium laevigatum 31-60%
Gaudium laevigatum >61%
Site Boundary
Gaudium laevigatum
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94


Legend
31 - 60 %
> 61 %
Site Boundary
Combined Weed Density
Coogee Proposed Golf Course,
City of Cockburn
0
100
200 m
N
Client: City of Cockburn
Date: Feb 2024
Created by: K.Grant
Image Source: Nearmap 2024
Datum: GDA 94



REPORT OF AN ABORIGINAL AND HISTORICAL HERITAGE DUE DILIGENCE ASSESSMENT FOR THE PROPOSED MANNING RIDGE PROJECT AREA, COCKBURN WA

February 2024

For the City of Cockburn

archae-aus

1/107 Stirling Highway North Fremantle Western Australia 6159 PO Box 742 Fremantle Western Australia 6959 ABN 92 074 791 156
Telephone +61 8 9433 1127 Email office@archae-aus.com.au www.archae-aus.com.au

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7 February 2024

Version: Final 1.0

Prepared by Archae-aus Pty Ltd for the City of Cockburn

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Draft 1.0	19/12/2023	Victoria Huntley, Ayesha Limb and Dr Janelle White	Stuart Rapley	12/01/2024
Final 1.0	05/02/2024	-	Renée Gardiner	07/02/2024

Table 2. Distribution of Copies			
Version	**Date Issued**	**Media**	**Issued to**
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Archae-aus Pty Ltd

1/107 Stirling Highway
North Fremantle WA 6159
PO BOX 742
FREMANTLE WA 6959

T: 08 9433 1127
E: office@archae-aus.com.au

http://www.archae-aus.com.au

Project Manager: Lucy Sinclair
Email: lucys@archae-aus.com.au

Cover images:
View Above Manning Park (source: A Walk from Manning Park to the South Mole Lighthouse, Perth, Western Australia (metrotrekker.com))

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Please be aware that this report may contain images of deceased persons and the use of their names, which in some Aboriginal communities may cause sadness, distress, or offence.

DISCLAIMER

The authors are not accountable for omissions and inconsistencies that may result from information which may come to light in the future but was not forthcoming at the time of this research.

The cover photo of this report is for the Due Diligence report only. The City of Cockburn will need to seek approval from the source owners before publishing in any reports.

SPATIAL INFORMATION

All spatial information contained in this report uses the Geocentric Datum of Australia (GDA20), Zone 50, unless otherwise specified. All information obtained from the City of Cockburn is assumed to be accurate to two decimal places.

AUTHORSHIP

This report was written by Victoria Huntley [BA (Hons) Archaeology *W.Aust.*], Ayesha Limb [BA (Hons) Archaeology *W.Aust.*], Janelle White [PhD Applied Anthropology *UniSA*], with editorial assistance from Stuart Rapley [BA (Hons) Archaeology *W.Aust*; GDipMuseumStuds *Deakin*] and Renée Gardiner [BA (Hons) Archaeology, *La Trobe*].

The GIS data and maps were drafted by Victoria Huntley and Ayesha Limb.

KEY TERMS AND ABBREVIATIONS

Term / Abbreviation	Meaning / Interpretation
Aboriginal archaeological place or assemblage	A place (or group of physical sites) in which evidence of past activity by Aboriginal people is preserved (either prehistoric or historic or contemporary), and which has been, or may be, investigated using the discipline of archaeology and represents a part of the archaeological record.
Aboriginal Site	This term is used for Aboriginal heritage sites to which the AHA applies by the operation of Section 5. An Aboriginal site is defined by section 5 of the Act to mean: a) any place of importance where persons of Aboriginal descent have left any object, or have used, in connection with the traditional cultural life of the Aboriginal people, past or present; b) any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent; c) any place which is, or was, associated with Aboriginal people and which is of historical, anthropological, archaeological or ethnographical importance to the State; and d) any place where objects to which the Act applies are stored. How to report Aboriginal Cultural Heritage: https://www.wa.gov.au/government/document-collections/achknowledge-portal#how-to-report-potential-aboriginal-heritage
ACH	Aboriginal Cultural Heritage
ACHA	*The Aboriginal Cultural Heritage Act 2021*
ACHC	Aboriginal Cultural Heritage Council which previously superseded the ACMC, now superseded by the Aboriginal Cultural Heritage Committee (Committee)
ACMC	The former Aboriginal Cultural Material Committee (see ACHC)
ACHknowledge Portal	The portal is used to request advice, lodge and track applications and report information concerning Aboriginal cultural heritage.
Activity Area	Proposed work area / development envelope / project area
AHA	The *Aboriginal Heritage Act 1972*
ACHIS	The Aboriginal Cultural Heritage Inquiry System which holds information about: • Registered Aboriginal Sites (ACH Register Layer) • Lodged places (ACH Lodged Layer) • Historic records (ACH Historic Layer)
ACHMP	Aboriginal Cultural Heritage Management Plan (no longer required)
AHIS	The DPLH Aboriginal Heritage Inquiry System, an online and publicly accessible copy of the Register of Aboriginal sites, superseded by the ACHIS.
Archaeological site	Is a place (or group of physical sites) in which evidence of human past activity is preserved (either prehistoric or historic or contemporary), and which has been, or may be, investigated using the discipline of archaeology and represents a part of the archaeological record. This term is used to refer to a place regardless of whether it has been assessed under section 5 of the AHA.
Artefact	Any object (article, building, container, device, dwelling, ornament, pottery, tool, weapon, work of art etc.) made, affected, used, or modified in some way by humans.
Assessment	Professional opinion based on information that was forthcoming at the time of consideration
ATSIHP	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act).

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Term / Abbreviation	Meaning / Interpretation
CHMP	Cultural Heritage Management Plan
Committee	Aboriginal Cultural Heritage Committee (see ACHC)
Cultural material / archaeological material	Any object (article, building, container, device, dwelling, ornament, pottery, tool, weapon, work of art etc.) made, affected, used, or modified in some way by humans.
DAA	Abbreviation for Department of Aboriginal Affairs, now the Department of Planning Lands and Heritage (the Department)
The Department	See DPLH
DPLH	Department of Planning Lands and Heritage (the Department)
Ethnographic Site	A place that is significant to an Aboriginal group because of its stories and connections. These places have intangible heritage values and are linked to traditional custom and law.
FPIC	Free Prior and Informed Consent
Harm	In relation to Activity impacting ACH, including destroying or damaging ACH – except where that harm relates to an Aboriginal person acting in accordance with the person's traditional rights, interests and responsibilities.
Heritage survey	Survey and inspection undertaken in order to investigate and document the archaeological record of a particular area
HISF	Heritage Information Submission Form now superseded by the ACHknoweledge portal submission form and Aboriginal Heritage Enquiry Form
ICH	Indigenous Cultural Heritage
Native Title	Recognition of the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people
NSHA	Noongar Standard Heritage Agreement https://www.wa.gov.au/government/document-collections/noongar-standard-heritage-agreement-south-west-native-title-settlement
NTA	*Native Title Act 1993*
Object	An artefact - any object made, affected, used, or modified in some way by humans. Objects may be protected under the AHA if they meet the section 5 criteria for an Aboriginal site.
Section 18 (s18)	The section of the *Aboriginal Heritage Act 1972* that details the process for permission to disturb the land on which a site is located.
Section 18 (s18) Approval	A letter from the Minister of Aboriginal Affairs providing consent for the disturbance of land on which a site is located.
Section 39(2) Assessment	Process of the ACMC (now the ACHC / Committee) assessing a reported site's significance and interest.
Study Area	Entire area subject to the due diligence assessment, including the proposed Activity Area.
SWALSC	South West Aboriginal Land and Sea Council
Whadjuk	Whadjuk Native Title Group (WI2017/015)

EXECUTIVE SUMMARY

The City of Cockburn is proposing to undertake works associated with the development of a golf course as well as other community recreational facilities and a building.

As a result, the City of Cockburn requested the services of Archae-aus Pty Ltd to undertake:

1. A desktop analysis to identify any risk to heritage values within the survey area, and
2. A preliminary assessment of any approvals required under the *Aboriginal Heritage Act 1972* for the Manning Ridge Project Area

This desktop due diligence assessment forms the first stage of the heritage works required to progress the project. It has been recommended that the next stage involve an Aboriginal Cultural Heritage (ACH) Investigation (Aboriginal heritage surveys). It is always encouraged that a relationship and dialogue with the local Aboriginal community be established early on in a Project to identify not just Aboriginal Cultural Heritage (ACH) but any key social, economic, and/or environmental concerns and opportunities early on that might be relevant to the Project.

In addition, consulting with the Aboriginal Knowledge Holders at the start of the project can facilitate a process that follows the principles of Free, Prior and Informed Consent (FPIC) (see Legislative Context – UN Declaration on the Rights of Indigenous People).

SUMMARY OF THE RESULTS

Desktop research was undertaken to identify:

- Any previously recorded Aboriginal sites in the Activity Area and immediate surrounds.
- Any previously recorded historical heritage places.
- The proposed land use activities and associated levels of disturbance according to DPLH's Aboriginal Heritage Due Diligence Guidelines (2013).
- Any potential risk of harm to Aboriginal archaeological and/or ethnographic sites, at a preliminary desktop level.
- Any necessary approvals under the *Aboriginal Heritage Act 1972*.
- The appropriate Aboriginal organisations that should be consulted where necessary.

To inform this research, searches were carried out using the Department of Planning, Lands and Heritage's (DPLH) Aboriginal Cultural Heritage Inquiry System (ACHIS), the Heritage Council's site database (InHerit) and the Department of Primary Industries and Regional Development (DPIRD). These inquiries were followed by a search of other sources of information, including the Archae-aus library and reports, and other online digital resources.

Archae-aus identified no ACH or historical sites within the proposed Activity Area. One (1) ACH site is located approximately 200 m to the west, *Indian Ocean* (ID 3776). No registered historical sites were identified as intersecting the Activity Area. Although there are twenty-five (25) historical sites within 1 km from the Activity Area.

A total of seven (7) previous heritage surveys intersect the Project Area. A desktop review of these survey reports show that they are unreliable due to their age and their lack of relevance to the Manning Ridge Project Area.

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The Activity Area has been identified to be a minimally altered to moderately altered environment. Therefore, the DDA has identified a **low to moderate** potential for ACH within the Activity Area, this includes:

- **Moderate potential** for the following types of ACH: Artefact scatters, scar trees, ethnographic sites, and historic sites.
- **Low potential** for the following types of ACH: Grind stones, potential archaeological deposits (PADs), rock art, quarries, burials, rock shelters, human-made structures, and water sources.

Based on this, and an examination of the types of landforms present in the survey area, Archae-aus has assessed that there is a **low, moderate and high** risk of impacting Aboriginal and Historical heritage within the Activity Area.

- **High Risk**: Areas where there is dense remnant vegetation.
- **Moderate Risk**: The areas outside of high-risk areas in which vegetation is less dense but present and the land is not as significantly impacted or modified.
- **Low Risk**: Sections of the Project Area, including graded tracks, cleared land, and modern buildings.

Accordingly, an archaeological and ethnographic survey are required for areas of high and moderate potential (as shown on Map 5).

In summary, it has been assessed that:

1. The proposed activity is classed as significant to major disturbance according to the Aboriginal Heritage Risk Matrix (Figure 7)
2. There is a potential risk of harm to ACH across the Activity Area
3. Desktop research of the Activity Area revealed no ACH or historic heritage places that intersect the Activity Area. However, one ACH site is within 200 m of the Activity Area.
4. A search of the heritage councils InHerit register revealed twenty-five historic sites within 1 km of the Activity Area.
5. A heritage survey / ACH Investigation is required to formally identify any ACH within the Activity Area and to identify the key next steps in the ACH process.

ADVICE

The desktop due diligence assessment is complete. Based on this assessment, Archae-aus **advise** that the City of Cockburn are aware that:

1) This desktop due diligence assessment examines the risk of harm to any known or potential ACH within the proposed Activity Area, which includes future development works.
2) An initial search of the Aboriginal Heritage Inquiry System (AHIS) and updated search of the new Aboriginal Cultural Heritage Inquiry System (ACHIS), revealed that the Activity Area has

been covered by previous surveys (archaeological and ethnographic); however, these are not considered reliable[1] due to:

a. Their age (most previous surveys have been conducted pre-2013 or did not display a date).
b. Lack of relevance to the current Activity Area and proposed activities.
c. Inadequate coverage of the Activity Area (by the publicly available surveys and lack of archaeological investigation within the Activity Area itself).

3) Desktop research of the Manning Ridge Activity Area revealed an Aboriginal Heritage Site approximately 550 m west of the Activity Area (DPLH Site ID 3776)
4) The desktop research indicates that there is **low, moderate and high potential** for encountering certain types of Aboriginal Cultural Heritage in the Activity Area; and **low to moderate potential** for historical heritage in the Activity Area.
5) Based on the preliminary risk assessment for the Activity Area, an archaeological and ethnographic heritage survey is required to carry out a formal risk assessment to confirm whether there is ACH and historical heritage within areas of high and moderate archaeological potential.
6) That the heritage surveys will confirm the required next steps, including any necessary approvals, based on a formal assessment of risk of harm to any ACH within the Manning Ridge Activity Area.
7) That the City of Cockburn contact SWALSC and the Whadjuk Aboriginal Corporation for a list of names to undertake a survey of the proposed Activity Area, in order to confirm and facilitate the recommended heritage surveys.

[1] As per the ACH Investigation Guidelines.

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SECTION ONE – INTRODUCTION

PROJECT BACKGROUND

The City of Cockburn are proposing to undertake the construction of a golf course and potentially other community recreational facilities. The City of Cockburn has requested the services of Archae-aus to undertake an Aboriginal Heritage Due Diligence Assessment (DDA) on the area of impact under the *Aboriginal Heritage Act 1972* and with reference to the *WA Heritage Act 2018*. The indicative Activity Area in which these works are proposed to take place, is detailed in Map 1.

This Due Diligence Assessment describes the archaeological, ethnographic and historical background of the indicated Activity Area, outlining areas of potential heritage risk and providing guidelines for mitigating and managing risk to areas of potential Aboriginal Cultural Heritage (ACH) in order to meet legislative requirements. The potential for any historical/non-Aboriginal heritage will also be considered.

ACTIVITY AREA

The Activity Area that is the focus of this report is the Manning Ridge Project Area. The Activity Area is bounded by Spearwood Avenue to the north, Hamilton and Cross Road to the east, Ocean Road and King Street to the south and Cockburn Road to the west. The Activity Area covers approximately 42 hectares. The area is partially cleared bushland less than a kilometre from North Coogee. Additionally, the Activity Area is located on South West Settlement Native Title land WC1996/041, WC1997/071 and WC1998/058.

SCOPE OF SERVICES

The City of Cockburn has engaged Archae-aus to carry out the following Scope of Services in relation to the due diligence assessment, including:

- Desktop heritage assessment:
    - To assess whether the activity may harm historical and ACH and/or how the activity may be carried out so as to avoid harm.
    - To provide recommendations on any approvals required under the *Aboriginal Heritage Act 1972*
    - To provide evidence of DDA and any correspondence and advice obtained from DPLH, SWALSC/LACH.

To fulfil the above Scope, Archae-aus carried out the following.

- Desktop research and consideration of the results from the relevant registers and databases.
- Consideration of the coverage and reliability of previous surveys and associated reports.
- Identification and outline of engagement requirements and timeframes.
- Assessment of any potential impacts the proposed Activity will have on any Aboriginal Cultural Heritage that may be protected under the *Aboriginal Heritage Act 1972*.
- Identification of measures to avoid, mitigate, or manage impacts to Aboriginal Cultural Heritage in accordance with the *Aboriginal Heritage Act 1972* and best practice standards (see Legislation and Guiding Principles section).


383000
384000
385000
6449000
6448000
6447000
6446000
0 250 500 750 m
Perth
Legend
Manning Ridge Project Area
archae-aus
Map 1. Overview of the Manning Ridge Project Area
Drafted by Victoria Huntley, 14th December 2023. GDA94, Zone 50. Satellite imagery courtesy of Google Maps.

LIMITATIONS

This due diligence assessment is desktop only, providing preliminary advice on any existing and potential archaeological and ethnographic values within the Activity Area. It is not to be solely relied on for the identification of all possible ACH that may be in the area. A field assessment is required due to the lack of previous heritage surveys and assessed high potential for heritage.

DUE DILIGENCE ASSESSMENT METHODS

The following methods were used to undertake the due diligence assessment:

- Desktop research into any registered Aboriginal archaeological and ethnographic sites, Other Heritage Places, and previous archaeological assessments/surveys within and surrounding the Activity Area. This includes requesting site files from the Department of Planning, Lands and Heritage (DPLH).
- Desktop research into any registered historical heritage places in or around the Activity Area that may hold significance to Aboriginal People and Cultural Heritage.
- Desktop research into previous and historical land use of the Activity Area, including areas of disturbance to determine areas of cultural heritage risk to be targeted during heritage surveys.
- Internal data search of Archae-aus library and reports.
- Preparation of GIS maps that outline the Activity Area, existing cultural heritage areas, and areas of potential archaeological risk.

LEGISLATION AND GUIDING PRINCIPLES

The following section briefly summarises the relevant legislation and guiding principles that may relate to the Activity Area.

The Burra Charter 2013

The Burra Charter (*The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*, 2013) is the foundational document for conserving Australia's cultural heritage (both Aboriginal and non-Aboriginal). The Charter encapsulates two important aspects in conserving heritage places. First, it establishes the best practice principles and processes for understanding and assessing a place's significance, as well as developing and implementing a conservation plan. Second, the Charter defines and explains the four primary cultural values that may be ascribed to any place: aesthetic, historic, social or spiritual, and scientific. These values are essential as they delineate the types and quality of information needed to accurately determine a heritage place's significance.

The language of the new *Aboriginal Cultural Heritage Act 2021* in sections defining ACH and in assessing significance and importance to the State aligns with the Burra Charter. Recent practice within DPLH with respect to site reporting and significance assessment under the AHA also referred to Burra Charter values.

Aboriginal Heritage Legislation

WA Aboriginal Heritage Legislation

Aboriginal cultural heritage in WA has been protected by the *Aboriginal Heritage Act 1972* (the AHA), administered most recently by the Department of Lands, Planning and Heritage (DPLH). While a progressive piece of legislation in the 1970s, the AHA has come under increasing criticism in recent

years and is widely recognised as not meeting 21st century best practice standards of heritage legislation. The destruction of Juukan Gorge by Rio Tinto in 2020 brought problems with the AHA into sharp focus, particularly the section 18 process for approving the destruction of Aboriginal Sites. This process was strongly criticised in *A Way Forward*, the final report of the Parliamentary Inquiry into the destruction of Juukan Gorge (Parliament of the Commonwealth of Australia, 2021). The committee concluded that the original good intentions of the legislation ultimately failed and the law became in practice 'a mechanism through which the disturbance, damage and destruction of both physical and intangible Aboriginal cultural heritage has repeatedly taken place' (para 4.125). The committee attributed this to:

- Amendments that undermined the original purpose
- How legislation was interpreted and administered by successive Ministers.
- The prominence of section 18 as the basis for the system of damage by permit.
- The role of the Minister as arbiter for decisions about approval, to the exclusion of the voice and interests of traditional owners.

In summary, the 'AHA has failed to strike a balance between the needs and aspirations of the various parties and has excessively favoured the interests of proponents' (para 4.126).

Other problems with the AHA include the role of Aboriginal people in the protection of their heritage, including the absence of legislated representation on the ACMC, definitions of Aboriginal cultural heritage and the lack of integration with Native Title legislation.

The committee encouraged the WA government to continue its consultation with regard to its draft Aboriginal Cultural Heritage Bill, recommending that it addressed the concerns already expressed in submissions by Aboriginal people and that it accommodates 'the principles of free, prior and informed consent', conducting consultation 'in a way that accords with Aboriginal traditions of dialogue' (para 4.135).

The WA government passed the *Aboriginal Cultural Heritage Act 2021* (ACH Act) in December 2021. The objectives of this legislation were:

- To recognise the importance of Aboriginal cultural heritage and Aboriginal custodianship.
- To recognise, protect and preserve Aboriginal cultural heritage.
- To manage activities that may harm Aboriginal cultural heritage.
- To promote an appreciation of Aboriginal cultural heritage.

Due to extensive backlash and criticism of the ACHA, the WA Government has now officially repealed the ACHA and the AHA (an amended version) was proclaimed on the 15 November. The proposed amendments to the AHA attempt to address the criticisms of the Section 18 process by:

- formal recognition of Native Title holders and rights of appeal in respect of s18 decisions by the Minister,
- replacement of the ACMC with an Aboriginal Heritage Committee, based on the composition of the Aboriginal Heritage Council established under the ACHA, with male and female Aboriginal co-chairs, and preferably a majority of members of Aboriginal descent.
- requirement to bring any new information with respect to a s18 approval.

Currently, DPLH have published the following documents following the revival of the AHA:

- **Consultation Policy** – outlining 'the Government's expectations of proponents to undertake consultation with Aboriginal people prior to submitting a section 18 notice'. https://www.wa.gov.au/government/document-collections/aboriginal-heritage-approvals#policy-and-guidelines
- **Aboriginal Heritage Act 1972 Guidelines** – providing practical guidance for landowners where section 18 consent is required to impact Aboriginal cultural heritage (sites and objects). https://www.wa.gov.au/system/files/2023-11/aboriginal_heritage_act_1972_guidelines.pdf

Under the AHA (s17) it remains an offence to alter an Aboriginal site in any way, including collecting artefacts; conceal a site or artefact; or excavate, destroy or damage in any way an Aboriginal site or artefact; without the authorisation of the Registrar of Aboriginal Sites under Section 16 or the Minister of Aboriginal Affairs under Section 18 of the AHA.

An Aboriginal site is defined in Section 5 of the AHA as:

a) Any place of importance and significance where persons of Aboriginal descent have, or appear to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with the traditional cultural life of the Aboriginal people, past or present.
b) Any sacred, ritual or ceremonial site which is of importance and special significance to persons of Aboriginal descent.
c) Any place which, in the opinion of the Committee [i.e. Aboriginal Cultural Material Committee, or ACMC], is or was associated with Aboriginal people and which is of historical, anthropological, archaeological or ethnographical interest and should be preserved because of its importance and significance to the cultural heritage of the State.
d) Any place where objects to which the AHA applies are traditionally stored, or to which, under the provisions of the AHA, such objects have been taken or removed.

Section 39 (2) states that:

> In evaluating the importance of places and objects the Committee [i.e. the ACMC] shall have regard to —
>
> a) any existing use or significance attributed under relevant Aboriginal custom;
> b) any former or reputed use or significance which may be attributed upon the basis of tradition, historical association, or Aboriginal sentiment;
> c) any potential anthropological, archaeological or ethnographical interest; and
> d) aesthetic values.

Section 39 (3) stated that:

> Associated sacred beliefs, and ritual or ceremonial usage, in so far as such matters can be ascertained, shall be regarded as the primary considerations to be taken into account in the evaluation of any place or object for the purposes of this Act.

Information about heritage places and their legal status is available through the DPLH Aboriginal Cultural Heritage Inquiry System (ACHIS)[2]. There are three categories by which the ACHIS now characterises heritage places:

[2] When searching based on shapefiles or coordinates, GDA2020 projection is not currently supported.

- Registered Aboriginal Sites – Aboriginal Cultural Heritage (ACH) **Register layer.**
- Lodged places[3] – Aboriginal Cultural Heritage (ACH) **Lodged layer.**
- Historic records - Aboriginal Cultural Heritage (ACH) **Historic layer.**

Fees

The WA Government has introduced new fees associated with section 16 and section 18 applications. Commercial and Government proponents are expected to pay the following fees for new applications:

- A $250 application fee.
- $5,096 multiplied by the number of ***proposed investigation sites*** for section 16 applications and ***identified sites or places*** for section 18 applications.

> *'The Director General has the ability to waive, reduce or refund fees; and extend the time within which to pay fees. Any such matter will be considered on a case-by-case basis[4]'.*

Other Heritage Legislation

Aboriginal heritage sites are also protected under the *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the HPA). The HPA complements state / territory legislation and is intended to be used only as a 'last resort' where state / territory laws and processes prove ineffective. Under the HPA the responsible Minister can make temporary or long-term declarations to protect areas and objects of significance under threat of injury or desecration. The HPA also encourages heritage protection through mediated negotiation and agreement between land users, developers and Aboriginal people.

Aboriginal human remains are protected under the AHA and the HPA. In addition, the discovery of human remains requires that the following people are informed: the State Coroner or local Police under section 17 of the *Coroners Act 1996*; the State Registrar of Aboriginal Sites under section 15 of the AHA and the Federal Minister for Aboriginal Affairs under Section 20 of the HPA.

In terms of broader recognition of Aboriginal rights, the Commonwealth *Native Title Act 1993* (the *NTA*) recognises the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people. Under the NTA, native title claimants can make an application to the Federal Court to have their native title recognised by Australian law. The NTA was extensively amended in 1998, with further amendments occurring in 2007, and again in 2009. Under the future act provisions of the *Native Title Act 1993*, native title holders and registered native title claimants are entitled to certain procedural rights, including a right to be notified of the proposed future act, or a right to object to the act, the opportunity to comment, the right to be consulted, the right to negotiate or the same rights as an ordinary title holder (freeholder).

[3] Information about these places is in the process of being verified by the Department and Committee.

[4] https://www.wa.gov.au/government/document-collections/aboriginal-heritage-approvals

Corporate Social Responsibility

Aboriginal Community Engagement

In the *A Way Forward* report (Parliament of the Commonwealth of Australia, 2021: 256) the Centre for Social Responsibility in Mining submitted that mining companies do not have the capacity to avoid incidents such as the destruction of Juukan Gorge. The Centre suggested mining companies (and applicable to other developers) are not performing in their social responsibility to prevent activities that would be detrimental to the community.

> *The field of mining and social performance is in decline. This has weakened the ability of community relations and social performance professionals to challenge production priorities in circumstances where risks to community exceed reasonable thresholds. Our research highlights shortcomings across organisational structures, internal lines of reporting, management systems, incentives, and talent management.*

Furthermore, Hon Warren Entsch MP (Chair) stated in the Foreword of the 2020 *Never Again Interim Report*, following the Juukan disaster, that corporate Australia 'can no longer ignore the link between its social licence to operate and responsible engagement with Indigenous Australia' Owners' (Joint Standing Committee on Northern Australia, 2020). One of the key lessons learnt by Rio Tinto has been the recognition that they put their social licence to operate in jeopardy by focussing on commercial gain ahead of 'meaningful engagement with Traditional Owners' (Joint Standing Committee on Northern Australia, 2020: 7). According to Recommendation 6.91 of the later *A Way Forward Report*:

> *…. These actions remind corporations that their social licence to operate and corporate ethical positions will affect how they are able to do business in the future – it will affect their investment prospects and return on investment. The same principles* ***apply to other industries,*** *particularly in the context of a transition to renewables, opening the way for them to learn from the mistakes of the mining boom and pay respect to the living heritage of Aboriginal and Torres Islander peoples.*

The idea of 'meaningful engagement' is encapsulated by the United Nations Declaration on the Rights of Indigenous Peoples, which was signed by Australia in 2007 (United Nations, 2008). Effective engagement with Aboriginal peoples can be underpinned by six inter-related principles:

- Acknowledging and understanding of the individual aspirations and unique circumstances of different people and groups.
- Building trust.
- Maintaining a respectful manner, that acknowledges the need for reciprocity.
- Effective communication.
- Ensuring informed consent.

- Sustaining the relationship.

Direct and sustained engagement process is the best approach when working with Aboriginal communities.

UN Declaration on the Rights of Indigenous People (UNDRIP)

The UN Declaration on the Rights of Indigenous People (UNDRIP) sets out the rights of Indigenous people around the world to set and pursue their own priorities for development, and to maintain and control their cultural heritage (United Nations, 2008) The key provisions relevant to mineral development in the Australian Context include Indigenous people having the right to:

- practice and revitalise their cultural traditions and customs, and states shall provide redress for cultural property taken without free, prior and informed consent (Article 11)
- practice their spiritual and religious traditions, customs and ceremonies, maintain sites, control ceremonial objects and repatriate human remains, and states shall seek to enable the access and/or repatriation of ceremonial objects and human remains (Article 12)
- maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions and intellectual property over such heritage, knowledge and culture, and states shall, in conjunction with Indigenous peoples, take effective measures to recognize and protect the exercise of these rights (Article 31)
- determine and develop priorities and strategies for the development or use of their lands or territories and other resources, and states shall consult and cooperate with Indigenous peoples in order to obtain their free and informed consent before the approval of any project affecting their lands, territories and resources, provide effective mechanisms for redress for any adverse impact from such activities (Article 32)

A core principle of UNDRIP is the right of Indigenous people to make decisions about development proposals that have the potential to impact their land and culture from an informed position that is free from coercion, intimidation, or manipulation (Joint Standing Committee on Northern Australia, 2021). In order to uphold these principles, Free and Prior Informed Consent (FPIC) has been recognised as the best practice approach for engaging with Indigenous people when seeking consent for projects or activities that affect Indigenous people's culture or country (Kemp and Owen, 2014).

While the UNDRIP has not been formally adopted into Australian law, there has been an increasing recognition within industry of the importance of FPIC in building meaningful relationships with Traditional Owners and maintaining a social licence to operate. In addition, Mr Buti, the WA Aboriginal Affairs Minister, has indicated that 'new Act embedded consultation, due diligence, agreement making and **informed consent** within legislation' (as reported by Torre, 2022).

Free Prior and Informed Consent (FPIC)

In relation to cultural heritage and development, the UNDRIP means that Indigenous communities have a right to know, and make decisions about, projects that affect them and their heritage. The principles of Free, Prior and Informed Consent (FPIC) for Indigenous persons or communities in relation to development projects are a best practice standard to be applied. They protect and promote Indigenous Rights within the development process. The processes of FPIC should be ongoing throughout the life of the project. To break this down:

- ***Free*** **-** the process to be free of manipulation or coercion (including financial).
- ***Prior*** **-** the process occurring in advance of any activity associated with the decision being made and allowing time for traditional decision-making processes.
- ***Informed*** **-** objective, accurate, current and easily understandable information.
- ***Consent*** **-** right to approve or reject a project (Hill, Lillywhite and Salmon, 2010).

The 'Darwin Statement' – implementing Best Practice Cultural Heritage Principles

In 2018, the Heritage Chairs and Officials of Australia and New Zealand (HCOANZ) agreed to implement best practice cultural heritage principles under what they termed the 'Darwin Statement'. The Heritage Chairs were joined by representatives of Aboriginal and Torres Strait Islander heritage organisations from the Commonwealth, states and territories in an approach aimed at working together to advance 'a shared approach to Australia's cultural heritage' (Heritage Chairs of Australia and New Zealand, 2020, p. 33). The HCOANZ group emphasised the principles of:

- Sharing the comprehensive Australian heritage story (including the 'critical importance' of recording and sharing the stories of Aboriginal and Torres Strait Islander cultural heritage).
- Inclusion and engagement with Aboriginal and Torres Strait Islander people.
- Cooperation and collaboration.

Their objective was to facilitate Indigenous Cultural Heritage (ICH) legislation and policy across the country that is consistently of the highest standards.

The HCOANZ group made their recommendations at a time of statutory reviews of Commonwealth Acts, including the *Environment Protection and Biodiversity Act 1999* (Cth) (EPBC Act) and the Australian Heritage Strategy, the Commonwealth's key heritage policy document. Their vision, captured in a document entitled *'Dhawura Ngilan'/Remembering Country*, reminds us that, as a foundational principle, Australia's Indigenous Peoples are entitled to expect that Indigenous Cultural Heritage legislation will uphold the international legal norms contained within the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), and that the key to UNDRIP is the principle of self-determination. The four primary visions of *'Dhawura Ngilan'/Remembering Country* are:

1. Aboriginal and Torres Strait Islander people are the Custodians of their heritage. It is protected and celebrated for its intrinsic worth, cultural benefits and the well-being of current and future generations of Australians.
2. Aboriginal and Torres Strait Islander heritage is acknowledged and valued as central to Australia's national heritage.
3. Aboriginal and Torres Strait Islander heritage is managed consistently across jurisdictions according to community ownership in a way that unites, connects, and aligns practice.
4. Aboriginal and Torres Strait Islander heritage is recognised for its global significance.

This is the current climate under which the new *Aboriginal Cultural Heritage Act 2021* has evolved and been enacted, with the establishment of the ACH Council, and the Local Aboriginal Cultural Heritage Services (LACHS) to manage (their own) Aboriginal cultural heritage. The proposed amendments to the AHA include the replacement of the ACMC with an Aboriginal Heritage Council, with Aboriginal chairs and majority Aboriginal membership and the recognition of Native Title holders.

UNESCO Convention for the Safeguarding of Intangible Cultural Heritage 2003

As noted in the *'Dhawura Ngilan'/Remembering Country* visionary document (Heritage Chairs of Australia and New Zealand, 2020, pp. 38–39), intangible cultural heritage can exist independently of the association with a particular place. Thus, 'the management, protection and promotion of this form of cultural heritage can provide particular challenges in a legislative context'. Whilst this is understood, the HCOANZ group point to the importance of this manifestation of ACH as indicated by the number of international instruments, in addition to the UNDRIP, that address this topic. The 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO 2003) remains the key instrument in the recognition and protection of such cultural heritage; however, Australia has not yet ratified it. Acknowledging the constitutional arrangements in Australia, the HCOANZ group support the development of national legislation for the recognition and protection of intangible ICH/ACH.

For the purposes of this Convention (UNESCO 2003: Appendix 2) 'intangible cultural heritage':

- means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity.
- is manifested inter alia in the following domains:
  (a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage
  (b) performing arts
  (c) social practices, rituals and festive events
  (d) knowledge and practices concerning nature and the universe
  (e) traditional craftsmanship.

Both the AHA (Section 5 and Section 39 (2) and (3)) and the ACHA (Section 12) include consideration of intangible cultural heritage values that are considered important to the Aboriginal people of the State, and are recognised through social, spiritual, historical, scientific or aesthetic values, as part of Aboriginal tradition. However, most forms of intangible cultural heritage, including oral traditions and rituals, are excluded unless they are associated with place.

Summary

A key result of the Parliamentary Inquiry into the destruction of Juukan Gorge was the reminder to corporations of their 'social licence' to operate. In relation to Aboriginal cultural heritage and tradition this means respect for Aboriginal people and meaningful engagement with them as set out by UNDRIP and underpinned by the principles of FPIC. These principles are reflected in both national and international best practice cultural heritage standards and codes.

The AHA's Section 18 process came under criticism by that Inquiry, which commented that it 'failed to strike a balance between the needs and aspirations of the various parties and has excessively favoured the interests of proponents (4.126). In commenting on the draft ACH Bill, the Committee supported the aspirations of the WA Government to strengthen Aboriginal voice in the management

of ACH and in its efforts to seek a better balance between proponents and traditional owners (4.129). In noting concerns raised in consultation about the Bill, the Committee strongly urged the WA Government to incorporate the principles of FPIC in addressing the issues raised by Aboriginal groups as it progressed the new legislation (4.135).

The ACHA broadened the definition of Aboriginal cultural heritage and acknowledged Aboriginal people as its primary custodians and decision makers. It instituted a new tiered approvals process, based on the amount of ground disturbance. It promoted the role of Aboriginal people in managing harm to their heritage by requiring substantially more engagement with Aboriginal people by proponents at all stages of the approvals process. The establishment of the Aboriginal Cultural Heritage Council (ACHC) and Local Aboriginal Cultural Heritage Services (LACHS) are based on the principle of self-determination.

The proposed amendments to the AHA, following the announcement to repeal the ACHA, attempt to address the criticisms of the Section 18 process by formally recognising the interests of Native Title holders, by extending the right of appeal to Aboriginal people, and by creating a more transparent process of decision-making timelines by the Minister. Increased involvement of Aboriginal people is addressed by replacing the ACMC with a new Aboriginal Heritage Committee, based on the composition of the ACHC established under the ACHA. These amendments may not adequately incorporate the principles of FPIC or meet the best practice standards recommended by the Parliamentary Inquiry. The onus is on proponents to meet best practice cultural heritage standards in order to avoid or limit any risks that may impact their social licence to operate.

Historic Heritage Legislation

Heritage of Western Australia Act 1990 (repealed)

In July 2019, the *Heritage of Western Australia Act 1990* (the HWAA) was repealed and replaced by Heritage Act 2018. Any heritage agreements entered into under Section 29 of the HWAA that were in effect on the commencement day of the Heritage Act 2018 continue to have effect as if it were certified under the new legislation. The municipal heritage inventories that were compiled and maintained under the HWAA are still a maintained repository of information for local governments today. Indeed, the collation of local heritage information is still required under Part 8 of the *Heritage Act 2018*, now referred to as Local Heritage Surveys.

Heritage Act 2018

The purpose of the *Heritage Act 2018* (HA) is to recognise and promote WA cultural heritage by defining principles for conservation, use, development or adaptation for heritage places. In repealing the HWAA, the HA is the main legislative framework for historical heritage, sometimes referred to as European heritage, in the State.

The HA sets out processes for the management of the State Register of Heritage Places, including the establishment of a Heritage Council. The purposes of this Council include assessing places of significance, advising the Minister for Heritage, guiding public authorities on best practice, promoting public awareness and administration of the register of places. The Heritage Council of Western Australia is Western Australia's advisory body on heritage matters and focuses on places, buildings and archaeological sites, with a mission to provide for and encourage the conservation of places significant to the cultural heritage of WA under the jurisdiction of the HA.

The HA requires the keeping of a Register of Heritage Places for places that are protected by the provisions of the Act. Heritage places generally gain registration under the HA by being shown to be of cultural heritage significance or possessing special interest relating to or associated with cultural heritage. Section 38 outlines relevant factors in determining the significance of heritage places. This section uses definitions and values like those of the Burra Charter (see above): the Council are to consider values such as aesthetic, historical, scientific, social or spiritual, and characteristics such as fabric, setting, associations, use and meaning.

Places registered under the HA may also have Aboriginal heritage values listed within the significance statement.

Part 5 outlines the responsibilities of public authorities to consider heritage matters within development planning. Under Section 73 of the HA, public authorities must refer a development proposal to the Council when the proposed works have potential to impact a registered place. The advice provided by the Council in response to a referred proposal may consider the restoration, maintenance and interpretation of the heritage place in question.

Part 11 outlines the definitions and penalties for offences and contraventions of the Act. Under section 129 of the HA, unauthorised impact to registered heritage places is subject to penalty. Section 129 defines damage as including altering, demolishing, removing or despoiling any part of, or thing in, a registered place. The penalties for contravention of the Act are severe, including a $1 million fine, imprisonment for one year and a daily penalty of $50,000. Applications to develop, disturb or alter any place entered on the Register can be made under Part 5 Division 2 of the HA. The HA is currently administered by the Department of Planning, Lands and Heritage in Perth.

Planning and Development Act 2005

The purposes of the Planning and Development Act 2005 (the PDA) are to consolidate the provisions of the Acts repealed by the Planning and Development (Consequential and Transitional Provisions) Act 2005 (i.e. the Metropolitan Region Town Planning Scheme Act 1959, the Town Planning and Development Act 1928 and the Western Australian Planning Commission Act 1985). The PDA is intended to provide for an efficient and effective land use planning system in the State, as well as promoting the sustainable use and development of land in the State.

Under Section 73 of the *Heritage Act 2018*, any development proposal that is likely to affect a Registered place must be referred to the Heritage Council for its advice. Under Section 75 of the HA, it is important to comply with Heritage Council advice in order to not adversely affect a registered place.

Under the PD Act, the definition of development 'includes the concept of physical development and the use of the land'[5].

> *"Development means the development or use of any land, including – (a) any demolition, erection, construction, alteration of or addition to any building or structure on the land; (b) the carrying out on the land of any excavation or other works; in the case of a place to which a*

[5] https://www.dplh.wa.gov.au/getmedia/475ca92d-87a9-45b9-9313-efe3684f6f70/Making-Good-Planning-Decisions-(website-published)-2

Conservation Order made under section 59 of the Heritage of Western Australia Act 1990 applies, any act or thing that – (i) is likely to change the character of that place or the external appearance of any building; or (ii) would constitute an irreversible alteration of the fabric or any building."

Local Planning Schemes

As the Activity Area occurs within the City of Cockburn boundary, local planning schemes will apply to proposed developments.

Town Planning Scheme No. 3

The City of Cockburn has included guidance around ACH in the Local Planning Scheme No. 3 specifically[6]:

- 4.12.1 Application Requirements
  - a) Unless the local government waives any particular requirement each application for planning approval for an extractive industry shall include the following information in addition to the requirements of clause 67 of the Deemed Provisions –
    - (i) a report detailing the existing physical environment including geology, soil profiles, surface and ground water hydrology, identified sites of historic / heritage or cultural significance, current land use, zoning, surrounding land use and potential external impacts;

City of Cockburn Local Planning Strategy

The City of Cockburn has included guidance around heritage in the Local Planning Strategy, for the conservation of places and areas of heritage interest[7]:

- 6.13 (a) Action: Have due regard for buildings and places in Council's Municipal Heritage Inventory when considering applications for subdivision, rezoning and Planning approval.

[6] City of Cockburn Local Planning Scheme No. 3 2023, prepared by the Department of Planning Lands and Heritage: Cockburn Scheme Text (www.wa.gov.au)

[7] City of Cockburn Local Planning Strategy 2022, prepared by the Department of Planning, Lands and Heritage: Local Planning Strategy - City of Cockburn

SECTION TWO – CULTURAL HERITAGE BACKGROUND

PREVIOUS RESEARCH

Previous Aboriginal Heritage Assessments

The following summary of previous research has been compiled from information that is publicly available from DPLH's Aboriginal Cultural Heritage Inquiry System (ACHIS). This may not be a comprehensive record of all heritage sites recorded and surveys undertaken, with the possibility that some information may exist in 'grey literature' held by private individuals and organisations which has not yet been provided to the DPLH for addition into the ACHIS.

Accordingly, caution should be exercised in areas where no surveys have been completed, or where surveys have only been completed for parts of the area where the proposed activity is intended. Heritage surveys over only part of the land may not have identified all possible sites. In addition, surveys that took place prior to 1 January 2013 may not have reliable spatial information (see Table 3, Table 4 and the Report Summaries section below). A copy of the ACHIS search results and maps can be found in Appendix One.

The reliability of these reports has been assessed as per DPLH ACH Survey Report Guidelines[8] (Table 3 and Table 4).

Table 3. Previous heritage assessments that intersect the Project Area

DPLH Report ID	Report Title	Report Authors	Survey Type	Reliability
21817	Ballaruk (traditional owners) Aboriginal site recording project	Machin, Barrie	Ethnographic	Unreliable
21818	Ballaruk (traditional owners of Whadjuk territorial boundaries the lands of the Ballaruk Peoples) Aboriginal site recording project: additional material	Machin, Barrie	Ethnographic	Unreliable
102670	Preliminary Report on the Survey of Aboriginal Areas of Significance in the Perth Metropolitan & Murray River Regions July 1985.	O'Connor, R	Ethnographic	Indeterminate
103564	An Archaeological Survey Project: The Perth Area, Western Australia. Apr 1972	University of Western Australia	Archaeological	Indeterminate
105324	Report on Aboriginal Heritage Research undertaken in respect of the proposed Port Catherine development, Coogee	McDonald, E	Archaeological / Ethnographic	Unreliable
105508	Aboriginal contact consultation: report on Port Catherine Development proposal Coogee	Collard and Collard Consultants	Ethnographic	Very Good

[8] https://www.wa.gov.au/system/files/2023-07/ach_survey_report_guidelines.pdf

Table 4. Previous heritage assessments nearby to the Project Area

DPLH Report ID	Report Title	Report Authors	Survey Type	Reliability
102078	Aboriginal Heritage Study of the Jervoise Bay infrastructure planning precinct	McDonald, Hales and Associates	Archaeological / Ethnographic	Good

Report Summaries

The following section summarises the six (6) reports which intersect the Activity Area. It is important to note, the reports were assessed on reliability, age, coverage and relevance to the Activity Area.

Report ID: 21817

Machin, Barrie. Ballaruk (traditional owners) Aboriginal site recording project. 1994

The report details an ethnographic and archaeological survey for Aboriginal Sites within Whadjuk territorial boundaries. A portion of the report is dedicated to a cultural and historical background of the Noongar people and an investigation into custodianship and the ability to speak for country.

The report details the investigation of five ethnographic locations that were inspected for archaeological and ethnographic significance. It is stated that a comprehensive archaeological survey was not undertaken for the investigated locations. Two of the ethnographic locations are redacted, the remaining locations are: Bullya Spring, Mead Brook Ramble; South Chittering Gorge; Gingin Brook Aboriginal Cemetery. None of these sites are located within or immediately adjacent to the Activity Area.

Report ID: 21818

Machin, Barrie. Ballaruk (traditional owners of Whadjuk territorial boundaries the lands of the Ballaruk Peoples) Aboriginal site recording project: additional material. 1995.

This report details an ethnographic survey of sites contained within the Whadjuk territorial boundaries. One Aboriginal Consultant, Corrie Bodney, accompanied the survey team. Six sites were recorded: Bonron Hill; Joondol Muryang Ceremonial Ground; Wokalup Hill; Maamba Reserve; Lesmurdie Falls; and, Mundaring Weir Corrobboree Site. The report details Corrie Bodney's knowledge of or familial connection to each of these sites. None of these sites are located within or immediately adjacent to the Activity Area.

Report ID: 102670

O'Connor, R. Preliminary Report on the Survey of Aboriginal Areas of Significance in the Perth Metropolitan & Murray River Regions July 1985.

Comissioned by the Centre for Prehistory at UWA on behalf of the Department of Aboriginal Sites at the Western Australian Museum, this report outlines an ethnographic survey conducted as a component of a larger project which required an overview of Aboriginal Sites in the Perth Metropolitan Area.

The report lists the Aboriginal Sites identified and provides an assessment of the significance of Aboriginal Sites as well as the assessment of short-term and long-term land modification developments to assist with effective planning strategies to protect and conserve the most significant sites. The original survey area was deemed too small by Aboriginal advisors in the early planning stages of the survey, however the area the advisors suggested was beyond the time and financial scope of the survey. The survey area was therefore only extended to included Yanchep National Park, Gidgegannup and Pinjarra beyond the Perth Metropolitan Area. The survey was not restricted to Aboriginal knowledge of sites as the ethnographers also spoke to European-Australians and descendants of early settlers who held knowledge and materials of Aboriginal Sites. Information was also gathered by consulting data bases and historical records.

Report ID: 103564

University of Western Australia. An Archaeological Survey Project: The Perth Area, Western Australia. Apr 1972.

This report details an archaeological investigation of the changing patterns of Aboriginal settlement and land use, the ecological and symbolic ordering of life and landscape, in a sample area within the Southwest of Australia, centred on Perth. Three classes of data were used: ethnohistorical, from field survey, and from excavation.

The ethnohistorical sources demonstrate a picture of 'the seasonal round' – whereby Aboriginal people moved to different parts of the landscape during different seasons in order to exploit the more productive and reliable resources at certain times of the year. This is supported by the distribution of archaeological sites, which suggests two main zones of occupancy: one along the coastal plain; the other inland, from New Norcia through toward Albany. Hallam notes that archaeological sites on the coastal plain are highly varied in their material and the presence and absence of grindstones and mullers.

Report ID: 105324

McDonald, E. Report on Aboriginal Heritage Research undertaken in respect of the proposed Port Catherine development, Coogee. Nov 1997.

This report details an archaeological and ethnographic survey commissioned for the project area of the Port Catherine Development in 1997, City of Cockburn.

No aboriginal sites were identified, however, monitoring of the ground disturbing works was recommended in case of the presence of sub-surface materials and/or burials.

Only two previously recorded ethnographic sites were located within the project area, which were DPLH site S02169 Indian Ocean and unlisted site JBE#1. Both sites hold mythological importance. Only S02169 was impacted by construction works.

The archaeological survey was conducted by dividing the project area into "blocks" which were then assessed via vehicle inspection to identify target areas and survey techniques. The area was further divided into high, medium, and low surface visibility and transect lines were walked where possible. Opportunistic inspections of tracks and firebreaks in low visibility areas were also carried out.

The ethnographic portion of the survey was conducted via archival research and site inspections with Aboriginal consultants. Consultants were selected via network sampling and then those selected were asked to recommend other Aboriginal people who were also asked to recommend further people.

28

Twenty-six Aboriginal consultants were spoken to, six of these consultants were involved in site inspections. Most of the consultants were members of the Ballaruk Aboriginal Corporation. Many Aboriginal consultants associated with the area the project would take place in were not contactable.

Report ID: 105508

Collard and Collard Consultants. Aboriginal contact consultation: report on Port Catherine Development proposal Coogee.

Please note that at the time of report distribution, this DPLH survey report had not been received, therefore there is limited details available for some of the reports.

Report ID: 102078

McDonald, Hales and Associates. Aboriginal Heritage Study of the Jervoise Bay infrastructure planning precinct

Please note that at the time of report distribution, this DPLH survey report had not been received, therefore there is limited details available for some of the reports.


383000
384000
385000
6449000
6448000
6447000
6446000
201082
103964
104510
105508
105324
102670
21818
102078
22884
0
300
600
900 m
Perth
Legend
Project Area
Previous Aboriginal Heritage Surveys (DPLH)
archae-aus
Map 2. Previous Heritage Surveys Intersecting and Adjacent to the Project Area
Drafted by Ayesha Limb, 12th January 2024. GDA94, Zone 50. Satellite imagery courtesy of Google Maps.

Known Aboriginal Heritage Sites

According to the ACH Directory of the DPLH, no Aboriginal Cultural Heritage intersects the Activity Area. However, a wider search reveals that one (1) Aboriginal Cultural Heritage Historic site is in proximity, approximately 200m to the west of the Activity Area.

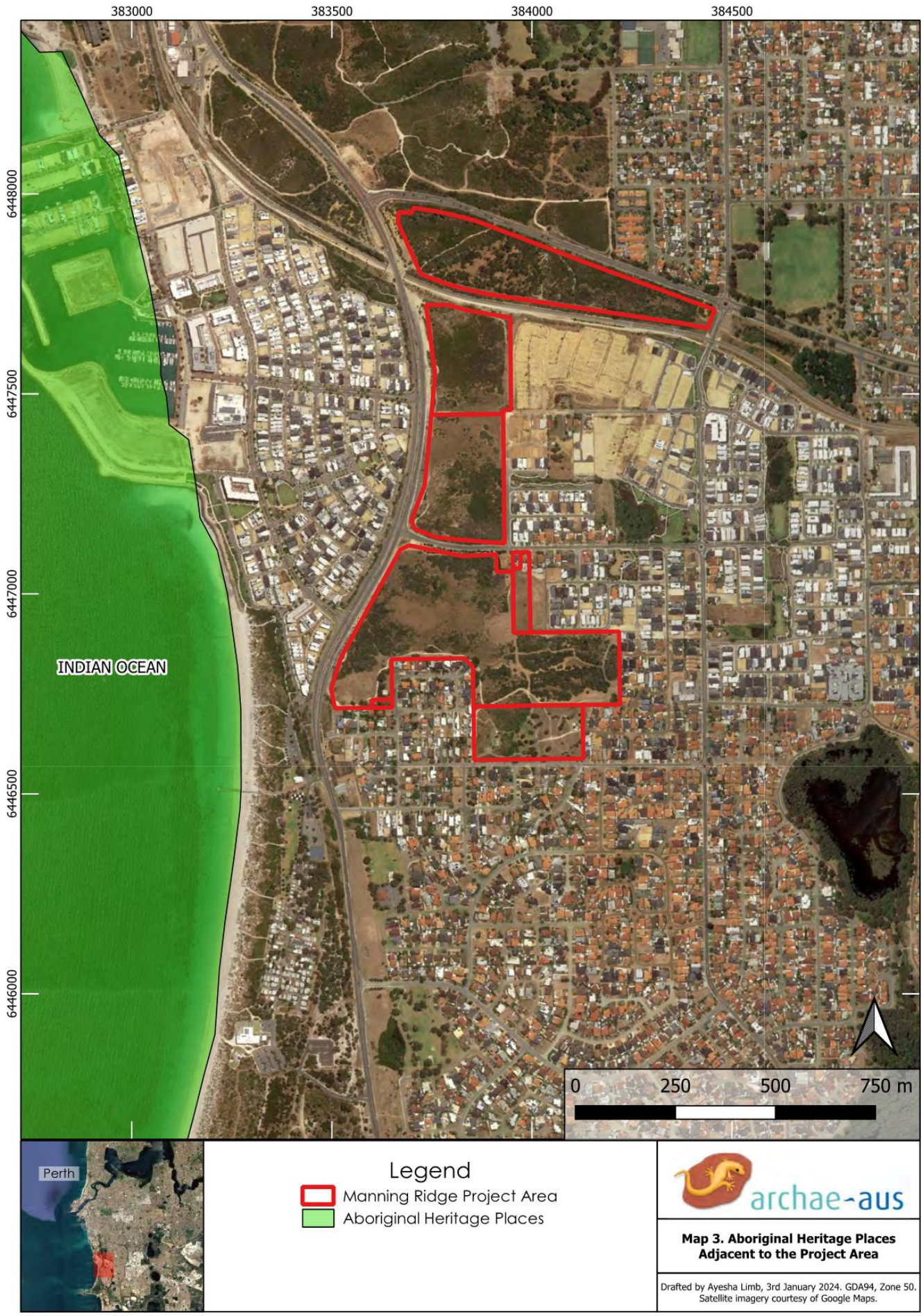
Table 5. Known Aboriginal Heritage Places adjacent to the Project Area

DPLH Site ID	Site Name	Place Type	Status	Legacy ID
3776	INDIAN OCEAN	Creation / Dreaming Narrative	Historic	S02169

Site Summaries

ID 3776 Indian Ocean

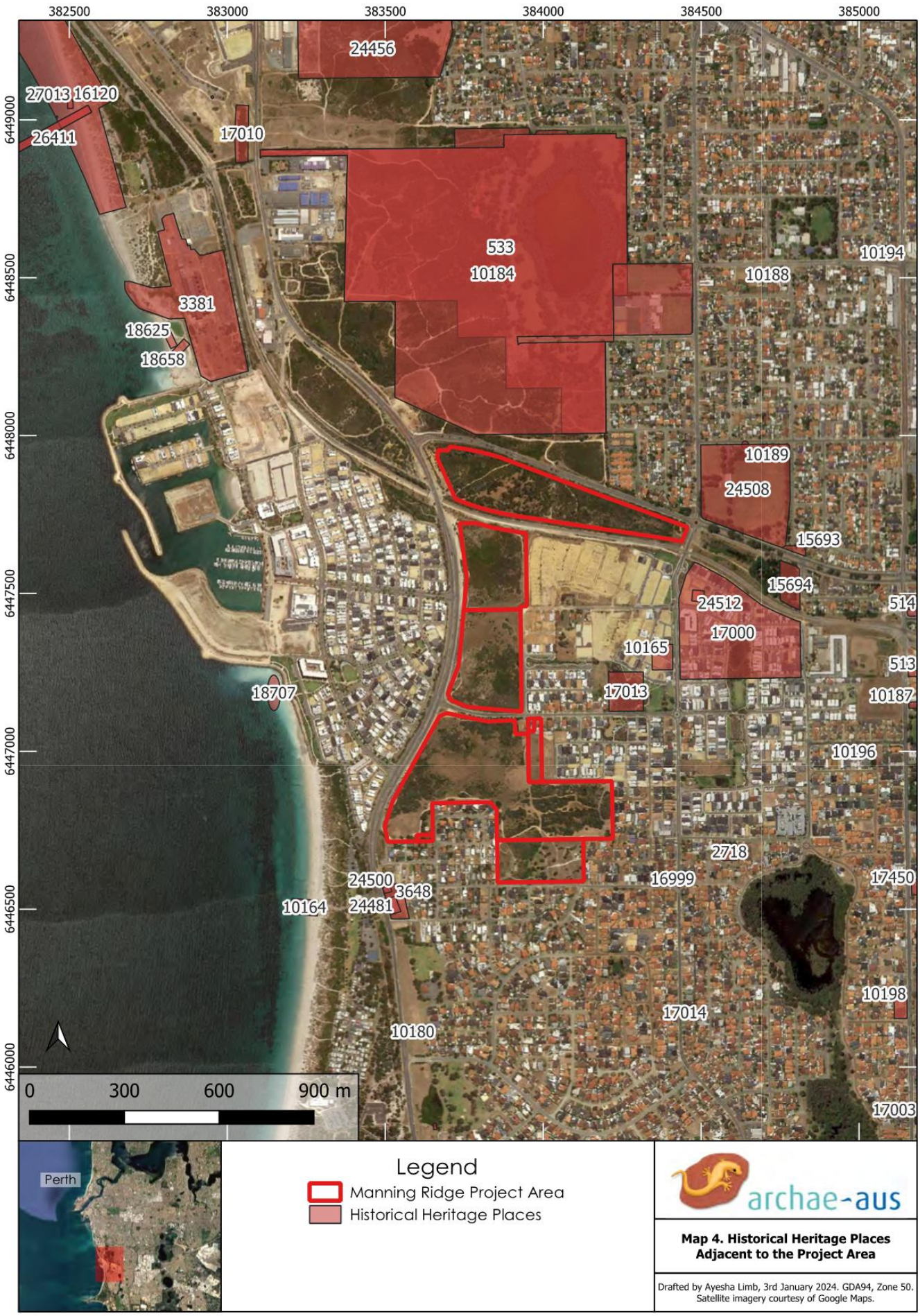
Mythological site that covers the ocean between the mainland and Rottnest Island, and Carnac and Garden Islands. The mythology explains the islands separation from the mainland (Australian Interaction Consultants, 2008).


383000
383500
384000
384500
6448000
6447500
6447000
6446500
6446000
INDIAN OCEAN
0
250
500
750 m
Perth
Legend
Manning Ridge Project Area
Aboriginal Heritage Places
archae-aus
Map 3. Aboriginal Heritage Places Adjacent to the Project Area
Drafted by Ayesha Limb, 3rd January 2024. GDA94, Zone 50.
Satellite imagery courtesy of Google Maps.

Listed Historical Heritage Places

There are no known historical sites that intersect the Activity Area. There are 25 historical heritage sites within a 1 km radius (see Map 4). Predominantly homesteads are situated around Project Area. 50 m to the north of the Project Area is Manning Park and Manning Estate (DPLH ID 10184 *Manning Park* and DPLH ID 533 *Manning Estate*, *Hamilton Hill.* Omeo Shipwreck (DPLH ID 18707) is to the west and there are a *Woodlands* and *Wetlands* (DPLH ID 24512 and DPLH ID 17013 respectively) over 200 m east of the Project Area.

None of these places will be impacted by the proposed works. However; they provide an understanding of the wider historical context and historical values associated with many of the buildings constructed in this area.


382500
383000
383500
384000
384500
385000
6449000
6448500
6448000
6447500
6447000
6446500
6446000
24456
27013
16120
26411
17010
533
10184
10194
10188
3381
18625
18658
10189
24508
15693
15694
24512
514
17000
10165
513
18707
17013
10187
10196
2718
24500
3648
16999
17450
10164
24481
10198
17014
10180
17003
0
300
600
900 m
Perth
Legend
Manning Ridge Project Area
Historical Heritage Places
archae-aus
Map 4. Historical Heritage Places Adjacent to the Project Area
Drafted by Ayesha Limb, 3rd January 2024. GDA94, Zone 50.
Satellite imagery courtesy of Google Maps.

ENVIRONMENTAL BACKGROUND

Areas that share similar climate, landform, native vegetation, geology and animal species, are classified into geographically distinct bioregions by the Interim Biogeographical Regionalisation of Australia (IBRA).[9] These bioregions are further classified into subregions. The Project Area within the Swan Coastal Plain bioregion within the Spearwood Dune landform, which contains Holocene Swamp Deposit wetlands. The Spearwood Dunes are characterised by lithified limestone dunes which have the potential to contain archaeological deposits and natural limestone features. A chain of lakes which came into existence approximately 7,000 years ago link the Spearwood and Bassendean zones (Semeniuk, 1987).

The Manning Ridge Project Area is situated across sand dunes comprised of calcareous sand and limestone of eolian origin. Vegetation includes Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo (DPRIRD, 2024).

ETHNOGRAPHIC BACKGROUND

The Project Area today sits within the Whadjuk Native Title Group (WI2017/015), which is the name ascribed to a dialectical group that covers approximately 5,580 km^2 of the Perth metropolitan area and is now the most densely populated area in Western Australia. Whadjuk territory is described here by here by Norman Tindale (Tindale, 1974:260):

> *Swan River and northern and eastern tributaries inland to beyond Mount Helena; at Kalamunda, Armadale, Victoria Plains, south of Toodyay, and western vicinity of York; at Perth; south along coast to near Pinjarra* (Tindale, 1974:260)

'Country' in Noongar Culture does not refer to a static and definable place on a map and Noongar 'maps' are often intangible and fluid, reproduced by song, dance, art, spoken word and ancient Dreaming stories. Country itself has fluidity too, as Deborah Rose Bird points out, Country can be considered as:

> *A living entity with a yesterday, today and tomorrow, with a consciousness, and a will toward life… Country is multi-dimensional- it consists of people, animals, plants, Dreamings; underground, earth, soils, minerals and waters, surface water, and air… Country is the key, the matrix, the essential heart of life* (Rose, 1996: 7-8,11).

Noongar ancestral lands are inalienable. Within Native Title legislation, there is often reference to relations between people and Country as being 'lost' or partially or even completely extinguished (Bernard, 2020). Noongar Culture and custom, however, considers the connection between person and Country as immutable and constant. Distinct territorial grouping throughout Noongar Country was systematically dispersed through processes of European settlement due to forced relocation and movement, deaths and the development of fringe camps, Aboriginal exclusion zones, curfews and

[9] https://www.dcceew.gov.au/environment/land/nrs/science/ibra

missions. This often worked to scatter distinct familial groupings that characterised the Traditional Noongar way of life prior to colonisation. During the nineteenth and twentieth centuries, Noongar people worked to create a sense of connection to lands and the traditional past despite colonisation (O'Connor, 2020). Identity and association to Country or 'belonging' to specific areas were based on connections with the traditional past, which became the foundation of the six Noongar Native Title Groups that today represent Noongar Country.

Noongar people form a distinct cultural bloc now and into the distant past, based on shared linguistic and cultural traditions, a cohesive social structure and kinship network, shared regional identity, and a common geographical connection to the lands and waters that make up the southwest corner of the Australian continent. There are a range of social structures which further delineate Noongar people and connect them to particular parts of the Southwest region. This is articulated succinctly in the Noongar evidence provided to the Federal Court hearings (Federal Court of Australia, 2006:38), during which the claimants noted that the southwest region:

> *was occupied and used by Aboriginal people who spoke dialects of a common language and who acknowledged and observed a common body of laws and customs. Those Aboriginal people recognized local and regional names within the broader society but shared a commonality of belief, language, custom and material culture, which distinguished them from neighbouring Aboriginal groups and societies. Responsibility for and control of, particular areas of land and waters, were exercised by sub-groups or families, but the laws and customs under which the sub-groups possessed those rights and interests were the laws and customs of the broader society.*

The term 'Noongar' (also sometimes spelt Nyungar, Nyoongar or other variations) is a common term used almost ubiquitously around the region for local Aboriginal people. However, its use as a term of identity is thought to be a linguistic adaptation that originated during the post-European contact period. It originally meant 'man' in the languages of the Southwest (Bates, 1985:47), and Aboriginal people of the southwest region used to identify as 'Bibbulmun' rather than 'Nyungar' (Bates, 1985:46). While some Southwest people still identify with this term, Nyungar is now more widely accepted and Bibbulmun is more commonly used as the identifier of people with customary rights and responsibilities to particular areas of the Southern forests from Denmark in the south-east to Nannup in the north-west.

Traditional Noongar society is divided into thirteen sub-groups, linked by language and cultural tradition that included practicing initiation rituals of upper body cicatrisation and piercing of the nasal septum, which follows what Berndt describes as the "Old Australian Tradition" (Berndt, 1980). These initiation rituals are not commonly practiced in the modern era.

The thirteen sub-groups broadly adhere to the Noongar linguistic and cultural traditions but distinguish among themselves on the basis of subtle cultural and linguistic distinctions, which relate to territorial and social organisation. Berndt (1980:82). described the sub-groups as 'dialectal units' of the broader Noongar linguistic group but also identified detailed distinctions among the thirteen affiliated groups based on social organisation. He divides the sub-groups into four distinct categories. The first incorporates seven of the thirteen sub-groups encompassing the northern and western majority of Noongar country and is based on social organisation which adheres to a matrilineal descent

system and paternal ritual affiliation (Berndt, 1980:82). The second is comprised of two sub-groups Bibbulmun and Mineng and is based on a similar organisation to the first, but uses a patrilineal descent system. The third comprises the Ballardong and Nyaginyagi, and utilizes two alternating descent systems between different generations, but is focused on patrilineal local decent groups, which Berndt suggests is similar to the social organisation of Western Desert people (Berndt, 1980:83-84). The fourth category refers to that of the Wudjari and the Goreng, which Berndt describes as similar to the third category, which is based on patrilineal descent. However, he distinguished between the third and fourth categories on the basis that Wudjari and Goreng maintained named totemic groups which he suggests are probably 'patrilocal descent units' (Berndt, 1980:84).

The Noongar cultural bloc, also referred to as the "South-West" cultural bloc by Berndt (Berndt, 1980:84), incorporates the south-west corner of the Australian continent following a line from around Jurien Bay in the north, to Esperance in the southeast, and encompassing all the area between there and the coastline. The kaip 'water' and bilya 'rivers' of the South-West Coast drainage basin are fundamental to the economic, social, and spiritual lives of Noongar people (note; kaip and bilya may differ slightly between dialect groups, but essentially these are the Noongar words for water and river). The rivers formed movement corridors and resource-rich landscape features integral to Noongar economy.

Rainfall levels which define the Southwest Botanical Province form a distinctive geographic and environmental zone, they also define Noongar country. As defining features of Noongar country, the rivers, lakes, creeks, and all of their tributaries are fundamental to Noongar culture, and thus maintain a special significance. Spiritual life is fundamental to Noongar culture and it is inextricably linked to the organisation of Noongar society and to the management of Boodjar (Country). The responsibility to look after Boodjar is deeply engrained in Noongar cosmology, which enshrines a set of governing principles for the management of land and water. Perhaps the most salient element of Noongar spiritual beliefs is the Waarkal:

> *In Nyungar Cosmology, the Waarkal is the Creator, the keeper of the fresh water sources. He gave us life and our trilogy of belief in the boodjar – the land – as our mother and nurturer of the Nyungar moort – family and relations – and our katitjin – knowledge so that we could weave that intricate tapestry known as the "web of life".*
>
> *Nyungar Katitjin is people's knowledge based on cosmological stories from the Dreamtime, known as Nyitting to Nyungar, on which cultural knowledge is founded.*
>
> *Nyitting (or Dreamtime) yarns are cosmological stories about events within and beyond the living memories of the Nyungar people. […] Nyitting literally means 'cold time', and refers to the time of creation."* (Collard, Stocker and Rooney, no date a; Rottnest Island Authority, no date)

Fundamental to Noongar identity and culture is connection to Country. This concept articulates a series of rights and responsibilities that every Noongar person maintains to certain places, landscapes and regions. Perhaps the two most important aspects of connection to Country are 1) the responsibility to care for Country and 2) the right to speak for Country. The responsibility to care for Country is something that Noongar people inherit from their ancestors and bequeath to their children.

Upholding these responsibilities are fundamental to Noongar culture and identity, and at some level to people's reason for being. On this basis, being able to uphold these responsibilities is pivotal to Noongar people's sense of purpose and self-worth and therefore, well-being. Intertwined with the responsibilities that people maintain to Country are rights to make collective decisions affecting Country.



Figure 1. Six regions from the Southwest Native Title Agreement (Source: Samantha Mickan, 2009)

Local Ethnographic Background - Water and the Indian Ocean

"As they were thinking, knowledge came to them about forming into the fourteen clans that became the Nyoongar nation. They thought about dividing all the people into two groups (moiety) to establish the first law of relationship and marriage. Clouds rolled in and rain fell. The water gathered and ran filling all the trails the serpent had made. The people followed the course of the water until it reached the ocean. Tired they lay down and slept. When they slept they dreamed their language, language comes from the earth and when someone dies and is buried their language returns to the earth. Each person took on a totem, some took animals, some trees, some plants that way they could care for everything." (Nannup 2006a:4)

Water is a defining feature of Noongar Country and Noongar people have a long, rich tradition with their extensive waterways and changing coastline. Ethnographic narratives associated with Noongar cosmology are often intertwined with the waterways, demonstrating a deep connection between land and water, people and Country. Oral traditions told of the Nyitting (cold time or creation period) recount massive geological or catastrophic environmental events that altered the landscape, such as floods or land movements that describe the features of the land and coast that we see in Noongar Country today.

The Nyitting (or Nyetting) is a significant period in the creation of the Noongar land and waters, described as 'the freezing cold, near darkness time, long, long ago when there was nothing on the earth, it was flat and featureless' (Nannup 2006a;1) (Robertson et al. 2016). The Nyitting tales not only told stories of the early ancestors and recounted creation myths, but these narratives also laid down the lore for social and moral order and established cultural patterns and customs (SWALSC 2016 in Robertson 2016). One of the most common Dreaming stories tells of the Waugal, a spiritual serpent who, during the Nyitting, moved throughout the Country bringing water to the lands creating the Kaata (hills), valleys, bilya (rivers), boya (rocks) and other significant landscape features (Bates, 1985:221). Places the Waugal travelled are marked by pieces of the serpent that metamorphosised into topographical and landscape features (Bates 1985:221).

The wetland systems that make up the Swan Coastal Plain were rich ecological landscapes that sustained generations of Noongar people. Pads connecting the wetlands to the river systems that extended through the territory and drained towards the sea, creating a network of hunting and movement patterns for Aboriginal people, the stories of which are sustained through oral histories (Ralph, Locke, Smith 1990:8). These streams and river systems that connect land and sea in the southwest, as well as many of the smaller springs, swamps, pools, and lakes are attributed to the movements of the Waugal (O'Connor, et al 1989:46,). The movements of the Waugal are extensive, as springs and freshwater systems found on Wadjemup (Rottnest Island) are also attributed to the Waugal (Windy Hill report 2021), demonstrating ancestral influence across land and sea and showing that the Islands off the coast of Perth are intertwined with the creation of the Swan Coastal Plain.

Noongar Boodja (Country), according to oral tradition, extends beyond the shoreline of the Western Australian mainland to include the bidjigurdu (islands) of the Swan Coastal Pad, specifically Wadjemup (Rottnest Island), Ngooloormayup (Carnac Island) and Meeandip (Garden Island) (Brown 1983:16; Fisher 2005:13, cited in Goode 2018). The mythological stories that seek to explain the interconnectedness of the land and seascapes incorporate historical events, physical and nonphysical

elements and create a wider cultural landscape that extends beyond the shoreline. Creation narratives in the southwest were recorded in the late 19th century by Moore (1884) and Armstrong (1836) who detailed differing creation accounts of the Noongar landscapes from different groups.

> *A Nyungar story, recounted to the early colonist George Fletcher Moore in the 1830s, describes how the Rottnest, Carnac and Garden Island were once connected to the mainland … [thus showing] an awareness among the Nyungar that in 'pre-island' times all three localities had been a part of the ancestral landscape.* (Dortch and Dortch 2012)

Moore (1884, cited in Brown 1983:16) records that the land joining the islands to the mainland was once thickly covered with trees, which fuelled a deadly fire that burned with such intensity that the ground split asunder with great noise, and the sea rushed in cutting off the islands from the mainland. These Nyitting narratives coincide with mass extinction events known through the fossil records. Morrison and Morrison (1990) describe a massive event when the supercontinent Gondwana began to break up; Greater India rifted westwards away from Western Australia, elevating the Stirling Range and creating the seaway with massive volcanism on either side. This event created the Darling Scarp, which is also prevalent throughout Noongar creation stories in the southwest (Robertson et al. 2016).

In Armstrong's (1836:790) account, which he notes was recounted to him from stories handed down from the informant's ancestors, the separation occurred during a great battle between the Waugal and an ancient Yondock (Crocodile). Gumbar Yondock, an ancestral crocodile travelled from the north and pushed himself onto the land, where his tail cut a deep channel in Cockburn Sound, known today as the Gage Roads, and pushed up Rottnest Island. The sound of rushing water woke the Waugal who smelt the sea and went to investigate. A battle between the two ensued which pushed up Carnac Island. At Woodman Point, the Waugal manoeuvred and carved out Jervois Bay with his tail. As the Waugal bit the tail of the crocodile, he surrendered, and the Waugal heard the seawater rushing into the Swan River from the fighting, he placed the severed tail across the entrance, using hair from his chin and armpit to anchor the tail down. This formed a reef across the Swan River mouth which was jagged like the tail of the crocodile. This reef that once blocked the mouth of the Swan River Harbour was destroyed to create Fremantle Harbour. The crocodile was then made to walk back up north while his spirit remained as Garden Island, known to Noongar people as Meeandip Yondock, Crocodile with a tail missing (Trevor Walley, Landscope WA Conservation, Parks and Wildlife Magazine).

These Nyitting stories highlight the significance of the land and sea that encompasses Noongar Boodja (Country), demonstrating that the ethnographic significance of the land is intertwined with the creation of the sea and islands of the coast of the southwest of Australia. Archaeological evidence of human occupation on Rottnest Island shows that the ancestors of the Noongar community today once occupied and utilised resources from Rottnest Island. Throughout the rich oral history of the Whadjuk Noongar Katitjin (knowledge), stories of Wadjemup's connection to the mainland, over 6,000 years ago, are passed down in the continuation of intergenerational stories about the 'old people' who used to walk the land bridges between Wadjemup and the mainland.

My grandmother used to live along the river right down there and she reckon they [ancients] used to walk right out to Rottnest Island; that it was all sandbanks way back. And they used to walk across there and because Rottnest Island is a hill and it stood out when there was no water there. They stayed for a time and then walked back. But believe or not, I don't know. I couldn't understand it, but in those olden days, things were a lot different. – Dorothy Winmar (Collard, Harben and van den Berg, 2004).

Rottnest is Wadjemup, you know. I was never much into following what went on over at Rottnest. Earlier, Uncle Felix and them used to say kura kura, Nyungars used to walk across there, that was a long time ago, he said. Kura means a long time ago. Nyungars jenna koorliny, means walk. So someone had handed it down to him. If he was alive today, he would be around 150 and you see a lot of older people handed it down to him. – Fred Collard (Collard, Harben and can den Berg, 2004).

In current Whadjuk conceptions of place, Wadjemup is part of Derbal Nara which incorporates the waters, islands and coastline of Cockburn Sound.

Derbal Nara, or the Estuary of the Salman is the Noongar name for Cockburn Sound. This area includes the water of Derbal Nara, the islands of Derbal Nara, which are Wadjemup (Rottnest), Ngooloormayaup (Carnac) and Meeandip (Garden) Islands, as well as the dunes and coastal plains behind the dunes and the freshwater lakes and waterways. Nyungar oral histories recount how these islands were once connected to the mainland, during the last ice age when sea levels were much lower. (Collard, Stocker and Rooney, no date b)

ARCHAEOLOGICAL BACKGROUND

The majority of the archaeological surveys and detailed assessments conducted in the Southwest have occurred in the Perth Metropolitan region (Hallam, 1972, 1975, 1977; Anderson, 1984; Strawbridge, 1988; Bowdler, Strawbridge and Schwede, 1991). The general pattern of archaeological site distribution indicated by these studies is that more sites are located on the Bassendean Sands than in any other geomorphic zone between the Darling Range and the coast (Strawbridge, 1988; Bowdler, Strawbridge and Schwede, 1991). It has been proposed that the high number of sites on the Bassendean Sands is directly related to the abundant resources associated with the chains of lakes and swamps along the eastern margin of this zone, toward the foothills of the Darling Range (Strawbridge, 1988; Bowdler, Strawbridge and Schwede, 1991).

It has also been suggested that sites located on the Bassendean Sands have little potential for containing undisturbed stratified archaeological deposits (Bowdler, Strawbridge and Schwede, 1991), owing in part to the fact that the Bassendean Sands consists of a stable core overlaid by a "superficial layer of mobile sands within which artefacts may have been deposited over a long period of time" (Bowdler, Strawbridge and Schwede, 1991). There is also the issue of disturbance by a range of European activities, such as farming, in one of the most populous areas of Western Australia. However, more recent excavations in other areas across the Swan coastal plains challenge (Bowdler, Strawbridge and Schwede, 1991) assertions. (Dortch, Dortch, and Cuthbert, 2009) excavations at Fiona Stanley Hospital show that even after the site was cleared by bulldozers, *in situ* archaeological deposits covering 8,000 to 33,000 years BP were still present. Similarly, recent excavations at Beeliar Wetlands (Hook and Dortch, 2017) clearly showed both charcoal and stone artefacts, including those made of fossiliferous chert, in undisturbed deposits up to 100 cm deep.

Dated sequences from the Southwest region have produced a well-established Pleistocene antiquity for human occupation. Devils Lair on the Leeuwin – Naturaliste Ridge, for example, has produced basal dates of approximately 37,000 BP (Dortch, 1979) and dates of similar antiquity have also been obtained from the nearby Tunnel Cave (Dortch, 1994, 1996).

The oldest known site in the Southwest, located near Upper Swan Bridge in Midland, is dated to 39,500 BP (Pearce and Barbetti, 1981). Other early dated sites are located at the site of the Fiona Stanley Hospital dating to 33,000 BP (Dortch, Dortch and Cuthbert, 2009), on an old river terrace in the Helena Valley dated to 29,400 BP (Schwede, 1983, 1990) and a site at Minim Cove near the mouth of the Swan River has been dated to 9,930 BP (Clark and Dortch, 1977).

Site Location and Assemblage Variation

In her synthesis of the archaeological evidence from research conducted on the Swan Coastal Plain and the Darling Scarp, (Anderson, 1984) formulated a seasonal land use model of human movement between the Swan Coastal Plain, the Darling Scarp and the Darling Range. A summary of this model is quoted below.

1) *Groups essentially based on the Swan Coastal Plain and the Darling Plateau were associated with specific core territories within those zones and had stronger cultural ties within four larger units such as* (Tindale, 1974b) *outlines.*

2) *In summer and autumn, the plains groups concentrated in larger numbers on the coast, estuaries, and larger inland water bodies to collect fish, waterfowl, and other*

water-based resources. The very large archaeological sites on the plain are the result of repeated visits to such venues, probably over long periods of time.

3) *In winter and early spring, when the coastal resources were less abundant, some of the plain based people moved into the jarrah forest in the Darling Range to relieve the pressure on available food sources; the remainder of the people fragmenting and ranging more widely. The extent of penetration into the densest and most uniform stands of the forest zone was only about 30-35 km. The predominantly small sites throughout the jarrah forest are evidence of the mobility necessitated by less prolific resources and the pursuit of game.*

4) *In late spring there was a gradual movement of people back toward the coast.*

5) *The western plateau area of the scarp is seen as having a less distinctly seasonal pattern of movement. The groups would possibly have been more nomadic and moved over wide ranges, taking advantage of the large mammal population and plant foods in the open woodlands.*

6) *The eastern jarrah forest (i.e., that portion more than 30 km east of the escarpment and gradually grading into wandoo woodland) was exploited by plateau groups, some of whose ranges penetrated well into the jarrah zone. More extensive swamps in the eastern jarrah forest may have allowed use of the area for a greater part of the year, especially if below-ground water was tapped. The large sites near Boddington are consistent with this general interpretation.*

7) *There was also some less patterned movement, more direct and rapid, through the forest zone from plain to plateau and vice versa by individuals and groups of varying sizes, for specific trade, social and ritual purposes* (Anderson, 1984).

(Anderson, 1984) used variation in the density of sites per square kilometres in support of her model. Numbers of sites on the Swan Coastal Plain were calculated to range from 3 /km² to 6.5/km², as opposed to the jarrah forests where site densities varied from 0.8 /km² to 5 /km². Artefact densities also varied, with those on the Swan Coastal Plain averaging at around 50,000 /km², and in the jarrah forest near the Darling Scarp returning ranges of 24 /km² to 190 /km².

The dominant lithic raw material in archaeological sites on the Swan Coastal Plain and the Darling Scarp is vein quartz (Anderson, 1984; Quartermaine, 1987, 1988; Veitch, Martin and de Gand, 1997). Other lithological components recorded in archaeological sites include dolerite, granite, mylonite, crystal quartz, silcrete, glass, and fossiliferous chert. As the Swan Coastal Plain does not possess any sources of natural stone, all of the raw materials, except fossiliferous chert, originate in the Darling Scarp or to the east of the scarp (Anderson, 1984). The sources of fossiliferous chert are postulated to be on the Continental Shelf to the west of the current coastline. Consequently, access to raw fossiliferous chert may have been denied from about 6,000 years ago when the sea level rose to its present level at the end of the Glacial Maximum (Glover, 1984).

In an appraisal of Anderson's model, Veth (Veth, 1987b) found a high number of large sites and high densities of archaeological material in the area now inundated by the Canning Dam. He concluded that this raised the possibility of spring and summer use of the Darling Scarp. Here the flaked stone assemblages were almost entirely dominated by quartz. Nearer to Boddington, whilst still dominated

by quartz, flaked stone assemblages were found to include a range of other lithologies including dolerite, with chert, quartzite, calcrete, granite and even flaked glass artefacts also present in small numbers (Anderson, 1984).

Variation in the proportions of retouched[10] artefacts were found to vary considerably between different areas from the Darling Scarp to the coast:

- The Swan Coastal plain includes percentages of retouched artefacts ranging from 9.9% to 17.8%.
- The jarrah forests returned low proportions of retouched artefacts (0.6% to 2.0%) (Veth, Ward and Zlatnik, 1983; Anderson, 1984; Veitch, 1988); and
- One study in the Collie region returned a notably high average of 28.1% (Pearce unreferenced in Anderson 1984).

The generally greater proportion of retouched artefacts on the Swan Coastal Plain may suggest more focussed use of this area instead of the jarrah forests (Anderson, 1984; Veth, 1993a), and the higher numbers of sites (such as that found on the Bassendean Sands) may further support that this area was a prime focus of Aboriginal seasonal occupation. Indeed, the available evidence suggests greater site densities on the Swan Coastal Plain in general, dropping off in the dense jarrah forests, and then rising again in the eastern part of the jarrah forests as the less densely packed wandoo forests begin to dominate. This model continues to rely heavily on the suggestion that the jarrah forest is a relatively resource poor area (Anderson, 1984).

Ferguson (Ferguson, 1985) suggested that the forests (particularly the karri forests) were less intensively used than the more open coastal plains and eastern woodlands. Similar findings have been reported for other forests in the Southwest region. A study of the southern forests suggests that poor resource availability and low encounter rates for archaeological material occur in forested areas, when compared to coastal plains (Associates, no date). However, they still reported that the distribution of archaeological material in the forests consists of "small, low density artefact scatters situated in a wide variety of topographic and environmental contexts" (Associates, no date; Veth, 1987b). Ferguson suggested that Aboriginal society in the region had flexible responses to this scattered resource base, leaving little in the way of an archaeological signal (Ferguson, 1985), supporting Hallam's (Hallam, 1975) model derived from ethno-historical sources.

On the Swan Coastal Plain, the over-riding pattern of open site location is that artefact scatters are found in clearings; however, areas of higher ground surface visibility make detection much easier (e.g., McDonald Hales and Associates n.d:106). Therefore, this raises the question of whether this pattern of site location is simply a function of ground surface visibility and thus represents a skewed sample rather than a true reflection of traditional land-use.

Another aspect of site location is the predominance of artefact scatters in association with drainage lines and water sources (Pearce, 1981; Veth, 1987b). Unlike the issue of ground surface visibility and detection, this site patterning is a well-supported model of land and resource use that is consistent with other regions in Western Australia. It reflects not only a need for potable water but is probably

associated with a greater diversity of floristic associations and relatively richer resource zones near to more permanent water sources (Veth, 1987b; Bowdler, Strawbridge and Schwede, 1991).

Using traditional models for archaeological site location, Anderson (1984) predicted that there will be a higher density of archaeological sites near to water sources and on elevated sandy areas near to water. The assemblages at these sites will tend to be dominated by quartz, with lesser proportions of dolerite, granite, silcrete, quartzite and chert.

One question that research near to the interface between the jarrah forests and the Bassendean Sands may be able to address is a comparison of flaked stone assemblages from these two areas, including a comparison of differences in artefact densities, raw material rationing and flaked stone reduction sequences. Investigations along these lines may assist in further developing ideas about how these areas were used before European settlement (cf. (Dobson, MacIntyre and Harris, 1993) and target the transition zones between forest and plain that may help to explore the site location models discussed above.

Predictive Models of Indigenous Cultural Material Place Location

It is likely that the pre-contact occupants adopted the risk minimising mode of land use, as originally described by Gould (1977); see also (Gould, 1980; Veth, 1989b, 1993b). One such theory of risk minimising, in terms of settlement patterns, has been called the "rain chasing" model. This model predicts the opportunistic movement of bands towards areas of localised rainfall and the structured use of all available water sources (Cane, 1984; Veth, 1989b, 1993b). Specifically, networks of ephemeral water sources are targeted first, leaving the few larger and more permanent waters to last. This produced an initial period of high residential mobility followed by more extended periods of reliance on permanent waters. The archaeological imprint, of the higher ratio of ephemeral "satellite" occupation sites to "core" habitation base camps, is numerous small artefact scatters across a range of arid environments. It is to be expected that the archaeological signature of the Survey Area would, therefore, be characterised by many small sites associated with ephemeral water-sources and a smaller number of larger sites, adjacent more permanent water, as seen in Veth's PhD field work in the Rudall River area (Veth, 1989b, 1989a).

The largest archaeological sites are, therefore, generally found in association with more permanent water sources. Such sites have been argued to contain greater lithological variety and more intense stone reduction with proportions of formal tools and retouched/utilised pieces throughout the Indigenous cultural material place being greater than average (Veth, 1984, 1989b, 1993c). Copious quantities of debitage associated with the manufacture and rejuvenation of formal implements is also usually present reflecting lateral recycling and economising of stone resources (Veth, 1989b).

Smaller, less complex sites are usually associated with ephemeral water sources. The characteristics of the habitation base camps discussed above are less well-expressed at these smaller ephemeral water sites (Veth, 1989b). It has been predicted that isolated artefacts, generally assumed to be task specific in nature, do not generally display any of the above characteristics. They tend to be made from locally available stone, are minimally reduced, rarely show evidence of lateral recycling and economising, are not usually formal implements and tend to be larger and heavier than average (Veth, 1989a). Veth (1989a) tended to find that, "the occurrence of artefacts away from habitation contexts...was negligible and, indeed, often absent" in the Rudall River region.

It is currently accepted that throughout the arid zone, availability of water has a dominant influence on the location of sites throughout the landscape. In addition, the structure of economic plant

communities and the availability of stone resources have been found to be other determining factors with regard to Indigenous cultural material place location (Veth, 1987a).

The predictive statement of Indigenous cultural material place location developed above, relates only to those sites which reflect the economic activities of the Aboriginal people who occupied the area. It, therefore, includes surface scatters of artefacts in the form of knapping floors and campsites, but does not include rock-shelters, painting or engraving sites and stone arrangements. Given the usually close correlation between economic Indigenous cultural material place location and water and stone resources, it is perhaps reasonable to assume that the lakes and outcrops throughout the region form the major loci of human activity and that non-economic sites, such as art sites and stone structures, would also be found in reasonably close proximity. Rock-shelters with occupation evidence, for example, can be expected to be found where conditions of topography permit, namely in cavities and rock overhangs in the breakaways and ranges where these are water sources across this region. Similarly, quarry sites will also be found where suitable surface outcrops of isotropic stone occur. The location of quarry sites is notoriously difficult to predict, given the general lack of detailed surface geology studies (Veth, 1987a).

It has; however, been determined from ethnographic sources and recent archaeological work from the arid and semi-arid zones (Veth, 1989a) that rock-shelters may only have been used as occupation sites in an extremely peripheral manner. The representativeness of, and role within, of rock-shelters in regional settlement and subsistence systems is perhaps comparable to those of small campsites adjacent to ephemeral water-sources (Veth, 1989a).

Having outlined, above, a general predictive model of Indigenous cultural material place type and location, the methodology employed during the Survey and the research/survey design, is informed by, and caters for both the predictive model and the environmental conditions.

North Coogee and Surrounds

Given the proximity to freshwater lakes and rich resources near the coastline, it is not surprising that there are Aboriginal sites in the wider North Coogee area. Additionally, the Manning Ridge Project Area is situated on sand dunes therefore, potential for Archaeological deposits, artefact scatters and campsites. Details of the results of previous assessments most relevant to Manning Ridge are summarised in the Previous Research section below.

HISTORICAL BACKGROUND

The following section is a brief historical timeline of the wider Coogee area, focusing on Aboriginal associations within the area and previous European land use. See Archaeological Background and Ethnographic Background for the detailed pre-1829 history.

Post-1829

Aboriginal Displacement and Survival

The Swan River Colony was established by the British in 1829, causing the displacement of Noongar people throughout the southwest as the colony expanded. Noongar groups experienced the rapid collapse of their way of life. Not to diminish the devastating impact caused by colonisation, it is important to recognise too that the historical record of the southwest demonstrate examples of tenacity and adaptations in the face of colonisation, which are often not widely discussed or acknowledged, let alone celebrated, in the general historical narratives about Western Australia.

This includes key Noongar participation in formative colonial activities and important industries, such as exploration, agriculture and pastoralism, the possum fur industry, product innovation and entrepreneurship, and many others. In addition, they created hybrid economies and communities on the fringe of mainstream society to survive, overcome, and resist the hardships and exclusion directly or indirectly imposed by European settlers and institutions, this discrimination was formalised through polices such as the *Aborigines Act 1905* and the later *Native Administration Act 1936* (Haebich, 1988; Laurie, 1994; Walshe *et al.*, 2019).

In the Cockburn district specifically, were the Beeliar Nyungar people led by Midgegooroo (City of Cockburn, 2024). Midgegooroo and his son Yagan resisted European occupation however, as stated by the City of Cockburn were punished by the colony with outlaw status, imprisonment, and execution (2024). Disease encumbered many of the Beeliiar Nyungar elders and those left were forced from their lands by the colonial government (City of Cockburn, 2024).

European Occupation

1800s

The land which became Coogee was surveyed and named in 1829 by Thomas Watson, a landowner and surveyor who came to Australia with Thomas Peel's settler group (City of Cockburn, 2024). The settlers including Peel arrived on the ship, *Gilmore* in 1829 claiming the land around Woodman Point (see Figure 2) (Harvey, 2020) Peel's ships *Hooghly* and *Rockingham* arrived with more settlers in 1830 however Thomas Peel's Peel town was ultimately a failure due to poor soil, a lack of food and shelter (Harvey, 2020).



Figure 2. The ships *Gilmore* and *Hooghly* off Woodman Point in 1830 with Peel Town in the background. Drawing by an officer on the *Hooghly* George Bayly. Courtesy of the City of Cockburn Library (Harvey, 2020, p.37)

Pensioner guards came to the colony on convict ships from 1850 to 1868 to watch over the convicts at Fremantle Prison (City of Cockburn, 2024; Monument Australia, 2024). Including the women and children, there was approximately 2500 soldiers who immigrated overall (Monument Australia, 2024). One of the first settlements of guard cottages was established at Lake Coogee, settled in 1876 (Figure 3) (City of Cockburn, 2024).

These men were allotted land ranging from half an acre to twenty acres in the countryside. In return for their work, the men were given convict labour, tools and seeds as well as £15 to develop the land (Monument Australia, 2024). The Pensioner Guards found the distance between Coogee and Fremantle to be too far (City of Cockburn, 2024). Therefore, the settlement was disbanded.



Figure 3. Remains of pensioner guard Barney McGrath's cottage. Photo by Steve Wells (Harvey, 2020, p. 44)

In 1880, British settlers arrived from England. As part of an assisted immigration scheme the settlers were allotted grants in the Cockburn district. A total of 40 new immigrants settled in Coogee and in

1876 they built Koojee Road to Fremantle (now known as Cockburn Road). In the 1890s the Coogee Hotel (Figure 4), lime kilns and Robb Jetty were also established in Coogee (City of Cockburn, 2024). Robb Jetty, formerly known as Owen Anchorage Jetty was built to accommodate the shipments of jarrah and sandalwood from the southwest as well as the import of cattle from the northwest(Harvey, 2020).

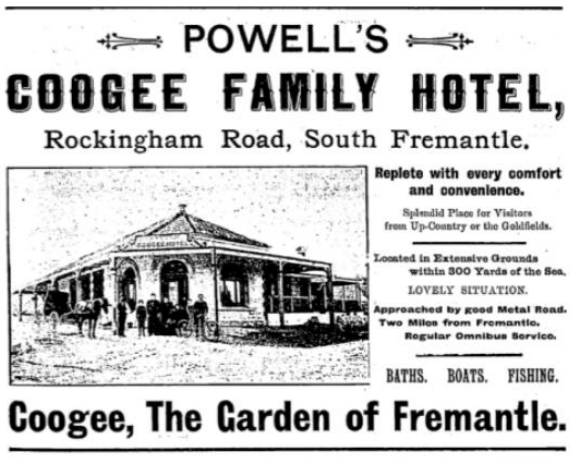


Figure 4. *The Western Australian Directory* 1899, p. 117. Retrieved from https://www.slwa.wa.gov.au/pdf/battye/pods/1899/0095.pdf. (Harvey, n.d, p. 42)

Davilak House

The land in which the Davilak Estate was eventually built was purchased by Charles Manning in the 1850s (Harvey, 2020). The land parcel bought by Charle's Manning is known as Manning Park (City of Cockburn, 2019). The first building completed was a 10 room estate (Harvey, 2020). This initial building ran as a farm to supply the Manning's main house in Fremantle (City of Cockburn, 2024). Additionally, the government rented the land from the Manning's to house convicts whilst building the Rockingham Road (Harvey, 2020). This house burnt down in the 1860s and in 1866 a new house was built by Charles Manning (Harvey, 2020). The new house was a 14 room cottage built by convicts from locally sourced limestone (Harvey, 2020). The cottage was associated with several outbuildings and became known as the Davilak Estate (Figure 5).



Figure 5. Davilak Estate c. 1900. Courtesy of City of Cockburn Library. (Harvey, 2020, p.34)

During the gold rush boom in Western Australia, Afghan cameleers began arriving in the Cockburn district(Harvey, 2020). Originally the camels were housed at the quarantine facilities at Woodman Point (Harvey, 2020). However, it quickly became apparent that there was no room left at Woodman Point and the extra camels were moved to Davilak House (Harvey, 2020). The Manning's family estate house camel camps for three years (Figure 6) (Harvey, 2020). After the gold rush, the camels were freed into the bush (Harvey, 2020).



Figure 6. Camel camp at Davilak Estate. Courtesy of City of Cockburn Library. (Harvey, 2020, p. 31)

Davilak Estate was abandoned in 1946 and burnt down in the late 1950s (City of Cockburn, 2019). The second house on the estate is currently used as a museum (City of Cockburn, 2019).

1900s

Wartime

The Cockburn area was used during the Second World War for military training and military defence (City of Cockburn, 2024). The Naval Base off the Cockburn shore was a prominent training camp (City

of Cockburn, 2024). Several searchlights and anti-aircraft batteries were also located off the shore and lake chains (City of Cockburn, 2024). Unfortunately, many Italian migrants in the Coogee area were taken to internment camps as 'enemy aliens' after Italy joined the Axis powers which had a lasting impact on the interned men and their families across WA (City of Cockburn, 2024).

Suburban Expansion

Until the 1960s Coogee remained semi-rural, with a small number of houses within the vicinity of the Coogee Hotel (City of Cockburn, 2024). The limestone quarry remained until the 1980s however, by the 1990s Coogee was transformed into suburbs (City of Cockburn, 2024). The industrial work in Coogee was abolished after almost 100 years of inhabitancy (City of Cockburn, 2024).

2000s

In 2005 North Coogee was approved and began the development of houses in the former industrial area (City of Cockburn, 2024). Traces of Coogee's historic past still remain through heritage listed buildings sites such as the Coogee Hotel, Manning Park, Robb Jetty and the Lime Kilns.

SECTION THREE – DUE DILIGENCE ASSESSMENT

PREDICTIVE STATEMENTS

The archaeological and ethnographic predictive statements and subsequent risk assessment are based on the results of the location and types of Aboriginal sites (Aboriginal Cultural Heritage) that have been previously recorded in this region.

Based on the predictive statements made in Table 6 below, there appears to be an overall **low** chance of encountering grinding stones/patches, PADs, rock art, quarries, burials, rock shelters, human-made structures, stone arrangements, ethnographic sites and water sources. within and around the Activity Area. There is a **moderate** chance of encountering Aboriginal artefact scatters, scar trees, ethnographic sites, and historic sites.

Table 6. Predictive Statements for the Project Area

Site Type	Site Description	Landform/Environment	Predictive Statement
Artefact Scatters / Isolated Artefacts	Stone flakes, cores, and debris from stone artefact manufacture. Some flakes may show signs of having been used. Tools that have been deliberately shaped (formal tools) may include scrapers, backed blades and adzes.	Found in both surface and subsurface contexts across many different landforms, including around creek lines, gravel flats, plains and rock shelters. There is a demonstrated association between water sources and artefact scatters on the Swan Coastal Plain.	Artefact scatters are a common site type that preserves well over long time periods in both surface and subsurface contexts. However, there is a lack of information on whether previous heritage surveys around the wider Study Area have recorded any artefact scatters. Due to the above statement and the level of land clearance within the Activity Area, there is a **moderate** chance that this type of site might be found in areas of high potential within the Activity Area.
Scar Trees	Modified trees in this region may relate to Aboriginal use of trees. Aboriginal people removed bark from the main trunk of a tree to manufacture dishes or shields. In other cases, scarring may be caused during the extraction of honey.	These types of sites will occur in locations where there are trees that are more than 150 years old.	Given the significant clearance around the site seen in aerial imagery but possibility of some mature trees, there is a **moderate** chance that this type of site will be encountered in the Activity Area.
Grind Stones / Grinding Patches	Grinding stones are stones that have been	Grinding patches occur on suitably flat areas of	There is a **low** chance as the aerial imagery displays a lack

Site Type	Site Description	Landform/Environment	Predictive Statement
	used for grinding seeds or sharpening stones, resulting in a distinctive abraded surface. Grinding patches are similarly utilised patches of bedrock.	bedrock, whereas Grindstones can be found throughout the landscape, but are often closely associated with water sources.	of granite bedrock in the Activity Area.
Potential Archaeological Deposits (PAD)	Potential archaeological deposits may contain cultural material and could possibly be dated if charcoal or other dateable organics are present. Preservation of any organic material may vary depending on the soil type.	These types of sites are generally found in rock shelters where sediment builds up overtime. Outside of rock shelters, in open air artefact scatters, sites are usually contained to the surface where the artefacts build up in a single palimpsestic deposit which rarely extends below the surface.	There is a **low** chance of encountering a PAD; however, this will also depend on local soil profiles and surface artefacts, which can only be assessed and identified during an on-ground heritage survey.
Rock Art	Rock art may be in the form of engravings or paintings. There are many different styles of engravings, including incised, pecked, grooved and abrasion.	This site type is found on bedrock outcrops of different sizes and formations. The surface is mainly flat. Paintings are mostly found in sheltered contexts such as rock shelters or overhangs providing good conditions for the preservation of the pigment used in the art. Engravings can be found in both open and closed contexts.	No rocky outcrops are evident in aerial imagery of the Activity Area. There is therefore a **low** chance of encountering this type of site in the Activity Area.
Quarries	These types of sites consist of stone sources, either in the form of bedrock or large nodules that are in their primary context. Quarries may be classed as stone procurement sites that usually have an associated artefact scatter containing stone reduction/knapping areas.	Located in areas where there are suitable outcrops of stone.	Using aerial imagery alone, a **low** chance of discovering a quarry. Further, the Swan Coastal Plain does not contain any material suitable for making stone tools.
Burials	Burials may include an isolated bone fragment or could involve complete individuals or multiple burials.	Skeletal material generally occurs in areas where the ground is softer such as along creek banks or in dunes.	Due to the lack of creek banks as well as the evidence of land clearance, there is a **low** chance of

Site Type	Site Description	Landform/Environment	Predictive Statement
			encountering burials within the Activity Area.
Rock Shelters	Rock shelters were used for shelter and other purposes by Aboriginal people. They may have conducted certain activities while in a shelter, such as making stone tools or caching items.	These occur where there is suitable bedrock present and may include overhang and cave formations.	There does not appear to be any large rock formations within the Activity Area that would create this type of site. There is a **low** chance that this type of site would be encountered in the Activity Area.
Human-Made Structures	Human-made structures include remnant structures used for housing, stone arrangements or other. House structures possibly constructed from branches, stone, corrugated iron, mud or other materials most likely in the historic period. Stone arrangements may include semi-circular rings of stacked stone, lizard traps, cairns, hunting hides, and standing stones.	The preservation of remnant structures, particularly those used for housing, may depend on the materials used, exposure to the elements and land use activities. Stone arrangements are present in areas where suitable rock is present; however, these types of sites are not very common overall.	There is a **low** chance that this type of site would be encountered in the Activity Area given the high disturbance of the area.
Ethnographic sites, including Mythological / Aboriginal Ceremony and Songlines	These types of sites are places of significance to Aboriginal people and may be connected to ceremonial activities and/or spiritual stories. In addition, there may be ethnographic information related to the historic use of the area by Aboriginal people.	These may be present across a range of different landscapes. Certain natural features may be considered a part of these types of sites, including specific landforms, rock formations, water sources, and plant or animal concentrations.	Although there is a **moderate** chance of encountering tangible mythological sites within the Activity Area, the Area does sit within a broader ethnographic landscape pertaining to Dreamings and Songlines associated with the surrounding waterbodies.
Water Sources	These types of places include rock holes, natural springs, creeks, pools and soaks that were an important source of water for Aboriginal people and later on the early settlers.	These are mostly located in low-lying areas where water collects along creeks and in soaks, or they may be associated with rock formations.	No water sources are present on aerial imagery. Therefore, there is a **low** chance of encountering water sources within the Activity Area.

Site Type	Site Description	Landform/Environment	Predictive Statement
Historic Sites	Historic sites may or may not have a shared history between Aboriginal people and early settlers. Historical sites may include homesteads, stockyards, building ruins, stone walls, wells, fences, bridges, small camps, old tracks, blazed trees, and other farm infrastructure.	These may be located anywhere across the landscape but especially in and around previously recorded historical heritage sites and Aboriginal sites (such as reserves or farm camps) that have a known historic component.	Although there are no previously recorded historical sites within the Activity Area, there are sixteen sites within a kilometre. Therefore, there is a **moderate** chance of finding historical refuse.

RISK ASSESSMENT

There are three levels of assessed risk for encountering Aboriginal and historical cultural heritage within the Activity Area: High, Moderate and Low (also see Map 5). Detailed descriptions of each level of risk are provided below. It is highly recommended that ground-truthing occur, in particular to refine the areas of archaeological risk, whilst providing further insight into the ethnographic impact.

High Risk

Aboriginal Heritage

Areas of high risk include the landforms where cultural heritage sites are typically found in this region. Areas with high-risk show signs of minimal disturbance, with limited impacts to sub-surface soils. High risk areas are more likely to occur where there is remnant vegetation.

Historical Heritage

Archae-aus are not aware of any historical sites of high risk within the Project Area. This has been based on DPLH historical heritage data and a historic map of the Cockburn Sound locations around Manning Lake which shows where early structures were c. 1895 (Appendix Two). However, ground truthing is required to make an accurate determination on whether any historical sites or features remain.

Moderate Risk

Aboriginal Heritage

Areas of moderate risk include landforms that Aboriginal people were likely to have used occasionally or alternatively, may include landforms that would have been intensively used but have since been impacted by agricultural practices. It is important to note that artefacts have been found in cleared paddocks elsewhere and so land clearing is not necessarily an indicator that an area has been heavily impacted.

Historical Heritage

Archae-aus have identified a historic map of the Cockburn Sound locations around Manning Lake which shows where early structures were c. 1895. However, the source is limited to the northern section of the Project Area. A combination of satellite imagery and ground truthing would be required

to provide a more accurate picture of where historical features may occur. Areas of moderate risk include areas away from previously identified historical sites that are still likely to contain historical features such as fences, stone walls, wells, outbuildings, and other farm infrastructure or historical refuse.

Low Risk

Aboriginal and Historical Heritage

Low risk areas are where there is a low likelihood of encountering cultural heritage sites and where modern impacts are high to both the surface and sub-surface soils.

Summary

Based on the above predictive statements and examination of the types of landforms present in the survey area, Archae-aus has assessed that there is a **low, moderate and high** risk of impacting Aboriginal and Historical heritage within the Activity Area.

- **High Risk**: Areas where there is dense remnant vegetation.
- **Moderate Risk**: The areas outside of high-risk areas in which vegetation is less dense but present and the land is not as significantly impacted or modified.
- **Low Risk**: Sections of the Project Area, including graded tracks, cleared land, and modern buildings.

At this stage, proposed works include the potential for ground disturbance within the Activity Area. The assessed zones of potential are shown in Map 5 below. A preliminary assessment of aerial photographs shows areas containing dense and partially vegetated land in comparison to the surrounding suburban area. As disturbance is present, the land contains a low to high potential for ACH.

The above risk assessment is also supported by an assessment of risk using the Aboriginal Heritage Due Diligence Guidelines Heritage Risk Matrix, the proposed impacts will fall between significant (includes new roads or tracks, land clearing, intensive soil or core sampling) and major disturbance (includes soil excavation, major construction works and mechanical earthmoving) (Figure 7). As the works will take place in minimally altered and moderately altered environments, the risk of encountering Aboriginal cultural materials is medium to high.

Figure 7. DPLH's Aboriginal Heritage Risk Matrix

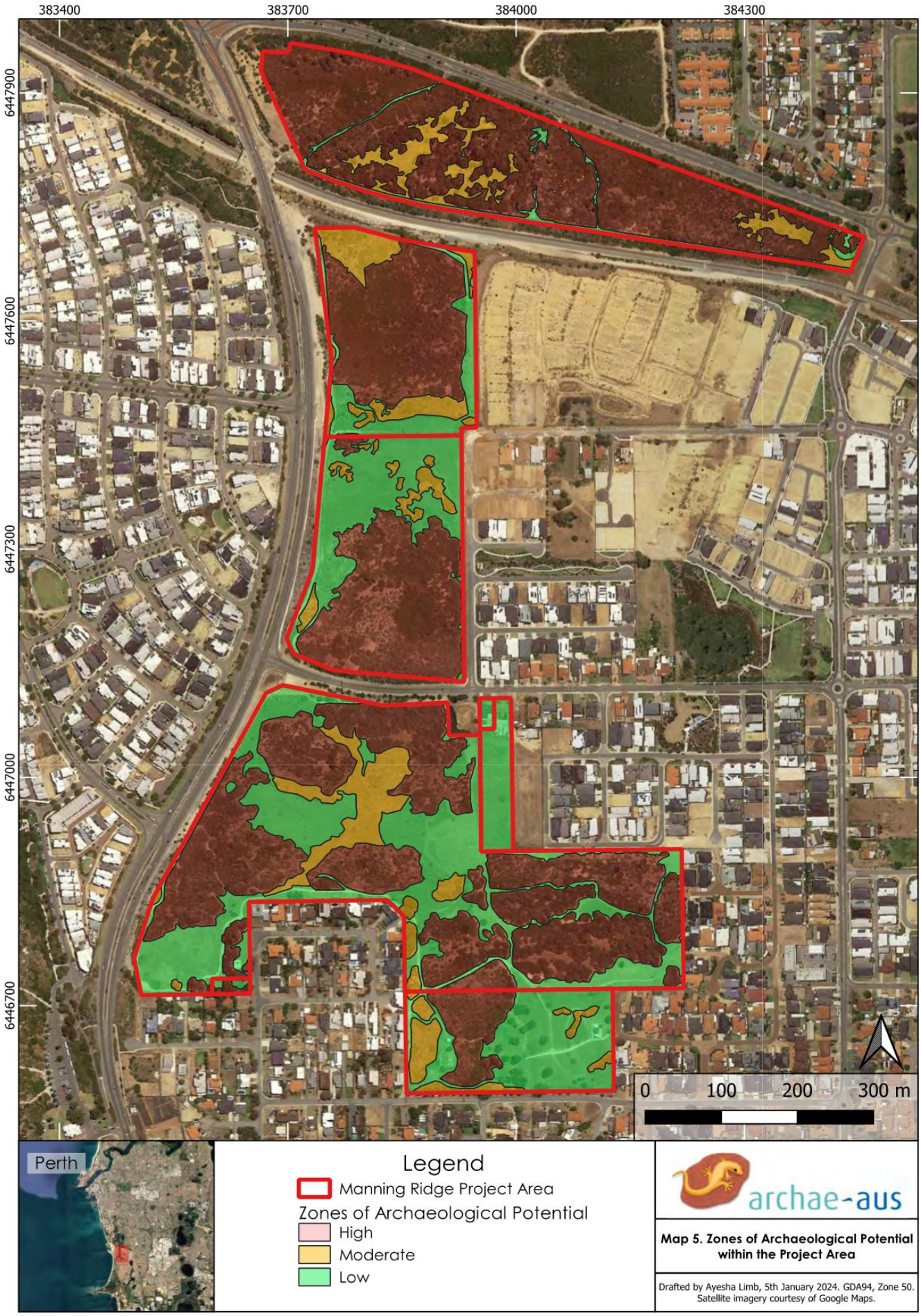
SCHEDULE 2 – THE ABORIGINAL HERITAGE RISK MATRIX

Previous Land Use	LAND ACTIVITIES – CATEGORIES 1-5					
		1. Negligible disturbance	2. Minimal disturbance	3. Moderate disturbance	4. Significant disturbance	5. Major disturbance
	Built Environment - e.g. urban environment, towns, metropolitan region.	Low	Low	Low	Low	Medium
	Significantly Altered Environment - e.g. cultivated and cleared land.	Low	Low	Low	Medium	High
	Moderately Altered Environment - e.g. partially cleared lands, re-vegetated landscape.	Low	Low	Medium	Medium	High
	Minimally Altered Environment - e.g. urban bush land, regrowth areas	Low	Medium	Medium	High	High
	Unaltered Environment - e.g. protected areas or pristine environment.	Low	Medium	High	High	High
Risk Assessment		**Actions**				
Low Risk (Review)		Review the landscape and proposed activity (see sections 2.4 - 2.8 - assessing the landscape and the activity). Refer to the AHIS.				
Medium Risk (Review /Exercise Caution)		Review the landscape and proposed activity (as above). The precautionary principle (see page 2) applies. Refer to the AHIS and contact the DAA. A range of actions may be recommended, including: no action, consultation with the relevant Aboriginal people, an Aboriginal heritage survey or modification of the proposed activity to avoid or minimise site impact.				
High Risk (Consult / Survey / Approvals)		Refer to the AHIS. Consult with the DAA and the relevant Aboriginal people. Dependent on consultation outcomes you may need to include: an Aboriginal heritage survey, modification of the proposed activity to avoid or minimise (see sections 2.24 - 2.28) impact to the site and/or other heritage management strategies. The land user may also need to apply for approval or consent (see section 2.26) to the activity.				
For major development projects refer to sections 2.10 - 2.12 for further advice.						

Potential Heritage Impacts and Mitigation

Future ground disturbance work within the proposed Manning Ridge Activity Area could pose a risk of harm to any potential ACH and historical heritage that may be identified during a field assessment. Significant to Major Land Use activities will cause permanent damage to any potential or known heritage. Accordingly, the following mitigation measures are proposed:

- Consultation with the relevant Aboriginal Party: the Whadjuk Native Title Group (WI2017/015).
- ACH Investigation involving an archaeological and ethnographic heritage field assessment of areas of high and moderate archaeological potential within the Manning Ridge Activity Area, including consultation with nominated Knowledge Holders.
- An update to the risk assessment following the archaeological and ethnographic heritage surveys.


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384000
384300
6447900
6447600
6447300
6447000
6446700
0
100
200
300 m
Perth
Legend
Manning Ridge Project Area
Zones of Archaeological Potential
High
Moderate
Low
archae-aus
Map 5. Zones of Archaeological Potential within the Project Area
Drafted by Ayesha Limb, 5th January 2024. GDA94, Zone 50.
Satellite imagery courtesy of Google Maps.

Survey Advice

A heritage field assessment / survey is highly recommended because the presence or absence of ACH cannot be confirmed at a desktop level. This is due to a lack of previous localised surveys in the area and the identified zones of moderate and high ACH potential (Map 5), which need to be assessed in the field.

The field assessment for this work should include all zones of high archaeological potential, a sample survey of zones of moderate archaeological potential, and the footprint of the proposed area of ground disturbance work. It must be noted that the above assessments were based on aerial imagery alone and may be reassessed following an on-ground heritage survey. Furthermore, any landforms such as stone outcrops and water sources that were not able to be identified on the aerial imagery, but become apparent during the survey, should be targeted regardless of whether they are within the zones of high or moderate archaeological potential. An ethnographic survey is also recommended owing to the contextual richness and proximity of *Cockburn Road* (DPLH ID 15840), *North Lake and Bibra Lake* (DPLH ID 3709) and *Lake Coogee* (DPLH 20866) (that relate to the Dreamings and Songlines) to the proposed area of work.

These surveys will require the participation of the appropriate Whadjuk Traditional Owners and Knowledge Holders. When looking to consult with a group of Aboriginal Knowledge Holders the first step is for the proponent to submit the project to the relevant Aboriginal Corporation for assessment by their Cultural Advisory Committee. As such the City of Cockburn, in consultation with the City's Aboriginal Reference Group, should contact SWALSC in the first instance.

SWALSC will review and pass the necessary information on to the Whadjuk Cultural Advice Committee who will meet about the project and will provide a list of names for the survey. The Aboriginal Corporation must be provided with a project overview and any relevant information about the proposed works. They may require this in the format of an Activity Notice, which can be located on the SWALSC website. They will then table the project at the next available Cultural Advisory Committee meeting, who will assess it and provide a list of Knowledge Holders. This process may take several weeks depending on when the meeting is scheduled and how busy the Corporations are.

While it is outside of the requirements of the NSHA, it also recommended that the City liaise with the City's Aboriginal Reference Group to inform them of the proposed project, as a secondary Aboriginal stakeholder group. They have meetings monthly where the project can be introduced.

Please note: At the time of writing, Archae-aus have been able to apply for the names on behalf of City of Cockburn, and the Whadjuk Cultural Advice Committee are in the processes of assessing the application.

Contact Details

SWALSC

legal.team@noongar.org.au

(08) 9358 7400.

DPLH (South West Native Title Settlement Heritage)

swsheritage@dplh.wa.gov.au

6551 7985

59

Whadjuk Aboriginal Corporation

kaya@whadjuknoongar.org.au

CEO – Noel Morich

P: 08 7095 3560

SUMMARY OF ADVICE

The desktop due diligence assessment is complete. Based on this assessment, Archae-aus **advise** that The City of Cockburn are aware that:

1) This desktop due diligence assessment examines the risk of harm to any known or potential ACH within the proposed Activity Area, which includes future development works.
2) An initial search of the Aboriginal Heritage Inquiry System (AHIS) and updated search of the new Aboriginal Cultural Heritage Inquiry System (ACHIS), revealed that the Activity Area has been covered by previous surveys (archaeological and ethnographic); however, these are not considered reliable[11] due to:
    a. Their age (most previous surveys have been conducted pre-2013 or did not display a date).
    b. Lack of relevance to the current Activity Area and proposed activities.
    c. Inadequate coverage of the Activity Area (by the publicly available surveys and lack of archaeological investigation within the Activity Area itself).
3) Desktop research of the Manning Ridge Activity Area revealed an Aboriginal Heritage Site approximately 550 m west of the Activity Area (DPLH Site ID 3776)
4) The desktop research indicates that there is **low, moderate and high potential** for encountering certain types of Aboriginal Cultural Heritage in the Activity Area; and **low to moderate potential** for historical heritage in the Activity Area.
5) Based on the preliminary risk assessment for the Activity Area, an archaeological and ethnographic heritage survey is required to carry out a formal risk assessment to confirm whether there is ACH and historical heritage within areas of high and moderate archaeological potential.
6) That the heritage surveys will confirm the required next steps, including any necessary approvals, based on a formal assessment of risk of harm to any ACH within the Manning Ridge Activity Area.
7) That the City of Cockburn contact SWALSC and the Whadjuk Aboriginal Corporation for a list of names to undertake a survey of the proposed Activity Area, in order to confirm and facilitate the recommended heritage surveys.

[11] As per the ACH Investigation Guidelines.

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APPENDIX ONE – ACHIS SEARCH RESULTS

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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Search Criteria

No Aboriginal Cultural Heritage (ACH) Register in Custom search area - Polygon - 115.760153598405°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.1148108640187°S (GDA94)

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the Aboriginal Heritage Act 1972.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://alt.jotfor.ms/DPLH/aboriginal-heritage-enquiry and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within or adjacent to the following Indigenous Land Use Agreement(s): Whadjuk People Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines, Industry Regulation and Safety (DMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage via https://alt.jotfor.ms/DPLH/aboriginal-heritage-enquiry.

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Coordinates

Map coordinates are based on the GDA 94 Datum.

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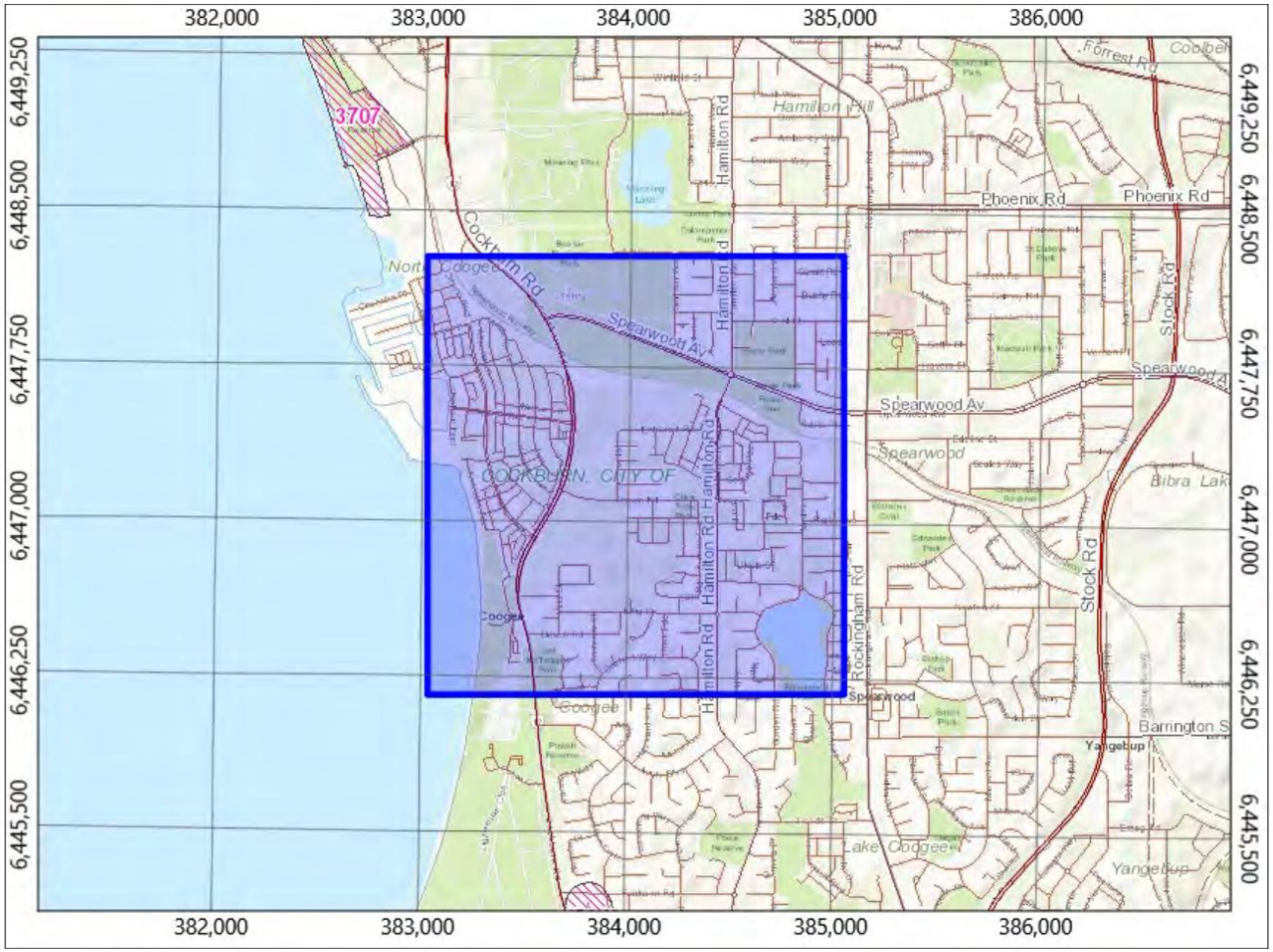
Topographic basemap sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register

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Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

1.09 kilometres

Map Scale 1 : 33,000

MGA Zone 50 (GDA94)

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Identifier: 826083

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Lodged

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Search Criteria

No Aboriginal Cultural Heritage (ACH) Lodged in Custom search area - Polygon - 115.760153598405°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.1148108640187°S (GDA94)

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Coordinates

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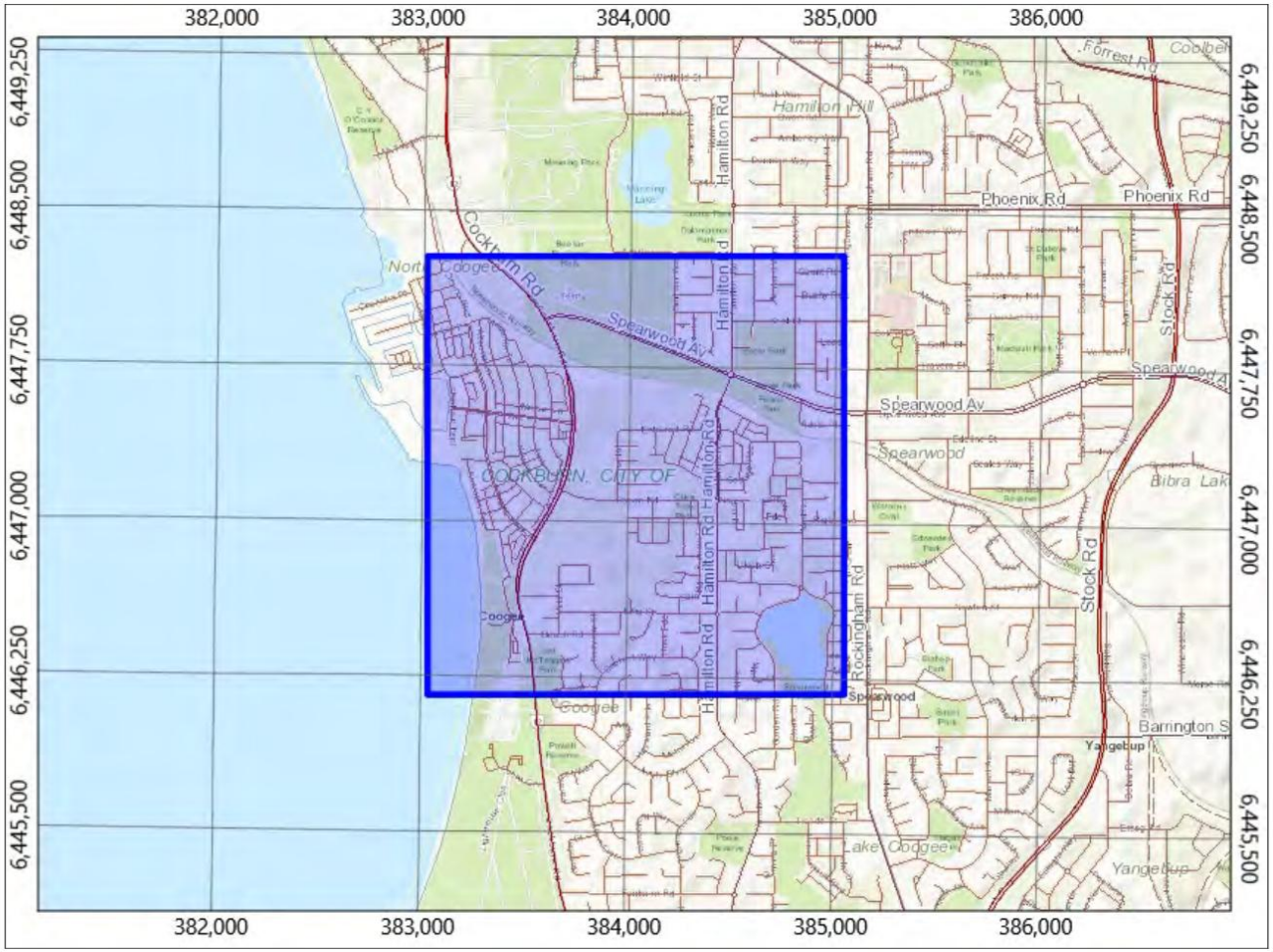
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Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Lodged

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Legend

- Aboriginal Cultural Heritage (ACH) Lodged
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

1.09 kilometres

Map Scale 1 : 33,000

MGA Zone 50 (GDA94)

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Identifier: 826084

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Historic

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Search Criteria

1 Aboriginal Cultural Heritage (ACH) Historic in Custom search area - Polygon - 115.760153598405°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.1148108640187°S (GDA94)

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Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Historic

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Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- Boundary Reliable (Yes/No): Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- Boundary Restricted = No: Represents the actual location of the ACH as understood by the Department..
- Boundary Restricted = Yes: To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- Culturally Sensitive = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- Culturally Sensitive = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://alt.jotfor.ms/DPLH/aboriginal-heritage-enquiry.
- Culturally Sensitive Nature:
  - No Gender / Initiation Restrictions: Anyone can view the information.
  - Men only: Only males can view restricted information.
  - Women only: Only females can view restricted information.

Status:

- Register: Aboriginal cultural heritage places that are assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Lodged: Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the Aboriginal Heritage Act 1972.
- Historic: Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the Aboriginal Heritage Act 1972. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Coordinates

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Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Historic

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
3776	INDIAN OCEAN	No	Yes	No	No Gender / Initiation Restrictions	Historic	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	S02169

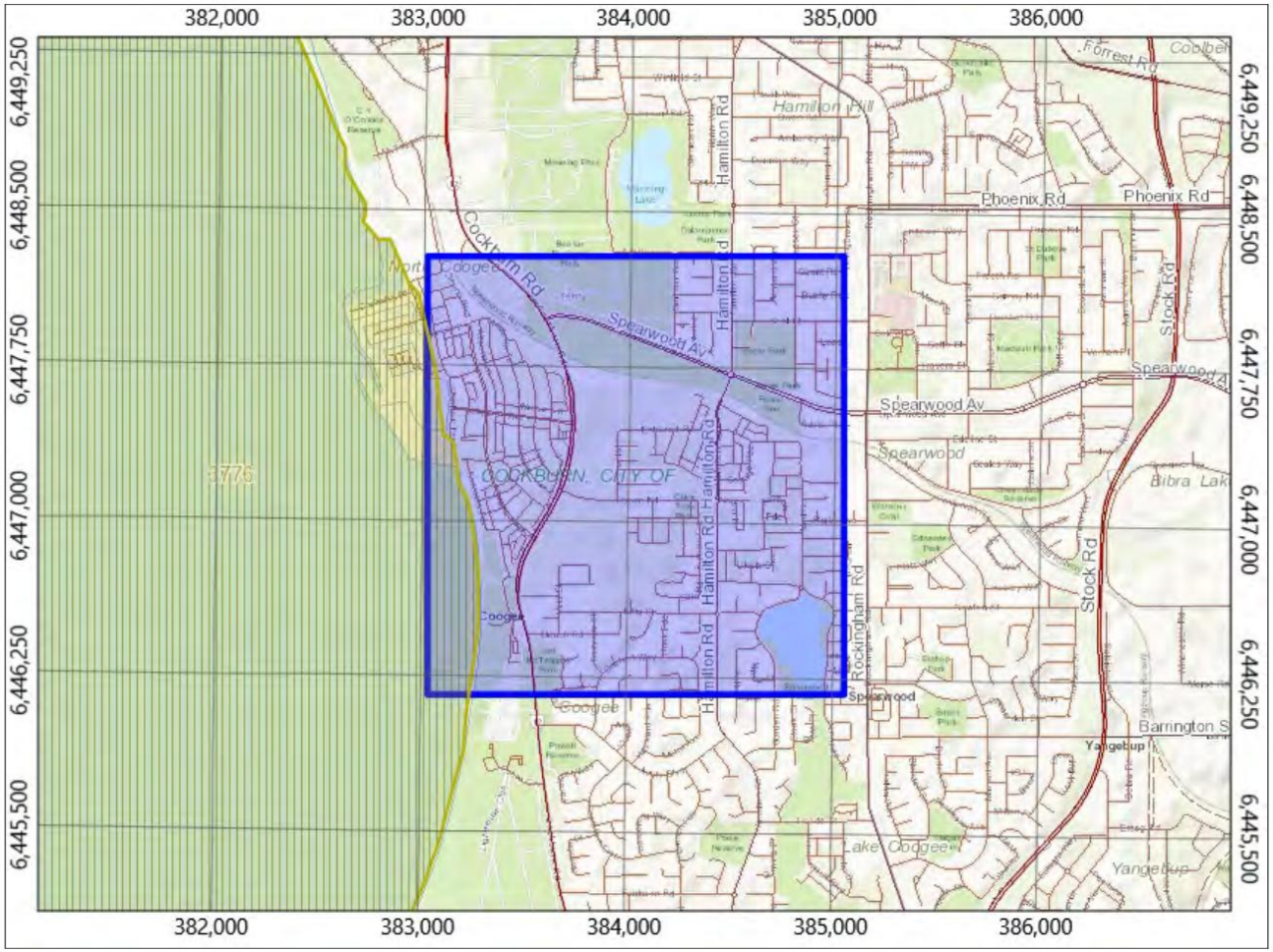
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Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Historic

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Legend

- Aboriginal Cultural Heritage (ACH) Historic
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

1.09 kilometres

Map Scale 1 : 33,000

MGA Zone 50 (GDA94)

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Identifier: 826087

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Heritage Surveys

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Search Criteria

7 Heritage Surveys containing 7 Survey Areas in Custom search area - Polygon - 115.760153598405°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.0957621937143°S (GDA94) : 115.781525439837°E, 32.1148108640187°S (GDA94) : 115.760153598405°E, 32.1148108640187°S (GDA94)

Disclaimer

Heritage Surveys have been mapped using information from the reports and / or other relevant data sources. Heritage Surveys consisting of small discrete areas may not be visible except at large scales. Reports shown may not be held at the Department of Planning, Lands and Heritage (DPLH). Please consult report holder for more information. Refer to https://www.wa.gov.au/organisation/department-of-planning-lands-and-heritage/aboriginal-heritage for information on requesting reports held by DPLH.

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Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

List of Heritage Surveys

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Access

Some reports are restricted.

Spatial Accuracy

The following legend strictly applies to the spatial accuracy of heritage survey boundaries as captured by DPLH.

Very Good	Boundaries captured from surveyed titles, GPS (2001 onwards) submitted maps georeferenced to within 20m accuracy.
Good / Moderate	Boundaries captured from GPS (pre 2001) submitted maps georeferenced to within 250m accuracy.
Unreliable	Boundaries captured from submitted maps georeferenced to an accuracy exceeding 250m.
Indeterminate	Surveys submitted with insufficient information to allow boundary capture.

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Aboriginal Cultural Heritage Inquiry System

List of Heritage Surveys

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Survey Report ID	Survey Area ID	Report Title	Report Authors	Survey Type	Area Description	Spatial Accuracy	Field / Desktop
21817	16317	Ballaruk (traditional owners) Aboriginal site recording project	Machin, Barrie	Ethnographic	Whadjuk territorial boundaries the lands of the Ballaruk Peoples as shown in Figure 10.	Unreliable	Field and Desktop
21818	16458	Ballaruk (traditional owners of Whadjuk territorial boundaries the lands of the Ballaruk Peoples) Aboriginal site recording project : additional material	Machin, Barrie	Ethnographic	Whadjuk territorial boundaries the lands of the Ballaruk Peoples as shown in Figure 10.	Unreliable	Field and Desktop
102078	14290	Aboriginal Heritage Study of the Jervoise Bay infrastructure planning precinct	McDonald, Hales and Associates.	Archaeological/ Ethnographic	Jervoise Bay Infrastructure Planning Precinct. The proposed development area consists of a section of the proposed Cockburn Road realignment and adjacent locations (land and sea) nominated for industrial development. The road realignment is bounded in the	Good	Field and Desktop
102670	16126	Preliminary Report on the Survey of Aboriginal Areas of Significance in the Perth Metropolitan & Murray River Regions July 1985.	O'Connor, R	Ethnographic	Perth Metropolitan & Murray River Regions. A roughly triangular region, with Yanchep National Park as the Northern point, Gidgegannup as the Eastern point and Pinjarra as the Southern point.	Indeterminate	Field and Desktop
103564	14104	An Archaeological Survey Project: The Perth Area, Western Australia. Apr 1972.	University of Western Australia.	Archaeological	The Perth Area. 103 site locations in 67 site groups were investigated.	Indeterminate	Field and Desktop
105324	14636	Report on Aboriginal Heritage research undertaken in respect of the proposed Port Catherine development, Coogee	McDonald, E	Archaeological/ Ethnographic	Proposed Port Catherine Development, Coogee. The area is located on the land adjacent to the Owen Anchorage, Cockburn. It measures approximately 1.5km north-south, and 400m east-west maximum as shown in Fig. 1	Unreliable	Field and Desktop
105508	14637	Aboriginal contact consultation : report on Port Catherine Development proposal Coogee	Collard and Collard Consultants	Ethnographic	Port Catherine Development, proposal Coogee.	Very Good	Field only

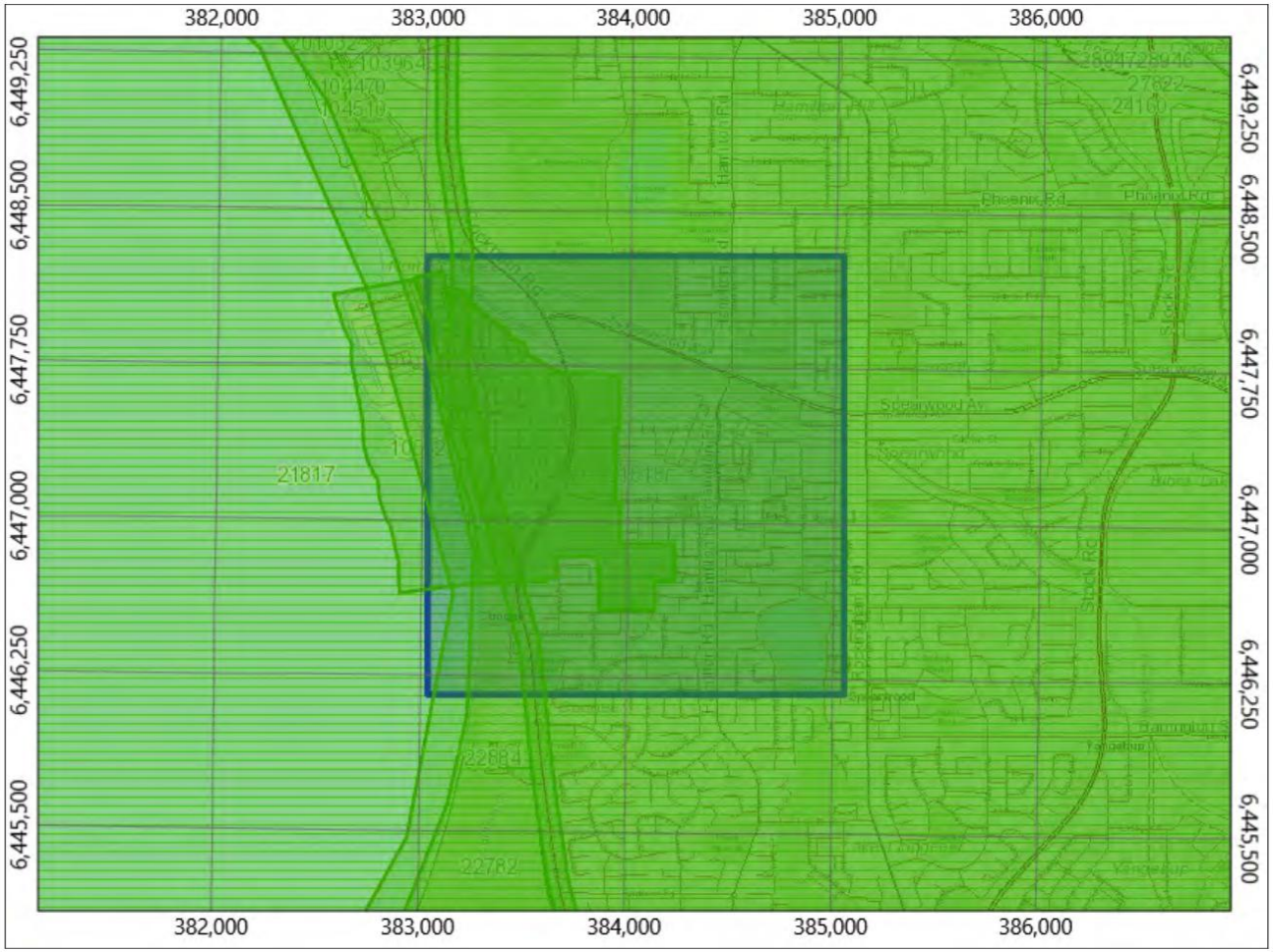
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Map of Heritage Survey Areas

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Legend

- Heritage Survey Area
- Search Area
- Aboriginal Community
  - *Permanent*
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- Town
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1.09 kilometres

Map Scale 1 : 33,000

MGA Zone 50 (GDA94)

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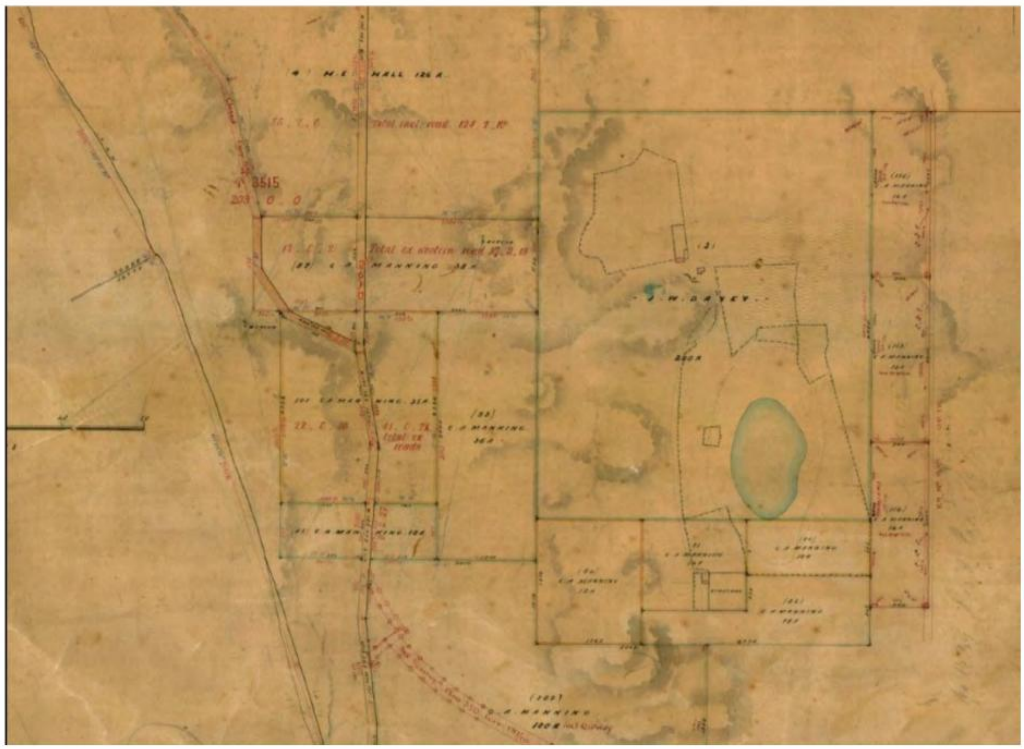
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Identifier: 826088

APPENDIX TWO – HISTORIC MAP

Cockburn Sound Locations at Manning Lake, c.1895, courtesy of the City of Cockburn BRN 511443.



APPENDIX THREE – COORDINATES

All coordinates are in GDA94 MGA Zone 50.

Table 7. Study Area Coordinates

Node	Easting	Northing	Node	Easting	Northing
1	383848	6446888	32	383848	6446888
2	383848	6446888	33	383848	6446888
3	383848	6446888	34	383848	6446888
4	383848	6446888	35	383848	6446888
5	383848	6446888	36	383848	6446888
6	383848	6446888	37	383848	6446888
7	383848	6446888	38	383848	6446888
8	383848	6446888	39	383848	6446888
9	383848	6446888	40	383848	6446888
10	383848	6446888	41	383848	6446888
11	383848	6446888	42	383848	6446888
12	383848	6446888	43	383848	6446888
13	383848	6446888	44	383848	6446888
14	383848	6446888	45	383848	6446888
15	383848	6446888	46	383848	6446888
16	383848	6446888	47	383848	6446888
17	383848	6446888	48	383848	6446888
18	383848	6446888	49	383848	6446888
19	383848	6446888	50	383848	6446888
20	383848	6446888	51	383848	6446888
21	383848	6446888	52	383848	6446888
22	383848	6446888	53	383848	6446888
23	383848	6446888	54	383848	6446888
24	383848	6446888	55	383848	6446888
25	383848	6446888	56	383848	6446888
26	383848	6446888	57	383848	6446888
27	383848	6446888	58	383626	6446725
28	383848	6446888	59	383626	6446725
29	383848	6446888	60	383626	6446725
30	383848	6446888	61	383626	6446725
31	383848	6446888	62	383626	6446725

82

Node	Easting	Northing	Node	Easting	Northing
63	383626	6446725	98	383830	6447286
64	383626	6446725	99	383830	6447286
65	383626	6446725	100	383830	6447286
66	383991	6446653	101	383830	6447286
67	383991	6446653	102	383830	6447286
68	383991	6446653	103	383830	6447286
69	383991	6446653	104	383830	6447286
70	383991	6446653	105	383830	6447286
71	383991	6446653	106	383830	6447286
72	383991	6446653	107	383830	6447286
73	383991	6446653	108	383830	6447286
74	383991	6446653	109	383962	6447084
75	383991	6446653	110	383962	6447084
76	383991	6446653	111	383962	6447084
77	383991	6446653	112	383962	6447084
78	383845	6447581	113	383962	6447084
79	383845	6447581	114	383975	6446995
80	383845	6447581	115	383975	6446995
81	383845	6447581	116	383975	6446995
82	383845	6447581	117	383975	6446995
83	383845	6447581	118	383975	6446995
84	383845	6447581	119	383975	6446995
85	383845	6447581	120	383975	6446995
86	383845	6447581	121	383975	6446995
87	383845	6447581	122	383975	6446995
88	383845	6447581	123	383975	6446995
89	383845	6447581	124	383975	6446995
90	383845	6447581	125	383975	6446995
91	383845	6447581	126	383975	6446995
92	383845	6447581	127	383975	6446995
93	383845	6447581	128	383975	6446995
94	383845	6447581	129	383975	6446995
95	383845	6447581	130	383975	6446995
96	383830	6447286	131	383999	6447808
97	383830	6447286	132	383999	6447808
133	383999	6447808	145	383999	6447808

Node	Easting	Northing	Node	Easting	Northing
134	383999	6447808	145	383999	6447808
135	383999	6447808	146	383999	6447808
136	383999	6447808	147	383999	6447808
137	383999	6447808	148	383999	6447808
138	383999	6447808	149	383999	6447808
139	383999	6447808	150	383999	6447808
140	383999	6447808	151	383999	6447808
141	383999	6447808	152	383999	6447808
142	383999	6447808	153	383999	6447808
143	383999	6447808	154	383999	6447808
144	383999	6447808	155	383999	6447808

Please note: the proposed Manning Ridge Zones of Archaeological Potential shapefile is a very large number of coordinate points. Please refer to the maps, geospatial data and Excel spreadsheet of precise Coordinates attached to this report for further information on the Manning Ridge Zones of High Archaeological Potential.

Archae-aus Pty Ltd

1/107 Stirling Highway
North Fremantle WA 6159

www.archae-aus.com.au

t: 08 9433 1127

TERRA ROSA
CONSULTING

HERITAGE REPORT

August 2025

The archaeological and ethnographic site identification Aboriginal and early European heritage survey of the City of Cockburn proposed Coogee Golf Course project with the Whadjuk Noongar Traditional Owners





Terra Rosa acknowledges the Whadjuk Noongar people, who are the custodians of the Country described in this document.

We recognise their continuing connection to their land and waters, and their intrinsic responsibility to care for Country, culture, and community.

We pay our respects to Elders past and present, and extend our support to emerging leaders for the continued care of Country into the future.

Survey type and standard

Archaeological and ethnographic site identification

Survey dates

15-16 July 2025

EXECUTIVE SUMMARY

City of Cockburn is planning to conduct development works (proposed golf course and community recreational facilities in Coogee) within the **Whadjuk Noongar** area of the South West Native Title Settlement (WCD2021/010), City of Cockburn issued a request to **Terra Rosa Consulting (Terra Rosa)** to undertake an archaeological and ethnographic site identification Aboriginal and early European heritage survey to ensure any Aboriginal or early European cultural heritage places are identified and documented in the project area in cooperation with the Whadjuk Noongar Traditional Owners.

The survey was undertaken between 15 and 16 July 2025 by seven Whadjuk Noongar representatives and three heritage consultants from Terra Rosa. One City of Cockburn representative was also present during this time to support the survey team.

The summarised survey results of the scope of works (SOW) are as follows:

Proposed Coogee Golf Course – Complete

- A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (ACHIS) identified **no** DPLH Aboriginal sites or Aboriginal heritage places exist within the survey area;
- A search in the Heritage Council's site database (InHerit) identified **no** early European (historical) sites exist within the survey area;
- The desktop survey identified **no** known heritage places, not included on the DPLH ACHIS or on InHerit;
- **One** new early European (historical) heritage place (COC2501-01) was identified during the survey and recorded to site avoidance standard;
- **No** avoidance areas were additionally demarcated within the survey area; and
- **No** isolated artefacts were identified within the survey area.

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Based on the results of the survey and consultation with the Whadjuk Noongar Traditional Owners, the following recommendations are made:

1. City of Cockburn is advised to avoid any impact or disturbance to the preliminary site identified as COC2501-01. City of Cockburn is also advised to work collaboratively with Terra Rosa to prepare an Archaeological Management Plan to clean, record and protect the site.

2. City of Cockburn is advised to engage three Whadjuk Noongar Traditional Owners as cultural monitors to be present for all initial ground disturbance works within the Proposed Coogee Golf Course survey area.

3. City of Cockburn is advised to preserve the limestone outcrops and the rock formations visible within the survey area.

4. City of Cockburn is advised to maintain the northern portion of the survey area as a preserve area, while in the central and southern portions, they are advised to avoid removing the mature trees and to protect the native vegetation. At the same time, City of Cockburn is advised to remove the weeds and other invasive species.

5. City of Cockburn is advised to collaboratively develop a Cultural Heritage Management Plan (CHMP) with the Whadjuk Noongar Traditional Owners.

6. City of Cockburn is advised to clean the rubbish up from the survey area.

7. City of Cockburn is advised to pass on information once plans are drafted or decisions made about the future of the area.

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THE PROJECT

City of Cockburn is planning to conduct development works within the Whadjuk Noongar area of the South West Native Title Settlement (WCD2021/010) for the Manning Ridge area in Coogee, the works still not identified as City of Cockburn has been progressing investigation into the potential for a golf course and associated community recreational facilities.

To minimise the likelihood of breaching the *Aboriginal Heritage Act 1972 (WA)*, and the *Heritage Act 2018 (WA)*, City of Cockburn commissioned Terra Rosa Consulting (Terra Rosa) to undertake an archaeological and ethnographic site identification Aboriginal and early European heritage survey over the area planned for development to ensure that any Aboriginal or early European cultural heritage values were identified and documented in cooperation with the Whadjuk Noongar Traditional Owners. These are detailed in scope of works RFQ NV02-2025, (SOW, see Appendix C).

Project location

City of Cockburn's proposed activity area is located within **Whadjuk Noongar area of the South West Native Title Settlement (WCD2021/010)**, in Perth subregion (SWA02) of Swan Coastal Plain (SWA) region of Western Australia. Whadjuk Noongar people maintain their traditional rights and responsibilities as custodians of this Country, and hold knowledge of cultural practices, values, and heritage relating to it.

City of Cockburn's project area is located approximately 18 km south of Perth's Central Business District (CBD) and 6 km south of Fremantle, in City of Cockburn, it includes the Rotary Park, Mills Street Playground and adjacent bushland to the north, which is bounded by Spearwood Avenue to the north, Cross Road to the east, King Street to the south and Cockburn Road to the west. The project area covers approximately 42 hectares.

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Field Map - Survey Area Overview
Job №: COC2501
Coordinate System: GDA94 MGA Zone 50
Date: 11/07/2025
Author: PemaWangdi
Disclaimer: The information in this map is accurate as at the date of issue. Spatial accuracy level of +/- 5m unless otherwise noted.
Scale
1:7,000
0 50 100 200 300 400
Meters
TERRA ROSA CONSULTING
Legend
Survey Area
Pending - Not Surveyed
DPLH Aboriginal Heritage
Historic Heritage Place
Overview
3776 - INDIAN OCEAN
383000 383200 383400 383600 383800 384000 384200 384400 384600 384800 385000
6448000 6447800 6447600 6447400 6447200 6447000 6446800 6446600

Survey participants

The heritage survey was conducted between

15 - 16 07 2025

by 7 Whadjuk Noongar representatives, 3 Terra Rosa consultants, and 1 Cockburn City representatives.

The heritage survey was carried out by the following people between 15 and 16 July 2025:

Whadjuk Noongar Traditional Owners	
Anthony Henry	Rachel Humphries
Cynthia (Cindy) Prior	Sam (Sveto) Humphries (present 16 July 2025)
Jennifer Garlett	Steven Garlett (present 16 July 2025)
Marie Walley	
Terra Rosa Consulting	
Lilia Alpers	Eliza Thompson
Ibrahim Omeri	
City of Cockburn	
Natasha Vale	Lachlan McDonald (present 15 July 2025 for the morning briefing)
	Matt Kennewell (present 15 July 2025 for the morning briefing)

The Whadjuk Noongar participants were selected by South West Aboriginal Land and Sea Council as are the appropriate knowledge holders for the survey area and consented to participate in the heritage survey.

Contact details for the heritage project stakeholders are provided in Appendix A of this report.



Above: *Survey team on16/7/2025*

Left to right: Lilia Alpers, Marie Walley, Rachel Humphries, Natasha Vale, Eliza Thompson, Anthony Henry, Cynthia (Cindy) Prior, Sam (Sveto) Humphries, Ibrahim Omeri, (Jennifer and Steven absent).

Below: *The heritage survey team on 16/07/2025 inspecting the most north part of the survey area*

(L to R): Marie, Anthony, Eliza, Lilia, Cindy



PROJECT METHOD

The archaeological and ethnographic Aboriginal and early European heritage survey of the City of Cockburn proposed Coogee Golf Course project was conducted to a **site identification** standard. The aims of a site identification investigation are to:

1. identify Aboriginal sites (as defined by the Traditional Owners and in reference to s5 of the *Aboriginal Heritage Act 1972*) and the early European heritage sites (as defined in reference to s5 and s38 of the *Heritage Act 2018*) within the requested survey area;
2. consult with Whadjuk Noongar representatives regarding the values held by the Aboriginal identified sites;
3. document the heritage values of the site comprehensively enough to provide the Department of Planning, Lands and Heritage (DPLH), the Aboriginal Cultural Heritage Committee (ACHC) or the Heritage Council of Western Australia with a fair understanding of the site's importance and significance;
4. document a site's heritage values with enough detail to gain an understanding of any risks to those values posed by the proposed activity. This may assist to inform a future Cultural Heritage Management Plan (CHMP);
5. provide City of Cockburn with relevant and informed heritage management recommendations for heritage values identified within the requested survey area;

Site identification surveys aim to record any identified Aboriginal sites to a standard that enables the ACHC to make a fair assessment of them under sections 5 and 39 of the *Aboriginal Heritage Act 1972 (WA)*, and to record any early European (historical) sites to a standard that enables the City of Cockburn or the Heritage Council of Western Australia to make a fair assessment of them under sections 5 and 38 of the *Heritage Act 2018 (WA)*.

Legislation and protocols



Aboriginal Heritage Act 1972 (WA)

Heritage Act 2018 (WA)

Information contained within this report has been developed in primary consideration of the amended *Aboriginal Heritage Act 1972* (WA). The Act provides statutory protection to Aboriginal heritage places in Western Australia, as well as a statutory pathway for development activities that may cause harm to Aboriginal heritage sites. Under section 17 (s17) of the Act, it is an offence to disturb an Aboriginal site without prior written Ministerial consent to do so under s16 or s18(3)(a) of the Act. This applies regardless of whether an Aboriginal site is registered.

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Consideration is also given to the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHPA), which is Federal legislation that may provide additional protection for areas and objects of particular significance to Aboriginal and Torres Strait Islander people.

Regarding the early European (historical) heritage sites, consideration is given to the *Heritage Act 2018 (WA)*, which recognise the importance of, and promote understanding and appreciation of, Western Australia's cultural heritage; and provide for the identification and documentation of places of cultural heritage significance and for the conservation, use, development and adaptation of such places.

Terra Rosa's principles and methods are designed around protocols established for best practice when documenting Indigenous Cultural and Intellectual Property (ICIP). The best practice guidance documents followed by Terra Rosa include:

- The Australia ICOMOS *Burra Charter 2013 Practice Notes for Indigenous Cultural Heritage Management*;
- The Australian Heritage Commission 2002's 'Ask First' guidelines; and
- The ICOMOS *International Charter and Guidance on Sites with Intangible Cultural Heritage 2024*.

Registered Aboriginal sites are heritage places that have been assessed by the ACHC as constituting **sites** under sections 5 and 39 of the Act.

Lodged Aboriginal heritage places include places for which data has been **lodged** with the DPLH but are pending assessment by the ACHC.

Historic Aboriginal heritage places are places that have already been assessed by the ACHC as not constituting an Aboriginal site under the meaning of the Act (listed as **historic** records / not a site).

Heritage sites are registered on one of the following four levels: worldwide, National or Commonwealth, State, Local government.

Some heritage places are not registered but classified by non-government bodies.

Desktop method

A **desktop assessment** was completed before the start of the field survey to know the heritage sites and to understand the extent of heritage research undertaken to date within the survey area.

Regarding the Aboriginal heritage, this research relies largely on the Aboriginal Cultural Heritage Inquiry System (ACHIS) maintained by the DPLH, which is informed by the Register of Places and Objects (the Register). The Register lists all known places to which the Act applies, including Aboriginal sites, Aboriginal cultural material, and protected areas. In addition to the information contained on the Register, the ACHIS also incorporates information relating to

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Aboriginal heritage places and areas that have previously been subject to survey and had their subsequent reports submitted to the DPLH.

It is important to note that the ACHIS is an incomplete record of Aboriginal heritage as it only shows **known** sites and places located in areas that have previously been subject to survey or investigation. Therefore, the absence of registered or lodged Aboriginal heritage within an area may not be reflective of the true cultural landscape present, especially if the area has not previously been investigated.

Before the start of the field work, the scoped survey area/s was/were entered into the ACHIS to learn whether any heritage surveys have previously been conducted, and whether any registered Aboriginal sites or heritage places exist in the area. An additional search of internal heritage databases, maintained by Whadjuk Noongar and Terra Rosa, was also completed as a part of this process.

After the ACHIS [and internal database] search was completed, relevant site files and survey reports were requested from the DPLH for review. The site files were assessed and summarised to provide the survey team with an understanding of the cultural landscape context of the survey area.

Some of the information held by the DPLH was not accessible due to file restriction or delays due to DPLH's administrative processes. In such cases, the inability to access information is noted in the bibliography and Appendix D of this report.

Any relevant unpublished material (such as heritage reports not registered with the DPLH) was also reviewed prior to field work and included in the heritage survey results where relevant.

Regarding the early European (historical) heritage, this research relies largely on the Heritage Council's site database (InHerit), and City of Cockburn database, which contain information about the cultural heritage places listed in the State Register of Heritage Places, local government heritage surveys and heritage lists, the Australian Government's heritage list, and other non-government lists and surveys.

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Before the start of the field work, a search in InHerit was conducted to know if there are any heritage places registered or classified.

The results of the desktop research are provided in the 'Survey Outcomes' section below and included in Appendix D at the end of this document.

Survey method

Before starting the heritage survey, Terra Rosa's heritage consultants conducted a survey brief. During this initial brief:

- the Whadjuk Noongar representatives were provided with information about City of Cockburn's intended project activity for the area;
- City of Cockburn representative, Natasha Vale, was present during the field survey, in addition to two environmental specialists were present in the first brief to discuss and answer any initial questions the survey team had regarding the proposed activities
- survey area maps were provided to the Whadjuk Noongar representatives, which were used by Terra Rosa's heritage consultants to show the proposed survey approach and method. The Whadjuk Noongar representatives were invited to contribute alternative suggestions where they felt it to be necessary;
- results from the desktop assessment were shared with the survey team;
- job safety risk assessments and other safety documentation was discussed;
- the Whadjuk Noongar representatives were invited to share any immediate cultural safety concerns regarding the survey area, and cultural protocols expected to be followed by Terra Rosa and City of Cockburn representatives while on Country;
- Terra Rosa's consultants provided the survey team with an overview of the statutory requirements that need to be met in relation to the documentation and reporting of identified heritages places; and
- Terra Rosa's consultants invited the Whadjuk Noongar representatives to feel open to raise any concerns they may

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have over the duration of the survey, and to request if they required space for private discussions.

Additional survey briefings were conducted as required across the duration of the survey to address any immediate physical or cultural safety concerns, communicate additional information, and reinforce or re-evaluate a survey or site recording approach.



Survey brief on 15/07/2025

L to R: Jennifer, Eliza, Cindy, Marie, Rachel, Ibrahim, Anthony, Environment specialist (Lachlan or Matt), Natasha.



Debrief on 16/07/2025

L to R: Anthony, Natasha, Eliza, Lilia, Marie, Cindy, Sam, Rachel

Pedestrian transects were not used for inspection as a large portion of the survey area is covered with dense vegetation (different kinds of trees and shrubs), and the areas that not covered by trees are covered by thick layer of grass making the visibility of the earth surface very low outside the existed tracks, therefore, the survey team members decided to walk only on the tracks and some spots where there are safe access and no dense plants. As such, the team could not be able to conduct comprehensive survey, that ensure the necessity for Aboriginal cultural monitors during the works (see rec 2)

Contextual landscape information about the survey area was collected by Terra Rosa's consultants, which included information regarding accessibility, the geomorphology and terrain, presence of waterways, botanical community, and the presence of any existing infrastructure and/or ground disturbance. Any relevant cultural information shared by the Whadjuk Noongar representatives was also documented to provide cultural context for any sites identified.

Once each part of the survey area was completed, an initial debrief and survey summary was conducted to discuss the preliminary outcomes documented by the Terra Rosa consultants and invite any comments from the Whadjuk Noongar representatives.

At the end of the field trip, a debrief was conducted to discuss the results of the heritage survey, and to offer the Whadjuk Noongar Traditional Owners an opportunity to provide additional comments and recommendations for the management of cultural heritage values in the area. These discussions were undertaken with the City of Cockburn representative present, with the consent of the Traditional Owners.

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Site recording

Any Aboriginal places demonstrating purposive activity and are considered by the Whadjuk Noongar representatives to be of cultural significance, are recorded as an **Aboriginal heritage place**, with consideration of the criteria outlined in s5 and s39(2) of the *Aboriginal Heritage Act 1972*. These places are recorded to a **site identification standard**, which collected:

- a reliable spatial boundary to enable all heritage values to be effectively avoided by the proposed activity;
- a summary of key heritage values / features;
- a preliminary understanding of the heritage place's value from the Whadjuk Noongar representatives;
- photographs; and
- heritage management recommendations.

Any early European (historical) heritage places demonstrating purposive activity and are considered by the Terra Rosa consultants to be of cultural significance, are recorded as a preliminary heritage place, with consideration of the criteria outlined in s5 and s38 of the Heritage Act 2018 (WA). These places are recorded to a site identification standard, which collected:

- a reliable spatial boundary to enable all heritage values to be effectively avoided by the proposed activity;
- a summary of key heritage values / features;
- a preliminary understanding of the heritage place's value;
- photographs; and
- heritage management recommendations.

Coordinate capture



MGA Zone 50

All spatial data and coordinates provided in this report and Attachment 1 were obtained with a Garmin hand-held GPS unit and Apple iPhone using the ESRI Field Maps App in the GDA94 Coordinate Reference System (CRS). All accompanying spatial data package is projected in GDA94 / MGA Zone 50. Dependent on external conditions, these units have an optimal spatial accuracy of ± 5 m.

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REGIONAL BACKGROUND

The Whadjuk People are the traditional custodians of Country around the Perth metropolitan area and Fremantle, in the Southwest region of Western Australia. The Whadjuk ILUA area is bordered to the north by the Yued ILUA area, to the east by the Ballardong ILUA area, and to the south by the Gnaala Karla Booja ILUA area; all are clans within Noongar boodjar (Country) that covers the entire southwest of Western Australia.

Whadjuk Noongar Country sits within the Swan Coastal Plain bioregion that runs from Perth City to Cape Naturaliste in the south. The primary geographic feature of this bioregion is the Swan River and prior to European settlement, the coastal plain comprised a series of freshwater wetlands.

The traditional tribal boundary of Whadjuk Noongar Country is recognised by Whadjuk Noongar Traditional Owners when making decisions, providing advice, and recommendations regarding Aboriginal heritage, country, cultural practices, and ongoing roles and responsibilities for Traditional Owners.

Beeliar / Derbal Yerrigan (Swan River) and Dyarlgarro (Canning River) hold great significance to the Whadjuk Noongar Traditional Owners, as they are believed to have been created by the rainbow serpent or Waugal; a being in the form of a giant snake. Whadjuk believe that the Waugal created creeks, waterholes, lakes, and valleys on its journey to the ocean from Kaarta Gar-up (Mt Eliza), including the Swan River. The Waugal is responsible for creating the landscape and water sources. Permanent water sources continue to be of high cultural importance, indicating the health of Country, which in turn reflects the health of culture.

The significance of the Swan and Canning rivers is reflected in the ongoing visitation and association with the river system by Whadjuk Noongar Traditional Owners, whose physical and spiritual wellbeing is viewed as being directly linked to such water sources. Hughes-Hallett (2010: 13) notes that “the condition of the rivers is directly related to the well-being of the Waugal, and both are interconnected with the health and well-being of Noongar cultural identity. It is

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thought that if the Waugal leaves or is killed, then the rivers and other water features connected will dry up, subsequently the processes of rejuvenation, with which it is linked, will cease to occur".

The knowledge and use of various plants and animals by the Whadjuk Noongar Traditional Owners that occupy the region, namely the use of a number of resource collection areas along the Perth Riverfront such as the use of bull rushes and catching fish, is indicative of the inherent ongoing connection they have to country. The connection between Whadjuk Noongar Traditional Owners and their environment, the water, plants, and animals form part of the order of all forms of cultural and spiritual life, and reflects the importance of land and water to the health, safety, and survival of the people.

There are many important places in Whadjuk Noongar country where the Traditional Owners practice their traditional knowledge and ceremonies and identify and navigate boundaries with neighbouring language groups. The term 'Aboriginal site' is used to identify places of importance and significance to Aboriginal people, and is based on the tangible and / or intangible cultural and heritage values contained within those places. Based on the register of sites held by the Department of Planning, Lands and Heritage, identified sites on Whadjuk Noongar country include:

- Mythological sites associated with stories and songs;
- ceremonial sites, including Lore Grounds;
- burial and birthing places;
- domestic camping and hunting sites (characterised by artefact scatters, rockshelters containing cultural materials, grinding patches, modified trees, hunting hides, and storage places / walled niches); and
- historical sites associated with the post-European Colonisation period.

Resources were often accessed via known 'Bidi' (tracks), concentrated on connecting permanent water sources

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Prior land use

The survey area is located less than 6 km south of Fremantle (which was settled from the first days of establishing the Swan River Colony by the British in 1829), using that area remained little as it was considered far from Fremantle.

A road between Dandalup and Fremantle passed Lake Coogee was established in 1841, and in 1850s, the first homestead in the area was built for Manning family (about 800 m at Davilak estate north the survey area in Manning Park).

In 1870s the Pensioner guards who settled on the shore of Lake Coogee were the first settlers in the area but they didn't continue for long time as they found it very far from Fremantle, and in 1876 Koojee Road (the current Cockburn Road which is the western boundary of the survey area) was cleared to connect the area with Fremantle, then more settlers were granted lands in Cockburn district after the assisted immigration schemes in 1880s.

In 1898 Coogee Hotel was opened (about 200 m south of the southwest corner of the survey area), around the same time, and during the beginning of 1900s, new quarries and lime kilns started in the area, one of these quarries was for Manning family at Davilak estate in the late 1880s (about 100 m north the northwest corner of the survey area in Manning Park), this industry lasted until 1950s together with abattoirs industry which started since 1890s when the area became landing site for Kimberley cattle and sheep arriving by Robb jetty. The area became known as well for market gardeners, the settlers who cleared the lands and developed farms and orchards and sell their products.

In the late 1960s, some houses were built around the old Coogee Hotel, Coogee Rotary Lookout was opened in 1979 in the south part of the survey area, and community garden was opened in the southwest part of the survey area, most of the area remained semi-rural until the mid-1990s when most of the modern suburban houses were built, and in 2005 North Coogee suburb was approved (summaries from https://history.cockburn.wa.gov.au/).

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The survey area is now surrounded by houses and residential projects from east and south, while Cockburn Road in the west and Manning Park in the north, the area is still used currently as a park especially the most southern portion, but big areas of the southern and central parts were cleared from its original vegetation and currently remained open areas covered with weed and introduced plants while some areas have dense shrubs and different trees native and introduced, few walking tracks (or fire barriers) were opened as well, Ocean Road penetrates the survey area east-west and separate the southern part from the central part.

The northern part is separated from the central part by the train rail going east-west, this part is still as a reserved area located to the south of Manning Park, its vegetation cover is still in good situation, only few tracks for walking and for BMX bike in primitive status were established within it.

Many rubbish dumps are scattered in the survey area, and some spots were used for illegal messy camping, in addition to some spots used as pits for fireplaces.



Memorial of the Market Gardeners in the southern part of the survey area near the Rotary Lookout.

Kilns and lime industry in the area

The lime and kilns industry started in the Swan River Colony since the early days in Fremantle and Albany around 1830s, and since 1850s this industry flourished in Claremont, Pepper Grove and Cottesloe around Fremantle. At the beginning of twenty century, those quarries started to run out, and the area became popular residential suburbs, in addition to increased need of lime for building and farming after the gold rush period.

Coogee became an important area for lime industry because of its location on limestone ridge starts in Fremantle and continue along the coastline to the south, it still open and spacious area with very little residential development, and above that, the close Robb Jetty will help merchants to transport their products to all areas.

The first lime kiln in the area was built in 1880s by Manning family in their nearby Davilak Estate. The first big company started work in Coogee is Briggs & Rowland (which have a quarry in Cottesloe) and bought 150 acres on Rockingham Road in 1901 to start their business there, in 1905 they became the biggest company in the area with 24 kilns.

Other companies in the area are: Weedon & Sales, Tyler & Walker's Coogee Lime, W. Oaten's Davilak Lime, Joseph Tylee, Thomas Bros., W. Triplett & Sons' Newmarket Lime Kilns, and McLaughlin & Kiesey. In 1911 the Fremantle and Districts Lime Operatives Union was formed, and in 1913 Coogee was producing the majority of the metropolitan area's building and agricultural lime products.

Lime industry thrived in the area until 1920s when bigger and newer lime districts started in Wanneroo and Yanchep, the Coogee area kilns slowed down but still in work until 1950s when Cockburn Cement started work in 1955.

The kilns were built mostly by the limestone in different shapes the most common are the cylindrical shaft, the inverted cone or dome and the inverted bell kilns.

In Coogee, three kilns are registered on the state heritage list under number 10180:

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- Coogee Lime Kilns: two chamber kiln constructed of limestone, located near the western edge of Len McTaggart Park.

- Tylee Lime Kiln: it is located 250 metres to the south of Coogee Lime Kilns, the kiln is concealed within an area of densely planted trees on the eastern edge of the Cockburn Road reserve beside the western edge of Powell Reserve. It is a single chamber that has been filled with soil, only the west side of the kiln is visible, the west wall is about 3 m high and is built predominately of limestone with brick base.

- Munster Lime Kiln: it is located at the western end of the Munster Wastewater Pumping Station in Beeliar Drive. The structure consists of a single chamber measuring 5 m by 3 m wide and about 3 m high.

References

https://history.cockburn.wa.gov.au/Industry-and-Business/Industry/Lime-kilns-at-Coogee
https://inherit.dplh.wa.gov.au/public/inventory/details/3d35c1e3-1880-45f5-b7a8-ef61747baad9
https://history.cockburn.wa.gov.au/getattachment/3eb2fdca-b5fc-4f8e-bbdd-afbf4c2aff0d/Maeve-Harvey-Round-About-Coogee-Doc-Set-ID-11361333-pdf.aspx
Michael Pearson, The Lime Industry in Australia - An Overview, Australian Historical Archaeology, 8, 1990, pp. 28-35

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Above: *View to the north, landscape of the north part of the survey area*

Down: *Rock formation used as a fire pit*



Previous heritage investigations

Aboriginal heritage investigation

The land within the survey area has been subject to several previous heritage investigations. During the desktop review based on broader 1.2 km, nine survey reports were identified in relation to the project area, none of them was dedicated to the survey area itself, but all of them were related to broader area (mostly all the Metropolitan) and covered the survey area in general. In addition, two reports related to very close areas. Summaries of these reports are presented below.

Report ID: 103564

University of Western Australia, Department of anthropology, **1972**, An Archaeological Survey Project: The Perth Area, Western Australia.

This report covers the Perth Area. A sample area of 103 site locations in 67 site groups were investigated and compared with the historical ethnographic resources to study changing patterns of Aboriginal settlement and land use. None of the sites is located in the project area.

Report ID: 102595

Tilbrook, L., **1985**, Preliminary Draft Report on the Historical Significance of Aboriginal Sites within the Perth Metropolitan Area, for the centre for pre-history, University of Western Australia and Aboriginal Sites Department of Western Australia

This desktop ethnographic survey area comprises the Perth Metropolitan area. No sites in the project area.

Report ID: 102670

O'Connor, R., **1985**, Preliminary Report on the Survey of Aboriginal Areas of Significance in the Perth Metropolitan & Murray River Regions.

This report covers Perth Metropolitan & Murray River Regions. A roughly triangular region, with Yanchep National Park as the Northern point, Gidgegannup as the Eastern point and Pinjarra as the Southern point. The study includes assessment to all Aboriginal sites in the Metropolitan area and the land modification and developments to assist with effective planning strategies. No sites in the project area.

DRAFT

Report ID: 104505

Strawbridge, L. (Centre for Prehistory, UWA), **1987**, Revised 1988, Aboriginal Sites in the Perth Metropolitan Area: A Management Scheme, for Department of Aboriginal Sites.

This report covers Perth Metropolitan Area. This is an audit of all known sites on the DAS database as of June 1987 - January 1988 to assess their potential contribution to understanding of the pattern of Aboriginal occupation and usage of the region. This study is combined with ethnographic study by O. O'Connor issued in 1985.

Report ID: 102172

Rory O'Connor, R., Quartermain, G. and Bodney, C., **1989**, Report on an Investigation into Aboriginal Significance of Wetlands and Rivers in the Perth-Bunbury Region for Western Australian Water Resources Council.

This report covers survey area extends from the Moore River in the north to the Preston River in the south including Swan, Murray and Collie and the sites related. No sites in the project area.

Report ID: 021817

Machin, Barrie (Tamora Pty), **1994**, Ballaruk (traditional owners) Aboriginal site recording project, prepared for National Estates Program, Heritage Council of Western Australia.

This report is related to the country of Ballaruk people who represent Whadjuk Aboriginal Owners, it is Metropolitan Perth area from Yanchep north to Rockingham south and inland about 80 km. Only six sites were identified around Gingin, Ellen Brook and Midland. None of those sites are in or close to the survey area in Cockburn. This report includes good cultural and historical background of the noongar people.

Report ID: 021818

Machin, Barrie, **1995**, Ballaruk (traditional owners of Whadjuk territorial boundaries the lands of the Ballaruk Peoples) Aboriginal site recording project: additional material, prepared for National Estates Program, Heritage Council of Western Australia.

This report is related to the country of Ballaruk people who represent Whadjuk Aboriginal Owners, it is Metropolitan Perth area from Yanchep north to Rockingham south and inland about 80 km. 23 sites were identified in the area six of them are new. None of those sites are in or close to the project area in Cockburn.

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Report ID: 102078

McDonald, Hales and Associates, **1997**, Aboriginal Heritage Study of the Jervoise Bay infrastructure planning precinct.

This report covers Jervoise Bay Infrastructure Planning Precinct. The proposed development area consists of a section of the proposed Cockburn Road realignment and adjacent locations (land and sea) nominated for industrial development.No sites in the project area.

Report ID: 105324

McDonald, E., **1997**, Report on Aboriginal Heritage research undertaken in respect of the proposed Port Catherine development, Coogee.

This report covers Proposed Port Catherine Development, Coogee. The area is located on the land adjacent to the Owen Anchorage, Cockburn. It measures approximately 1.5 km north-south, and 400 (700) m east-west maximum. No sites in the project area.

Report ID: 105508

Collard and Collard Consultants, **1998**, Aboriginal contact consultation report on Port Catherine Development proposal Coogee.

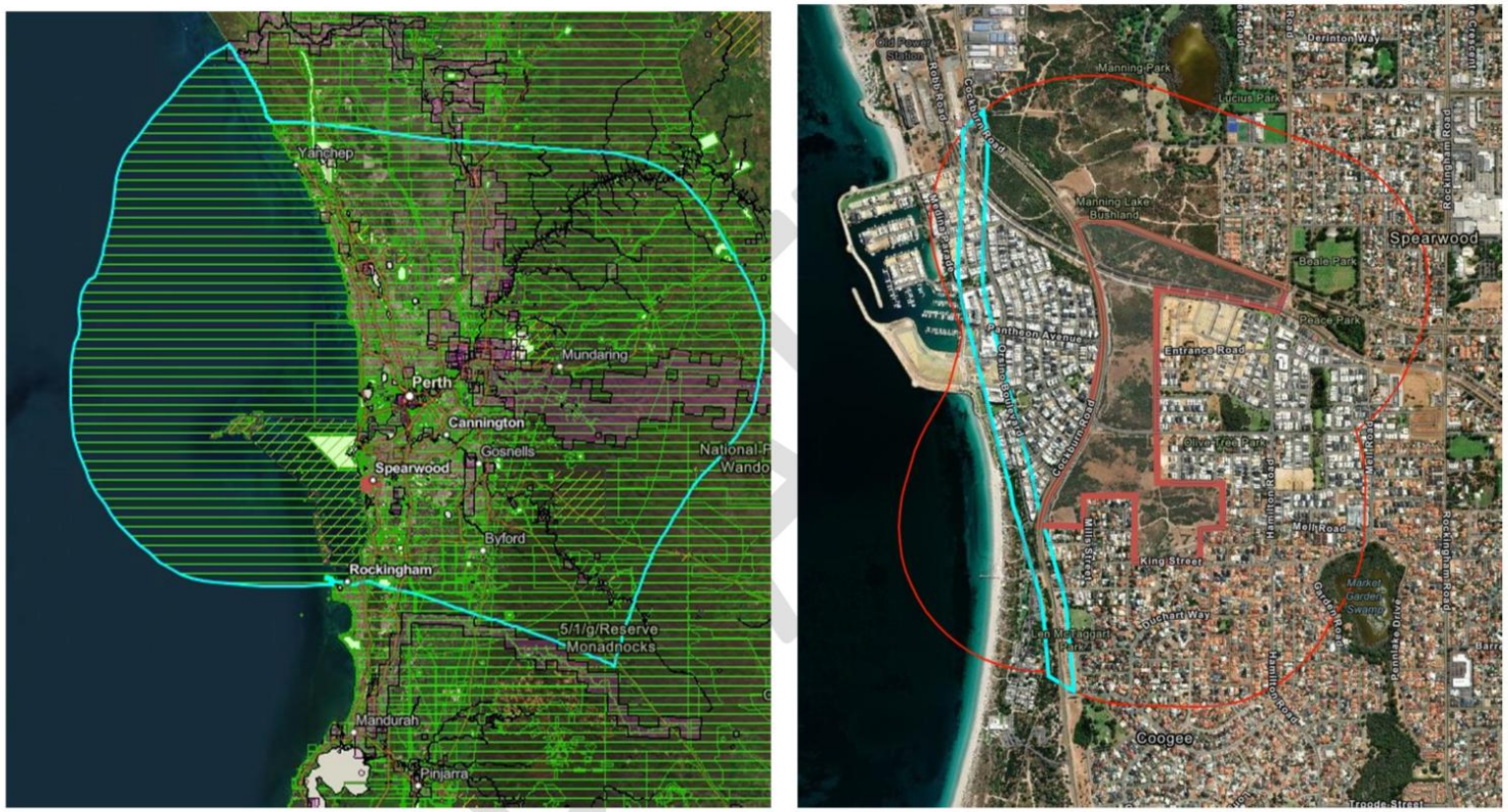
This report covers Port Catherine Development, proposal Coogee.

Report ID: 020961

McDonald, E., **2004**, Desktop survey of the Aboriginal Heritage values of the South Fremantle Power Station and Switch Yard sites.

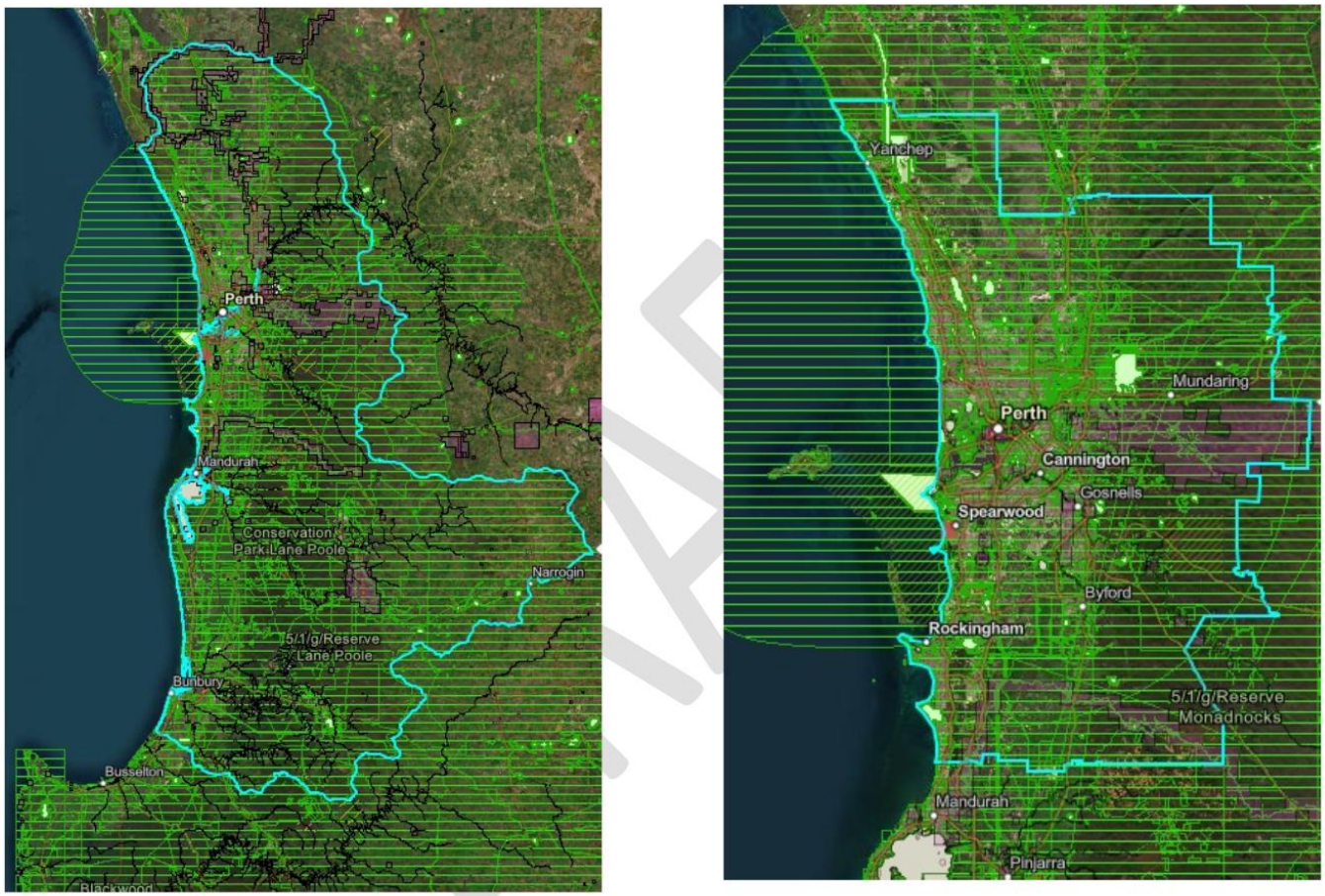
This report covers South Fremantle Power Station and Switch Yard Sites, located on the coast in the City of Cockburn and comprise areas of 6.2 ha and 4 ha respectively.

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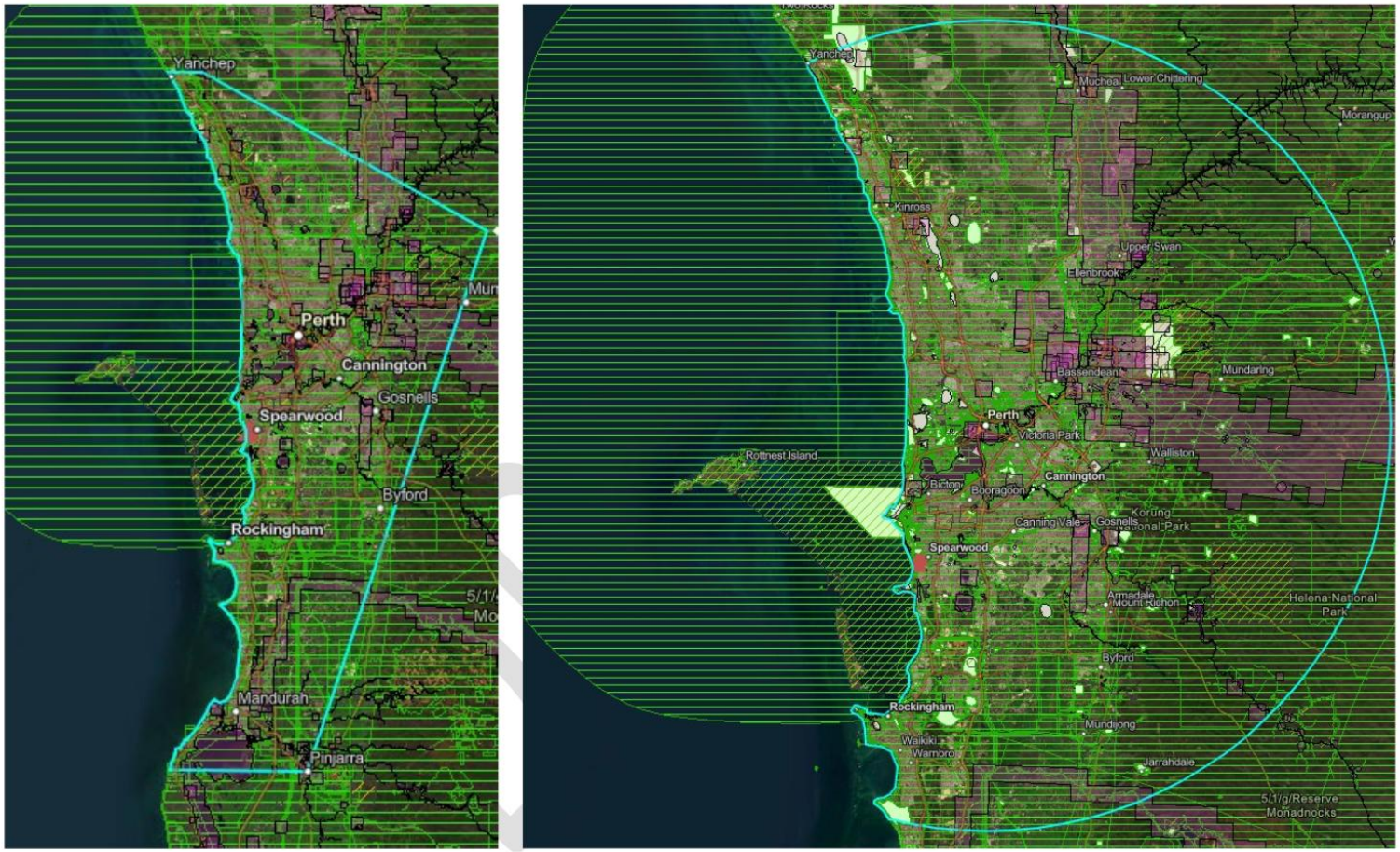
Left: 21817 & 21818 report survey area (Ballaruk sites), 1994 & 1995

Right: 102078 report survey area (Jervoise Bay), 1997



Left: 102172 report survey area (wetland & rivers in Perth Bunbury), 1989

Right: 102595 & 104505 report survey area (Perth Metropolitan), 1985 & 1988



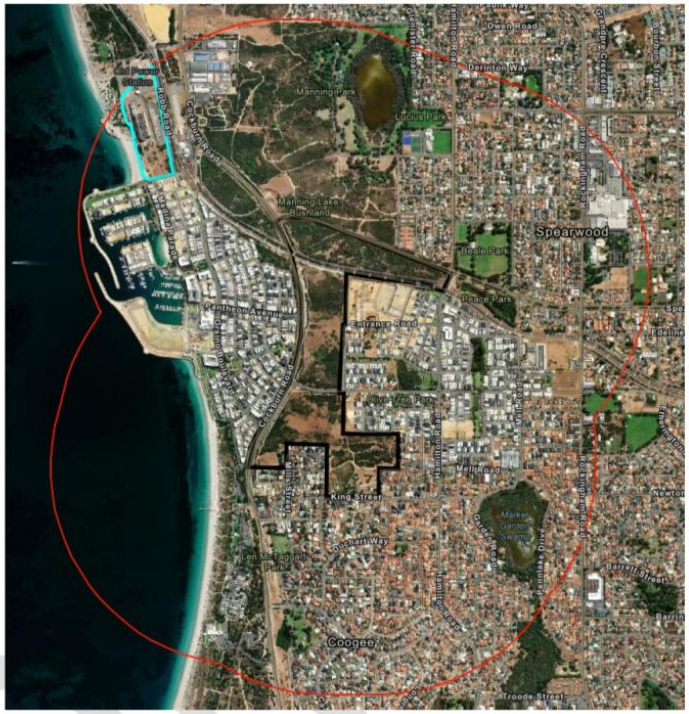
Left: 102670 report survey area (Perth Metropolitan & Murray River), 1985

Right: 103564 report survey area (Perth area), 1972



Left: 105324 report survey area (Port Catherine), 1997

Right: 105508 report survey area (Port Catherine), 1998



020961 report survey area (South Fremantle Power Station), 2004

Heritage sites

Twenty-one heritage places exist in broader 600 m search of the area surrounding the project area, the most important and closest sites to the project area, which should be taken in consideration regarding the final development of the area are:

- Coogee hotel and post office and Coogee Beach Jetty in the southwest corner of the project area.
- Two Soccer Clubs in the northeast corner of the project area.
- Manning Estate and Manning Park to the north of the project area.

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24500 – Coogee Post Office (fmr)

Coogee Post Office (fmr) is representative of places which served the rural areas near Perth but which have gradually been engulfed by urban development. Coogee Post Office (fmr) has aesthetic value as a simple limestone building, with some landmark value on Cockburn Road.

Now used as a residence, this old stone building and the Coogee Hotel are the earliest built in the area. The Post Office was built by Jock McKinnon around 1928. McKinnon was the brother-in-law of Walter Powell, the builder of the adjoining Coogee Hotel.

There was a courtyard between the two buildings for turning horses and carts. This was not the first Post Office in the area. Originally the post was sorted and collected from a shop about 1 km to the south of the Post Office building.



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24481 & 3648 – Coogee Hotel (fmr)



Coogee Hotel (fmr) is a rare example of a single-storey purpose built 'honeymoon' hotel, surviving in close to the city locations and is a surviving component of a precinct which was a destination for visitors and holiday makers for the first two decades of the 20th century

Coogee Hotel (fmr) has significance as an Anglican children's holiday camp from 1930 until the middle of World War II, after which it became a permanent children's home from the end of World War II until 1967.

Coogee Hotel (fmr) is a landmark on the coastal road between Fremantle and Rockingham.

Coogee Hotel (fmr), one of the first hotels in the area, was built by Walter Powell in 1898. Powell was a trustee for the Coogee Agricultural Society and a member of the Fremantle District Roads Board from 1887-1900. Powell is said to have modelled the hotel on places he had seen along the French Riviera.

It became a popular 'watering hole' visited by people after the long trip to Fremantle Markets. It was later patronised by customers who came by train. The hotel was the first stop from Fremantle for the stage coach on its way to Mandurah. The location of the hotel and its garden setting made it attractive to newlyweds and it became known as 'the Honeymoon Hotel of WA'. It was well attended on Race Days as the Race Course was built next door. Powell encouraged attendance by offering substantial purses, the most prestigious being the Coogee Cup.

When de-licensed (1930s) it remained vacant until 1942 when occupied by the Swan Anglican Children's Home. It was again vacated when the home closed in 1967. In the 1970s it was home to the Coogee Progress Association.

Coogee Hotel (fmr) has been recently renovated.

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10164 – Coogee Beach Jetty

Coogee Beach Jetty is associated with Coogee Beach, a popular tourist destination since the 1930s.

Coogee Beach Jetty has been used for recreational purposes since its construction in the 1960s.

In the 1930s Coogee Beach was a popular destination for picnics. People came from as far as Midland by train which deposited them close to the beach and jetty. The visitors enjoyed the fare from the Coogee Hotel and Poole's Tearooms.

Shacks and sheds were built during the 1930s, eventually expanding along the full length of the beach. The Government, stepping in to prevent exploitation of the coast, declared the area an 'A' Class Reserve. All the shacks and sheds were subsequently removed. The jetty remains for recreation purposes.



A Coogee Beach Management Plan was prepared in 1995 and facilities in the area were upgraded. A report prepared for the City of Cockburn in July 1997 identified elements of the jetty needing structural attention. The jetty has subsequently undergone significant alteration.

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24508 – Two Soccer Clubs

Cockburn City Soccer Club is thought to be oldest sporting association in the City of Cockburn.

Soccer in Cockburn is strongly identified with New Australian communities.

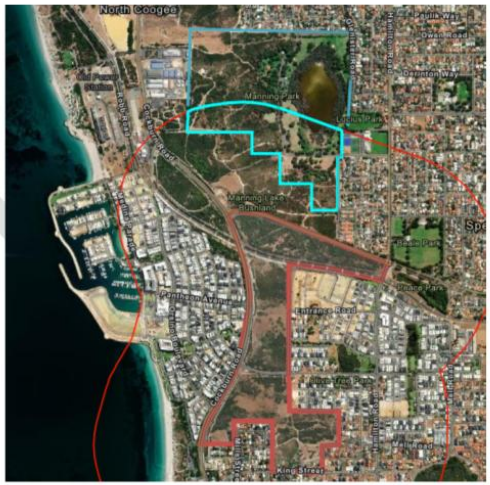
Both Spearwood Dalmatinac and Cockburn City have strong social significance for former players, administrators, support workers, and supporters of these teams.

Cockburn City Soccer Club's origin goes back to 1929 when they were known as Spearwood Rovers. This club split into two clubs in the early 1960s to become 'Spearwood Dalmatinacs' and 'Cockburn United'. The two clubs enjoyed success in the period after, with facilities close to each other at Dalmatinac Park and Beale Park, both of which are still used today for Junior and Senior teams.

The clubs reunited in 1998 under the negotiations of Angelko Petkovich and John Mijacika and became the Cockburn City Soccer Club of today.



533 – Manning Estate, Hamilton Hill & 10184 – Manning Park



The Azelia Ley Homestead is part of an uncommon and intact example of a precinct of farm buildings in the Metropolitan Region.

The homestead has a long association with the Manning family, and with Azelia Ley (née Manning) in particular, for whom the homestead was built.

The well-proportioned home is example of the Victorian Regency style and is representative of early settlement and development in the Cockburn district. The homestead has aesthetic value as part of a precinct of farm buildings of uniform construction and style.

Manning Park is named after a prominent Cockburn resident, Lucius Manning. The Manning family developed a large estate with two homes around a lake formerly known as Davilak (and now known as Manning). The Aboriginal name for the water was Dgilgie's Lake which was changed to Devil's Lake by Manning and subsequently pronounced Davilak by local Aborigines.

There is archaeological evidence of the first Manning homestead constructed on the site (c.1850s), which is located to the north of the lake.

Davilak House and surrounding complex of outbuildings was built by convict labour around 1866. The building and its outbuildings were abandoned after 1946 and burnt down in the late 1950s.

The house constructed by Manning for his daughter, Azelia Ley, remains as a museum for the Cockburn district.

Vegetation around Manning Lake consists of Swamp Paperbark (*Melaleuca rhaphiophylla*) and some large Tuart (*Eucalyptus gomphocephala*) trees, which are now rare in Cockburn. The lake is utilised for recreation and leisure pursuits, with the banks cleared and some landscaping around the trees. Children's play equipment attracts families to the setting.

The absence of any archaeological or ethnographic investigations means that any heritage values that may exist within the project area are unknown and unquantified. It is **not** an indication that no heritage values exist; only that ground-truthing is required to definitively identify whether any heritage values exist within the project footprint.

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Known Aboriginal heritage values

Based on the research undertaken on the DPLH's ACHIS, InHerit and Terra Rosa's internal spatial database, and any additional information provided to Terra Rosa by Whadjuk Noongar and City of Cockburn before the start of the survey, no sites are already known to exist within the survey footprint.

Although the survey area doesn't include any known Aboriginal sites, but due to its location among many ethnographic sites in the broad landscape, it needs to be covered by ethnographic survey.

The surrounded sites within 7 km circle are:

18332 – Clontarf Hill (Artefacts / Scatter; Camp; Ritual / Ceremonial; Creation / Dreaming Narrative; Historical; Hunting Place; Massacre).

3709 – North Lake and Bibra Lake (Camp; Creation / Dreaming Narrative; Hunting Place)

18937 – Yangebup Lake (Ritual / Ceremonial; Creation / Dreaming Narrative; Historical; Plant Resource; Water Source).

18939 – Thomsons Lake (Ritual / Ceremonial; Creation / Dreaming Narrative; Historical; Plant Resource; Water Source).

15840 – Cockburn Road (Creation / Dreaming Narrative).

20866 – Lake Coogee (Creation / Dreaming Narrative).

15841 – Woodman Point (Creation / Dreaming Narrative).



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Heritage Due Diligence Assessment

In 2024, the City of Cockburn requested Heritage Due Diligence Assessment from Archae-aus Pty Ltd to identify any risk to heritage values

within the survey area. As a result, Archae-aus has assessed that there is a low, moderate and high risk of impacting Aboriginal and Historical heritage within the Activity Area.

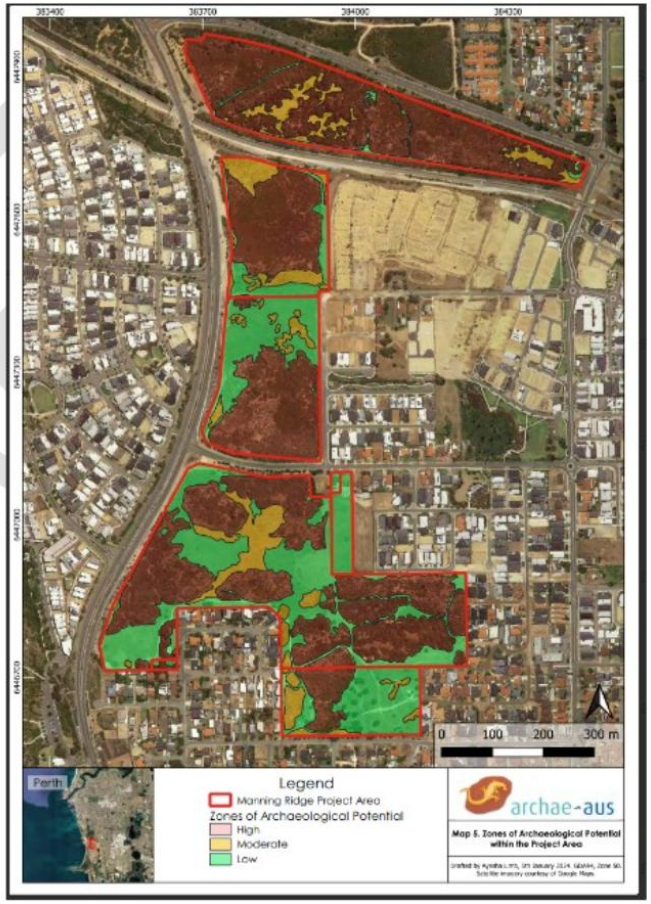
► High Risk: Areas where there is dense remnant vegetation.

► Moderate Risk: The areas outside of high-risk areas in which vegetation is less dense but present

and the land is not as significantly impacted or modified.

► Low Risk: Sections of the Project Area, including graded tracks, cleared land, and modern buildings.

(Archae-aus, 2024, *Report of an Aboriginal and Historical Heritage Due Diligence Assessment for the Proposed Manning Ridge Project Area, Cockburn WA*)



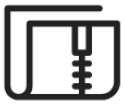
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SURVEY OUTCOMES

The archaeological and ethnographic site identification Aboriginal and early European heritage survey of the City of Cockburn proposed Coogee Golf Course project is complete .

The results of the desktop and field survey for the survey area are presented in the following table and are illustrated in the following maps. These complete results are further discussed by survey area below and the complete results of the desktop assessment are provided in Appendix D of this report.

Please note that the survey focused on the activity area footprint, which means that heritage sites and values may also exist nearby and/or sub-surface. As such, City of Cockburn should take all care to avoid causing ground disturbance outside the areas that have been surveyed, as unauthorised harm to Aboriginal heritage values, whether known or not, may result in substantial penalties under s17 and s57 of the Act.



Attachment 1:

COC2501 Spatial Data

Data

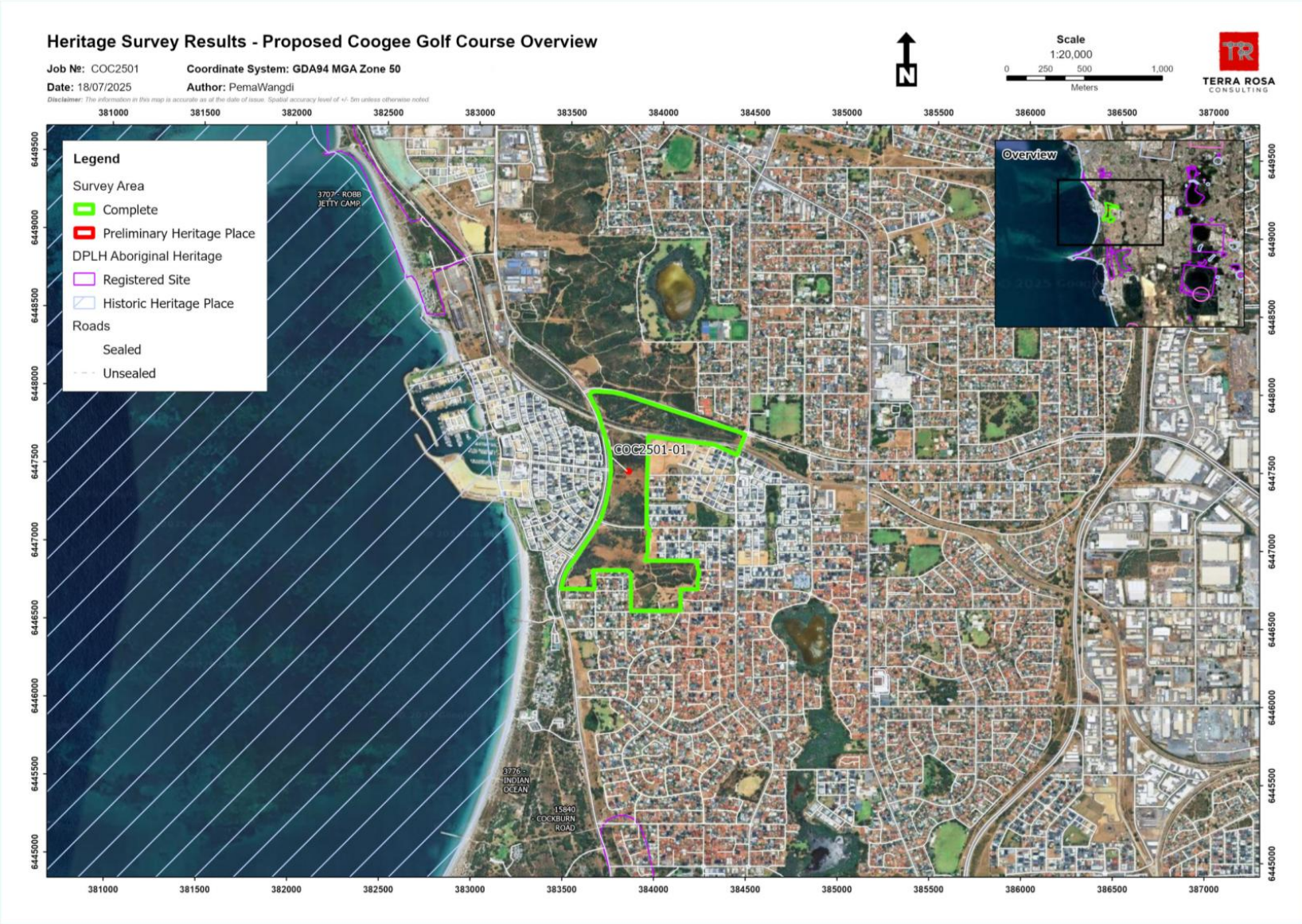
The survey results presented below are also provided in the spatial data pack (Attachment 1) that accompanies this report.

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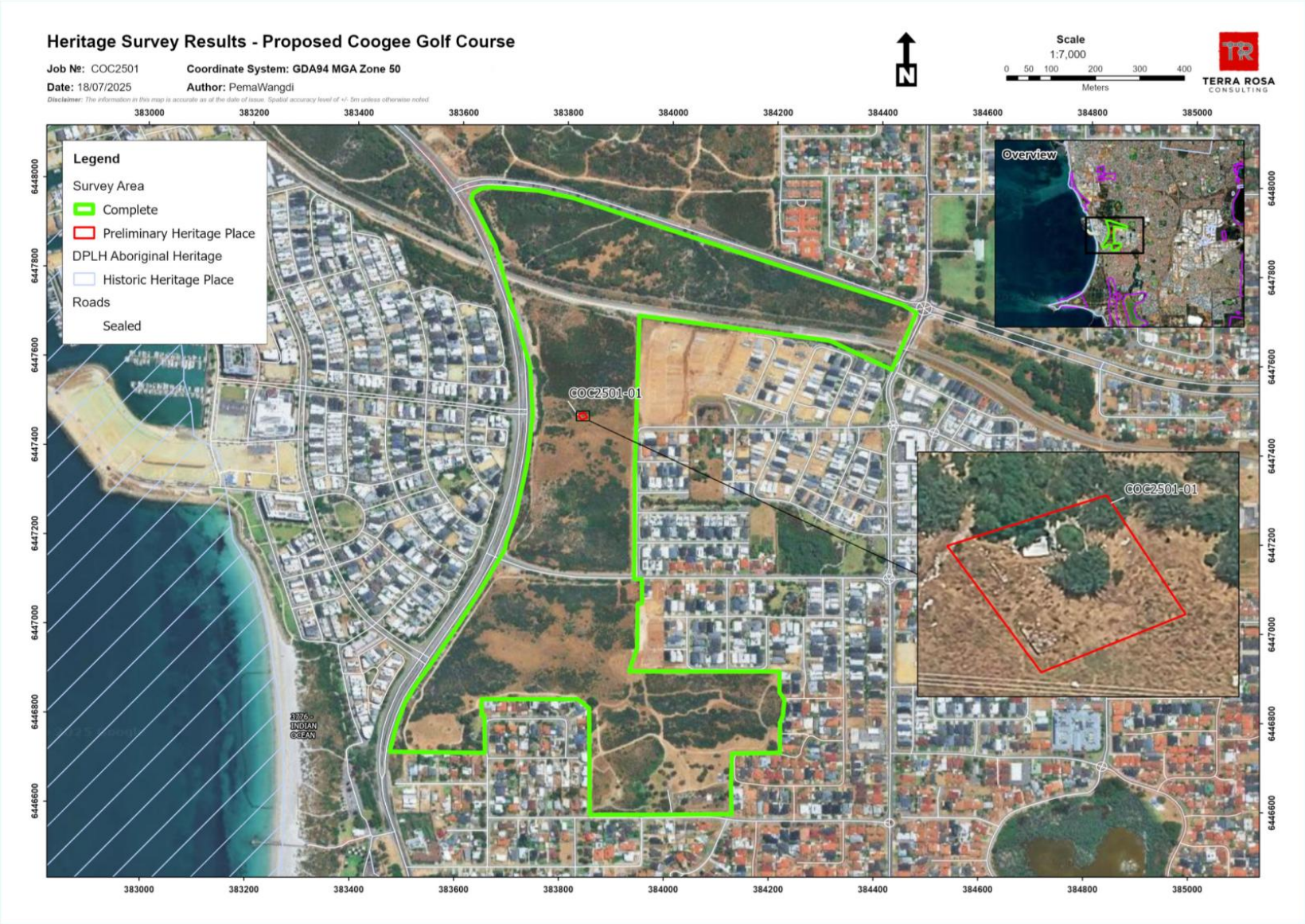
Summary of the desktop and heritage survey results

Survey area	Survey standard	Survey status	DPLH registered Aboriginal sites	DPLH Aboriginal heritage places	InHerit Early European Heritage sites	Other known heritage places	Newly recorded heritage places	Avoidance areas	Isolated artefacts	Notes
Proposed Golf Course	Archaeological and ethnographic site identification	Complete	0	0	0	0	1	0	0	the new identified heritage place is early European preliminary site

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Heritage Survey Results - Proposed Coogee Golf Course Overview
Job №: COC2501
Coordinate System: GDA94 MGA Zone 50
Date: 18/07/2025
Author: PemaWangdi
Disclaimer: The information in this map is accurate as at the date of issue. Spatial accuracy level of +/- 5m unless otherwise noted.
Scale
1:20,000
0 250 500 1,000
Meters
TERRA ROSA CONSULTING
N
Legend
Survey Area
Complete
Preliminary Heritage Place
DPLH Aboriginal Heritage
Registered Site
Historic Heritage Place
Roads
Sealed
Unsealed
Overview
COC2501-01
3707 - ROBB JETTY CAMP
3776 - INDIAN OCEAN
15840 COCKBURN ROAD
381000 381500 382000 382500 383000 383500 384000 384500 385000 385500 386000 386500 387000
6449500 6449000 6448500 6448000 6447500 6447000 6446500 6446000 6445500 6445000

41


Heritage Survey Results - Proposed Coogee Golf Course
Job №: COC2501
Coordinate System: GDA94 MGA Zone 50
Date: 18/07/2025
Author: PemaWangdi
Disclaimer: The information in this map is accurate as at the date of issue. Spatial accuracy level of +/- 5m unless otherwise noted.
Scale
1:7,000
0 50 100 200 300 400
Meters
TERRA ROSA CONSULTING
N
Legend
Survey Area
Complete
Preliminary Heritage Place
DPLH Aboriginal Heritage
Historic Heritage Place
Roads
Sealed
Overview
COC2501-01
COC2501-01
INDIAN OCEAN
383000 383200 383400 383600 383800 384000 384200 384400 384600 384800 385000
6448000 6447800 6447600 6447400 6447200 6447000 6446800 6446600

Site Identification

Complete

DPLH Aboriginal heritage: 0

Known heritage places: 0

Newly recorded heritage places: 1

Avoidance areas: 1

Isolated artefacts: 1

Proposed Golf Course results

The proposed golf course survey area was archaeologically and ethnographically assessed to site identification standard between 15 and 16 July 2025 by the Whadjuk Noongar Traditional Owners and Terra Rosa consultants.

Only one preliminary heritage place (historical / early European) was newly identified (COC2501-01), it is remains of stone structure its function is still not identified.

The full description of this preliminary site is in Appendix E.

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Landscape context

The proposed golf course project is located in Manning Ridge area in City of Cockburn, within the Swan Coastal Plain bioregion (SWA) within Perth subregion (SWA02) according to the Interim Biogeographical Regionalisation of Australia (IBRA), this area extends from Jurien Bay in the north to Busselton in the south on the coast and inland about 20-40 km, it is low-lying coastal plain rises in the east, mainly covered by woodlands, colluvial and aeolian sands, alluvial river flats, coastal limestone, marine dunes of various ages and complex series of seasonal wetlands. The dominated vegetation in general is Banksia spp. or Tuart (*Eucalyptus gomphocephala*) trees on sandy soils, Swamp She-oak (*Casuarina obesa*) on outwash plains, and Paperbark (*Melaleuca rhaphiophylla*) in swampy areas. Heath and/or Tuart woodlands on limestone.

According to the Department of Primary Industries and Regional Development (DPIRD), the area is located within the Spearwood Dune landform which extends behind the coast from Fremantle to Mandurah, characterised by river flats, series of wetlands and lithified calcareous sand and limestone dunes and natural limestone features, the vegetation in general is heath or woodlands in limestone areas, Banksia and Jarrah woodlands in marine dunes, and Marri in colluvial and alluvial soils. The climate is Mediterranean with about 800 mm of rain per year.



Some rock formations in the survey area

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The project area land is consisted of several kinds of structural classes, open woodland with some trees in different heights and kinds, and open tree and shrub mallee, closed to open scrub, heath, grassland, herbland and sedgeland covered with different types and sizes of plants and weeds. There are parklands in the southeastern and southwestern parts with playgrounds, lookout and community garden.

The original vegetation cover in general looks like degraded to completely degraded and not intact, big areas were disturbed or cleared, other areas were invaded by very aggressive weeds and not native plants. That is in the south and central areas, in the most north area, the situation is little bit better.

The current vegetation now is mixed of different trees, shrubs and small plants, native and introduced, such as different types of Eucalyptus, Banksia, Acacia, grass tree (*Xanthorrhoea preissii*), peppermint (*Agonis flexuosa*), Rock Sheoak (*Agonis flexuosa*) and Sheoak (*Allocasuarina fraseriana*), Tuart (*Eucalyptus gomphocephala*), Marri (*Corymbia calophylla*), Coastal Honeymyrtle (*Melaleuca systena*), Rottnest Island Pine (*Callitris preissii*), Aleppo Pine (*Pinus halepensis*), some Olive trees (Olea europaea) in the north area, Century Plant (*Agave americana*), Castor Oil (*Ricinus communis*), Fennel (*Foeniculum vulgare*), Coastal Daisybush (or Wild Rosemary) (*Olearia axillaris*).

Huge amounts of weed are everywhere, the most common weed is shrub tree-like Victorian or Coast Teatree (*Gaudium laevigatum*), Hare's Tail Grass (*Lagurus ovatus*), Perennial Veldt Grass (*Ehrharta calycina*) and Couch (*Cynodon dactylon*).



Landscape of the survey area

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The southern part of the survey area is dominated in the western side by a hill reaches 42 m (Australian Height Datum (AHD)) height where there is a lookout, this part slopes to the east and north toward the central part, the south west corner is the lowest part in the survey area, about 8 m AHD, increases toward north to reach to the central part which is undulating between 18 – 36 m AHD, the highest part is in the middle.

The northern part increases from 10 to about 28 m AHD from east to west, the general sloping of this part is from north to south, gentle in the eastern part and stronger in the western part.

The earth surface is covered with fine, medium and coarse limestone grains and sand yellowish and brownish mixed with some quartz and shell debris. The visibility is very low as the earth covered completely with plants, just some areas are still open in addition to the tracks.

No water resources in the survey area, only few very small wet areas were noticed in the northern part may indicate to small drainage or they are remains of previous rain.



The dense weed cover most of the open areas



The dense vegetation in the survey area



Landscape of the survey area



Rubbish, but became beautiful part of the landscape

HERITAGE MANAGEMENT RECOMMENDATIONS

Based on the survey outcomes, Terra Rosa and the Whadjuk Noongar Traditional Owners have developed the following recommendations to assist City of Cockburn with the management of the identified cultural heritage values in the area.

1

City of Cockburn is advised to avoid any impact or disturbance to the preliminary site identified COC2501-01. City of Cockburn is also advised to work collaboratively with Terra Rosa to prepare an Archaeological Management Plan to clean, record and protect the site.

During the survey, the team found remains of a historical site in the central part of the southern survey area (see the results map), the identity of this site is not clear as it is covered with dense vegetation and trees in addition to some rubbish and difficulties for access. City of Cockburn is advised to protect this site firstly, and then to prepare in cooperation with Terra Rosa an Archaeological Management Plan (AMP) to assess the heritage remains and their significance and to ensure that the site is protected and conserved. The AMP should identify the management strategies to:

- Clean the site and its surrounding in proper way and within the boundary illustrated in the results map; and to provide suitable and safe access to assess and document the remains;
- Conduct some excavation works to revel and expose the invisible parts of the buildings;
- Conduct some simple conservation works to stabilise the unstable parts of the building;
- Improve an interpretation signage demonstrates the site and reflects its significance in the area;
- Ensure that the site will be rehabilitated in appropriate way within the new development of the area; and
- Ensure all the works should be conducted under supervision of an expert archaeologist, and according to all statutory requirements.

2

City of Cockburn is advised to engage three Whadjuk Noongar Traditional Owners as cultural monitors to be present for all initial ground disturbance works within the Proposed Coogee Golf Course survey area.

During the survey, the team noticed that a large portion of the survey area is covered with dense vegetation (different kinds of trees and shrubs), and the areas

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that not covered by trees are covered by thick layer of grass making the visibility of the earth surface very low outside the existed tracks, consequently, the team could not be able to conduct comprehensive survey, and there is a high likelihood for the presence of subsurface cultural material that may be disturbed during the proposed works. As a result, the Traditional Owners request that three Whadjuk Noongar cultural monitors be engaged to oversee all initial ground disturbance activities within the project area. This would ensure that any cultural material unearthed is identified and appropriately managed.

City of Cockburn is advised to liaise directly with South West Aboriginal Land and Sea Council as to the selection and availability of appropriate cultural monitors for this role.

City of Cockburn is advised to preserve the limestone outcrops and the rock formations visible within the survey area.

3

During the survey, the team noticed that there are a lot of limestone outcrops and rock formations create significant natural forms, and some of them include small rockholes still contain water. The Whadjuk Noongar Traditional Owners present highlighted the importance of keeping those outcrops and formations as natural features give additional values to the area regardless of the future rehabilitation.

City of Cockburn is advised to maintain the northern portion of the survey area as a preserve area, while in the central and southern portions, they are advised to avoid removing the mature trees and to protect the native vegetation. At the same time, City of Cockburn is advised to remove the weeds and other invasive species.

4

During the survey, the team noticed that there are many mature trees including Eucalyptus spp., Sheoak (Allocasuarina fraseriana), Pinus spp., and Coastal Tea Tree (Gaudium laevigatum), in addition to various large native shrubs across the survey area. At the same time, there are a huge number of weeds and other types of plants and small shrubs not related to the area.

The Whadjuk Noongar Traditional Owners present highlighted the importance of keeping the mature trees and native shrubs and plants and advise the City of Cockburn to avoid removing the matures trees in the central and southern portions of the survey area and to maintain the existing nature preserve in the northern portion. City of Cockburn are also advised to remove all weeds and invasive plants in the survey area.

5 **City of Cockburn is advised to collaboratively develop a Cultural Heritage Management Plan (CHMP) with the Whadjuk Noongar Traditional Owners.**

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Although the current survey (see Recommendation 2) showed the area doesn't include Aboriginal heritage places, but it has a great significance in terms of intangible heritage connected to the adjacent areas and altogether represents a unity that should be protected.

Developing a CHMP will protect the integrity of the cultural landscape, emphasise the mutual relation between this area and the surrounding areas, and will focus on the details of the place itself by discussing the signage, viewing platform with information on the ridgelines, recognising this place's significance within the surrounding area, pointing out the nearby sites and general knowledge of the area and significance, in addition to the considerations raised by the Whadjuk Noongar Traditional Owners related to the future rehabilitation.

6

City of Cockburn is advised to clean the rubbish up from the survey area.

During the survey, the survey team noticed that there are many spots within the area used to dump different kinds of rubbish including old furniture, auto parts, and building materials. Small pieces of asbestos were also noted, in addition to remains of modern camps.

City of Cockburn is advised to remove all the rubbish and to ensure no further dumping in the area regardless of the future rehabilitation.

7

City of Cockburn is advised to pass on information once plans are drafted or decisions made about the future of the area.

The Whadjuk Noongar Traditional Owners expressed their wish to be informed about the future rehabilitation of the area when the council makes the decision or when the plans are drafted.

Key Heritage and Management Considerations

The Whadjuk Noongar Traditional Owners recommend that the City of Cockburn facilitates the development of a parkland and walking trails rather than a golf course.

The Traditional Owners highlighted the importance of this area within the broader cultural landscape. Although no Aboriginal heritage places were identified, the ridgelines were described as being of cultural importance as vantage points and landscape features that connect nearby places such as Manning Park to the north and the Indian ocean to the west. It was recommended during the survey that these ridgelines be protected and utilised as lookouts where people could visit and learn about the broader cultural landscape. The Whadjuk representatives advised that signage should be installed on these ridgelines and a walking trail be established along the ridge and connecting to Manning Park to create a "coastal walk" which imitates the likely pathway of Whadjuk ancestors across Country. Further

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consultation regarding the location and content of these signs should be conducted with Whadjuk Noongar Traditional Owners. It was suggested that the developments here maintain a similar feel to Manning Park to create continuity between these places.

Furthermore, general recommendations were discussed about the establishment of recreational facilities that would encourage the public use and appreciation of this place while maintaining its natural, aesthetic, environmental, and cultural value. Suggestions included playgrounds, barbecues, seating and toilets.

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APPENDICES

Appendix A – Project contacts

Appendix B – Acronyms and definitions

Appendix C – Heritage notice / SOW

Appendix D – Desktop research

Appendix E – Site description

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Appendix A – Project contacts

The contact details of the heritage project stakeholders are provided below. Terra Rosa thanks everyone involved with the heritage survey and its organisation.

Terra Rosa Consulting

Address	20 Stack St, Walyalup / Fremantle, WA 6160
Email	projects@trco.com.au
Report author	Ibrahim Omeri
Editor	Daniel Monks
Executive sign-off	Scott Chisholm

Whadjuk Noongar Traditional Owners

Contact	South West Aboriginal Land and Sea Council
Address	reception@noongar.org.au

City of Cockburn

Contact	Natasha Vale
Address	nvale@cockburn.wa.gov.au

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Appendix B – Acronyms and definitions

The following terms and acronyms are used in this report. Definitions are provided below for reference.

Term / abbreviation	Definition
Aboriginal heritage	Refers to Aboriginal sites defined under s5 of the Act, and Aboriginal heritage places.
ACHC	**Aboriginal Cultural Heritage Committee**
ACHIS	Aboriginal Cultural Heritage Inquiry System
ATSIHPA	**Aboriginal and Torres Strait Islander Heritage Protection Act 1984**
CHMP	Cultural heritage management plan
CRS	**Coordinate Reference System**
Cultural landscape	A group of areas interconnected through tangible and/or intangible elements of Aboriginal cultural heritage.
DPLH	**Department of Planning, Lands and Heritage**
GIS	Geographic information system
GPS	**Global positioning system**
Heritage object	An object that is a tangible element of Aboriginal cultural heritage, to which the Act applies under section 6.
Aboriginal site	**As defined by s5 of the Act. An area in which tangible elements of Aboriginal cultural heritage are present and that are of importance and significance to Aboriginal Peoples, as defined under s39 of the Act.** **Note: heritage site may be used interchangeably with Aboriginal site throughout this report.**
Historic Aboriginal heritage place	A heritage place that has been submitted to the DPLH and evaluated by the ACHC to not meet the criteria for inclusion on the ACHIS (i.e., not a registered Aboriginal site) (status H – historic / not a site).
ICIP	**Indigenous Cultural and Intellectual Property**
Isolated artefacts	Cultural material with insufficient density or context to constitute an Aboriginal site or heritage place under s5 the Act, but is recorded at the request of the Traditional Owners.
Lodged Aboriginal heritage place	**A heritage place that has been reported to the DPLH but is pending assessment by the ACHC (status L – lodged).**
MGA	Map grid of Australia
NNTT	**National Native Title Tribunal**
Register	The Register of Places and Objects as defined in section 38 of the Act.
Registered Aboriginal site	**A heritage place which has been determined as meeting criteria under section 5 of the *Aboriginal Heritage Act 1972 (WA),* and has been registered by the Registrar of Aboriginal Sites (DPLH status R - registered).**
SOW	Scope of works
Terra Rosa	**Terra Rosa Consulting**
Traditional Owners	Whadjuk Noongar

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Appendix C – Heritage notice / SOW

PLEASE READ AND RETAIN THIS DOCUMENT

RFQ NV02-2025
Consultancy Services -
Proposed Coogee Golf Course
Aboriginal and Early European Heritage Survey

SCOPE OF WORKS

8

PLEASE READ AND RETAIN THIS DOCUMENT

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Specification / Scope of Works – Request for Quotation

1. INTRODUCTION

The City of Cockburn (The Principal) is inviting submissions of quotation for a detailed Aboriginal and early European Heritage Survey of the proposed Coogee Golf Course site, inclusive of Rotary Park, Mills Street Playground and adjacent bushland to the north which is bounded by Spearwood Avenue, Cockburn Road and the railway.

The project area is approximately 48 hectares and is the extent of land as depicted below in figure 1. The surrounding road network is also shown for ease of reference.

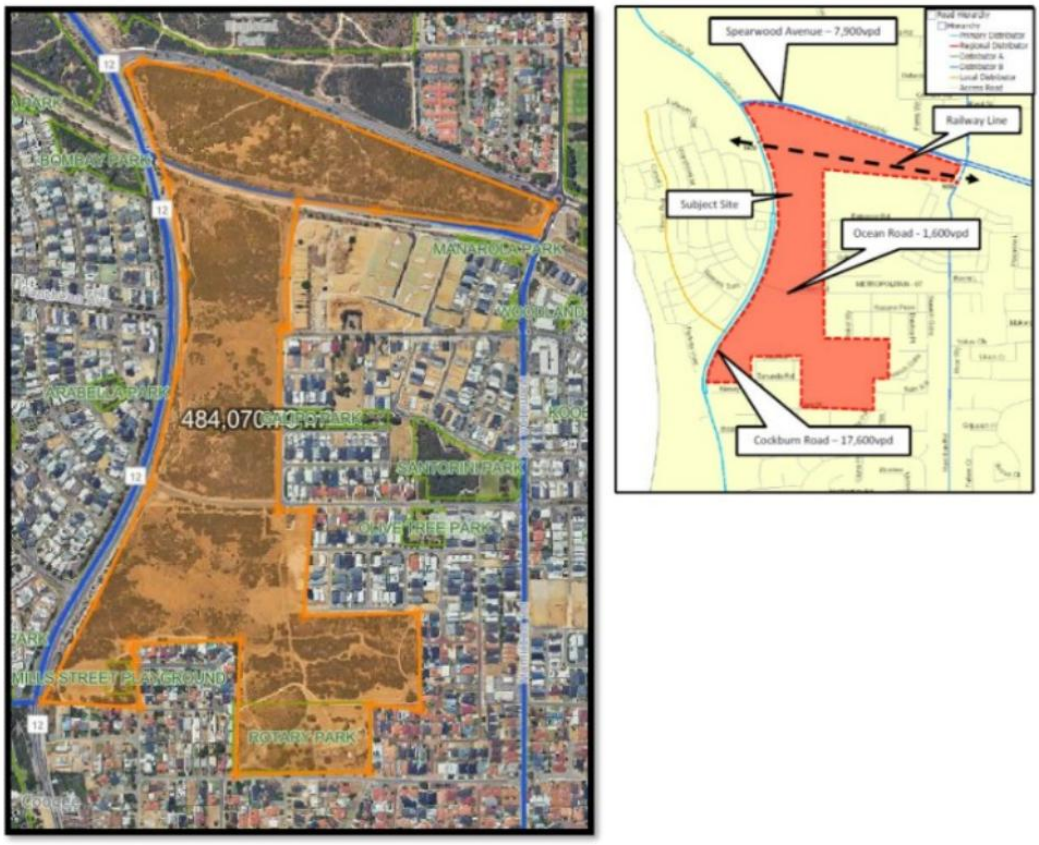


Figure 1: Site Location and Boundary

The proposal for a suitably qualified and experienced consultant to conduct an Aboriginal and early European Heritage Survey should contain (but not limited to) the following key aspects.

The key aspects include:

- **Field Assessments** – Undertaking field assessments of the project area.

- **Stakeholder Engagement** – includes appropriate consultation with First Nation Traditional Owners and Knowledge Holders.
- **Mapping** – Provide visual representation of key heritage sites and features and/or areas that may require retention as relevant to the findings.
- **Reporting and Recommendations** – provide clear and unambiguous report of findings which outline the methodology taken, extent of consultation and recommendations for the site.
- **Legislation** – Ensure process aligns with Aboriginal Heritage Act 1972 and any required legislations.

2. PROJECT BACKGROUND

The City has been progressing investigations into the potential for a golf course and associated community recreational facilities at the proposed location in Coogee. The site shape is not uniform with pockets of residential abutting the site. It is primarily bounded by Cockburn Road (west), Spearwood Avenue (north) with King Street at the southernmost boundary and Hamilton Road on the Eastern side. Ocean Road and the railway currently divides the site into three sections.

The progression of the project is subject to various investigations such as land and environmental constraints. In 2023, Council resolved to update previous flora and fauna studies and conduct assessments to ensure compliance with the *Aboriginal Heritage Act 1972*. These studies are required before any further steps can be determined.

In line with this resolution, the City has progressed flora and fauna studies, as well as completed the first stage of heritage investigations which was a Due Diligence Assessment for Aboriginal and early European Heritage.

The recommendation of the Due Diligence Assessment is to undertake an Aboriginal Cultural Heritage (ACH) investigation which entails an Aboriginal Heritage Survey for the proposed Coogee golf course site.

The Due Diligence Assessment identified areas of low, moderate and high risk of encountering ACH based on levels of disturbance of vegetation and land forms, presence of sites within the surrounding area and the significance of ground disturbance associated with the proposed development in the subject site.

Figure two (2) below depicts the identified zones of archaeological potential from high to low risk for the Project area.



Figure 2: Zones of Archaeological Potential within the Project Area

3. SCOPE OF WORK/SPECIFIC REQUIREMENTS

The proposal for a suitably qualified and experienced consultant to conduct a comprehensive Aboriginal and early European Heritage Survey should contain (but not limited to) the following key project phases.

The key phases include:

1. **Project and Document Review** – Confirm scope of project with Principal and undertake review of relevant documents such as the Due Diligence Assessment. This review is to ensure appropriate knowledge of the project area and identify any gaps.
2. **Stakeholder Engagement** – Development of a community engagement plan which demonstrates culturally appropriate engagement and is required for approval by the Principal prior to commencement. Engagement includes (but not limited to) consultation with First Nation Traditional Owners and Knowledge Holders, liaison with SWALSC and Whadjuk Aboriginal Corporation and liaison with the City's Aboriginal Reference group. Refer to appendix one for further engagement requirements.
3. **Field Assessments** – Undertaking appropriate field assessments of the project area ensuring relevant approvals are included within the Project methodology. Ensure adequate record keeping and photos of any heritage features.
4. **Mapping** – Provide visual representation of key heritage sites and features and/or areas that may require retention as relevant to the findings.
5. **Reporting and Recommendations** – provide clear and unambiguous report of findings which outline the methodology taken, extent of consultation and recommendations for the site. Report should include the extent of findings significance and required next steps in line with the findings. This includes indication of areas which may require retention or management, management recommendations and/or opportunities to incorporate key heritage features within design of the proposed site if appropriate.

Allowance is to be made within the submission for all required meetings and workshops with internal and external stakeholders. Outside of regular communications with the Principal, respondents should allow for monthly progress meeting/updates with Principal (30mins minimum).

It is expected that the Consultant will ensure the Project aligns with current *Aboriginal Heritage Act (1972)* and any relevant legislation. The Consultant is to provide advice and support for any development approvals within the recommendations which may apply under the Act pending outcomes of the Project are also to be included.

If there are any legislation changes during this project, the consultant is to discuss with the Principal any required adjustments to ensure all requirements are met.

4. PROJECT DELIVERABLES

The intended outputs of the Project will be:

1. **Engagement plan** and **evidence** of extensive stakeholder engagement which has informed the Heritage Study outcomes and recommendations.
2. A set of **plans/maps** which spatially depict identified heritage values including the different areas/sites, their values, areas of significance and their level of integrity.
3. **Photographs** and **written record** of all identified heritage values.
4. A final **Report** which provides a comprehensive Heritage Survey of the project area and that can be relied upon to make key project decisions which take into account Aboriginal and early European history and heritage values.
5. A set of **recommendations** as relevant for the State Government and/or City to appropriately manage, protect and interpret heritage values for the project area

In addition, upon appointment the Consultant is required to demonstrate their approach to workplace safety through a job safety analysis (JSA) and risk management procedures. The Project area has previous evidence of illegal dumping of waste including hazardous waste.

At completion of the Project, the consultant shall package and provide the following information to the City.

- The document and all plans and drawings in PDF format as well as MICROSTATION/CAD format for all maps gathered throughout the project.
- Any other information collated during the project including email correspondences (electronically).

All materials (including computer data, originals of reports and plans, records of consultation with stakeholders) prepared and acquired during the Project shall become the property of the Principal and must be provided to the Principal. This also includes copies of minutes of meetings, formal advice and comment from other stakeholders/agencies, working drawings and correspondence during the course of the study, which shall be submitted to the Principal.

5. PROJECT SCHEDULE

Respondents are required to demonstrate their approach and how best to meet Project deliverables within a reasonable timeframe. Respondents are required to consider adequate response times and meeting schedules of consultative bodies such as SWALS and Whadjuk Aboriginal Corporation.

The City's Aboriginal Reference Group meet bi-monthly with current scheduled to be confirmed upon appointment.

It is preferrable for the Project to be completed by June 2025, however It is understood that this may be subject to stakeholder consultation and approval timeframes.

6. GENERAL

This consultancy is for the provision of the whole of the consultancy services for the duration of the Project. Such services include, but not limited to, the project scope which is to be completed to the reasonable satisfaction of the Principal.

The Contractor shall not issue any information, publication, document or article for publication in any media or social media, which includes details of the Services under the Contract without the written approval of the Principal.

Notwithstanding the role of the Principal, the appointed Consultant shall be responsible for providing the Consultancy services as normally expected in a professional sense, as established by usual practice and in accordance with all applicable laws and regulations.

For the purposes of this Document, the following terms apply:

- "Principal" means City of Cockburn
- "Consultant" means Consultant
- "Project" means Proposed Coogee Golf Course – Aboriginal and European Heritage Survey

7. SUB-CONSULTANTS – OVERALL MANAGEMENT

The Consultant will be responsible for directly engaging any specialist sub-consultants as required to undertake the project. The Consultant shall manage the sub-consultants' scope, standard and suitability of work, timeliness for the Project's design and delivery (including responses to design enquiries and revisions). Sub-consultants will be deemed to be employed by the Consultant.

Sub-consultants may be requested by the Principal to attend project meetings. The associated costs to engage specialist sub-consultants should be incorporated into the Consultant's fee proposal within the price schedule supplied as part of this request.

8. INTELLECTUAL PROPERTY RIGHTS

All work and documentation provided as part of this service addresses 'Intellectual Property Right' (by way of definition as stated below) that includes the following:

- The Consultant warrants that the Goods and/or Services and any design, documents or methods of working provided by the Consultant do not infringe any Intellectual Property Right.
- The Consultant shall indemnify the Principal against any Loss resulting from any alleged or actual infringement of any Intellectual Property Right.
- All payments and royalties payable in respect of any Intellectual Property Rights required in respect of performance of the obligations under this Contract shall be included in the Contract Price and shall be paid by the Consultant to the person, persons, or body to whom they may be due or payable.
- Except as otherwise provided in this Contract, ownership of Intellectual Property Rights (other than third party Intellectual Property Rights) associated with the Goods and/or Services and any documentation provided by the Consultant pursuant to this Contract vests in and shall remain vested in the Consultant.
- Ownership of the Principal's Intellectual Property Rights (other than third party Intellectual Property Rights) vests in and shall remain vested in the Principal.
- The Consultant grants to the Principal an irrevocable, perpetual, worldwide, royalty free and transferrable licence to use and reproduce all Intellectual Property Rights associated with the Goods and/or Services and any documentation provided pursuant to this Contract.

'Intellectual Property Right' *means all intellectual and industrial property rights and interests throughout the world, whether registered or unregistered, including trademarks, designs, patents, inventions, semi- conductor, circuit and other eligible layouts, copyright and analogous rights, trade secrets, know how, processes, concepts, plant breeder's rights, confidential information and all other intellectual property rights as defined in Article 2 of the Convention establishing the World Intellectual Property Organisation on 14 July 1967 as amended from time to time.*

There is an expectation that the Principal will be able to utilise the deliverables and they will become publicly available:

- Final Aboriginal and European Heritage Survey Report including any relevant supporting appendices
- Mapping, photographs and supporting documents

There will be an expectation that the Principal can utilise the following deliverables for future project purposes as required:

- Field technical assessments and reports
- CAD / .dwg files and native file formats

APPENDIX 1 – STAKEHOLDER ENGAGEMENT

Engagement is to be carried out inline with the City's Community Engagement Policy and Framework. The City expects that consultation forms a primary role of the Project, and that the Consultant demonstrates that they are sufficiently resourced and experienced to be able to do this effectively.

Upon engagement, the successful Consultant(s) will need to provide a Stakeholder Engagement Plan for approval by the Principal and City's Community Engagement Officer before proceeding.

Given the importance of engagement within this project, it is anticipated it will be undertaken in two stages. The stages, purpose and preliminary stakeholders have been listed below. The Consultant is expected to revise the engagement methodology and stakeholders to ensure a comprehensive consultation process is undertaken to adequately inform future decision making for the location.

	Purpose	Internal Stakeholders	External Stakeholders
A	Determine heritage values to inform preparation of the document.	• City of Cockburn Aboriginal Reference Group • Local History Officer – Denise Cook	• South West Aboriginal Land and Sea Council • Whadjuk Aboriginal Corporation • City of Cockburn Aboriginal Reference Group • Local Traditional Knowledge Holders • Surrounding Residents and interest groups • Department of Planning, Lands and Heritage
B	Provide draft document for relevant Stakeholders to ensure an accurate and culturally appropriate account of the heritage findings and recommendations.	• City of Cockburn Aboriginal Reference Group • Local History Officer – Denise Cook	To be determined depending on findings in stage 1.

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APPENDIX 2 – SUPPORTING DOCUMENTS

Upon appointment, the consultant will be provided the following key City of Cockburn documents:

- Report of an Aboriginal and Historical Heritage Due Diligence Assessment for the proposed Manning Ridge Project Area - Archae-Aus.
- Early European and Aboriginal Heritage Study Hamilton Hill Swamp Precinct – Terra Rosa Consultants
- Any property, utility or technical data available through the City's mapping system

It is expected the appointed consultant will be able to source any further relevant documents to support the Principal's objectives.

Appendix D – Desktop research

Heritage sites within the survey area

Survey area	(ACHIS) DPLH Sites (Registered/ lodged/ historic)	InHerit Sites (historical/non-Aboriginal)	Other sites in survey area not listed on ACHIS or InHerit	Previous surveys	Previous TR job codes
Proposed Golf Course Project Area	None	None	None	None	None

Aboriginal sites around the survey area

Relevant survey area	DPLH ID	Place name / heritage value	Place type(s)	Place / heritage value summary (if available) Include distance, and relationship to survey area (if known).	TR job code (if relevant)	Related report(s)
Proposed Golf Course Project Area	DPLH ID 3776 (Historic)	Indian Ocean	Creation / Dreaming Narrative	The ocean is to the west of survey area. Closest point to the survey area is about 200 m, while the furthest point is about 600 m.	-	-

Historical sites around the survey area

Place no	Place name	Location
0533	Manning Estate, Hamilton Hill	Lot 9000 Glenister Rd, Hamilton Hill
2718	Parish Hall, Spearwood	15 Mell Rd, Spearwood
3381	South Fremantle Power Station	Robb St, Coogee
3648	Coogee Hotel (fmr)	371 Cockburn Rd, Coogee
10164	Coogee Beach Jetty	Powell Rd, Coogee
10165	Two Watsonia Cottages (site)	Hamilton Rd, Spearwood
10180	Three Lime Kilns Group	Cockburn Rd & Beeliar Dr, Coogee & Munster

Place no	Place name	Location
10184	Manning Park	Azelia Rd, Hamilton Hill
10189	Norfolk Island Pine Tree	9 Kent St, Spearwood
15693	RSL War Memorial	Spearwood Av Beale Park, Spearwood
15694	Peace Park	Spearwood Av, Spearwood
16999	Dragojevich Residence (fmr)	253 Hamilton Rd, Coogee
17000	Watsonia Factory (site)	174 Hamilton Rd, Spearwood
17013	Wetlands	Hamilton Rd, Spearwood
17014	Norfolk Pine Tree, Hamilton Road	300 Hamilton Rd, Spearwood
18707	Omeo Shipwreck	Coogee Beach, South Fremantle
24481	Coogee Hotel (fmr)	358 Cockburn Rd, Coogee
24500	Coogee Post Office (fmr)	358 Cockburn Rd, Coogee
24508	Two Soccer Clubs	Hamilton Rd, Spearwood
24508	Two Soccer Clubs	Hamilton Rd, Spearwood
24512	Woodlands (site)	174 Hamilton Rd, Spearwood

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Appendix E – Site Description

COC2501-01

Site type
Building

Centroid:
383832.95 mE
6447474.17 mN

Size: about 130 m2

COC2501-01 is a historical structure its function not defined yet. It was recorded on 16 July 2025. It is a place of potential heritage value from the last two centuries.

This description is preliminary assessment and documentation, the site needs some cleaning works by removing the plants covering the whole area and may need some excavation work to expose the invisible parts before assessing its function and date.

Location

COC2501-01 is located in middle of the central part of the survey area, proposed golf course in Coogee, City of Cockburn south of Fremantle approximately 6 km.

The site is situated in the southern slop of a small hill overlooks open land in the south covered with weed, while the hill itself is covered with dense shrubs and small trees.

The access to the site is available by 4WD cars from the junction of Cross Road and Entrance Road (about 100 m to the east) through dirt road under the high voltage electricity cables which go through the area east west.

The temporary boundary was allocated to enclose remains of the visible walls, in case of cleaning the area, new walls or remains may appear, and this boundary should be extended.

The site was not mentioned in the available resources or references.

Site description

COC2501-01 is located in open woodland area covered with different kinds of native and introduced shrubs and trees in addition to big variety of small plants and weed. The area is still semi-rural but surrounded from all sides by residential buildings.

The building consists of two parts or rooms, the lower (southern room) and the upper (northern room) which was covered with dome.

The visible parts of the building are few walls and remains of the dome. In the southwest corner of the lower room, there is a small wall (2.3 m east west) connected in the west to perpendicular wall (3.5 m south north) goes to the north but disappears under the dense plants, the remain height is less than one meter. This corner is all what lasted from the lower room, the invisible parts of this room should be located to the east of this corner.

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To the north of the mentioned corner about 3.5 m, the southern wall of the upper room is visible, it extends east west about 8 m but it is damaged and covered with plant in the middle part, this wall is connected to the western wall which goes to the north about 4 m then disappears under the plants, and to the eastern wall which goes to the north as well about 5.5 m then disappear under the plants.

The interior space of this hall was covered with dome, it is currently collapsed, only the lower parts are visible, the diameter of the dome is about 2.7 m, while the interior area of the hall is about 5x5 m.

All walls are built by small limestone with cement-lime mortar in random way, thickness of the walls differs from part to another between 45 – 75 cm.

No artefacts or any finding in the site, some rubbish, and a lot of plants cover the site.

Site condition

COC2501-01 is just remains of old building, only some walls are still visible in the site, it needs cleaning, excavation and conservation works to expose its original dimensions and parts, and to explain its function and date.

Significance assessment

COC2501-01 in its current situation has the potential for research may introduce a new cultural and historical information shed light on the history of the area and the land use in that specific spot.

Key heritage considerations and threats

The site is threatened by any development works occur in the area, and above that, because of the plants and the weather, it is prone to more damage and collapse if it remains without maintenance and conservation.

Site management strategies

- avoid any disturbance to the site.
- prepare Archaeological Management Plan as soon as possible.

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Top left: *COC2501-01 view to the north* **|** ***Right:*** *COC2501-01 view to the east*

Bottom left: *COC2501-01 view to the south* **|** ***Right:*** *COC2501-01 view to the west*



Top left: *COC2501-01 the southeast corner of the upper room from outside* **|** ***Right:*** *COC2501-01 details of the building materials*

Bottom left: *COC2501-01 view to the south to the southwest corner of the lower room* **|** ***Right:*** *COC2501-01 view to the north to the same corner*

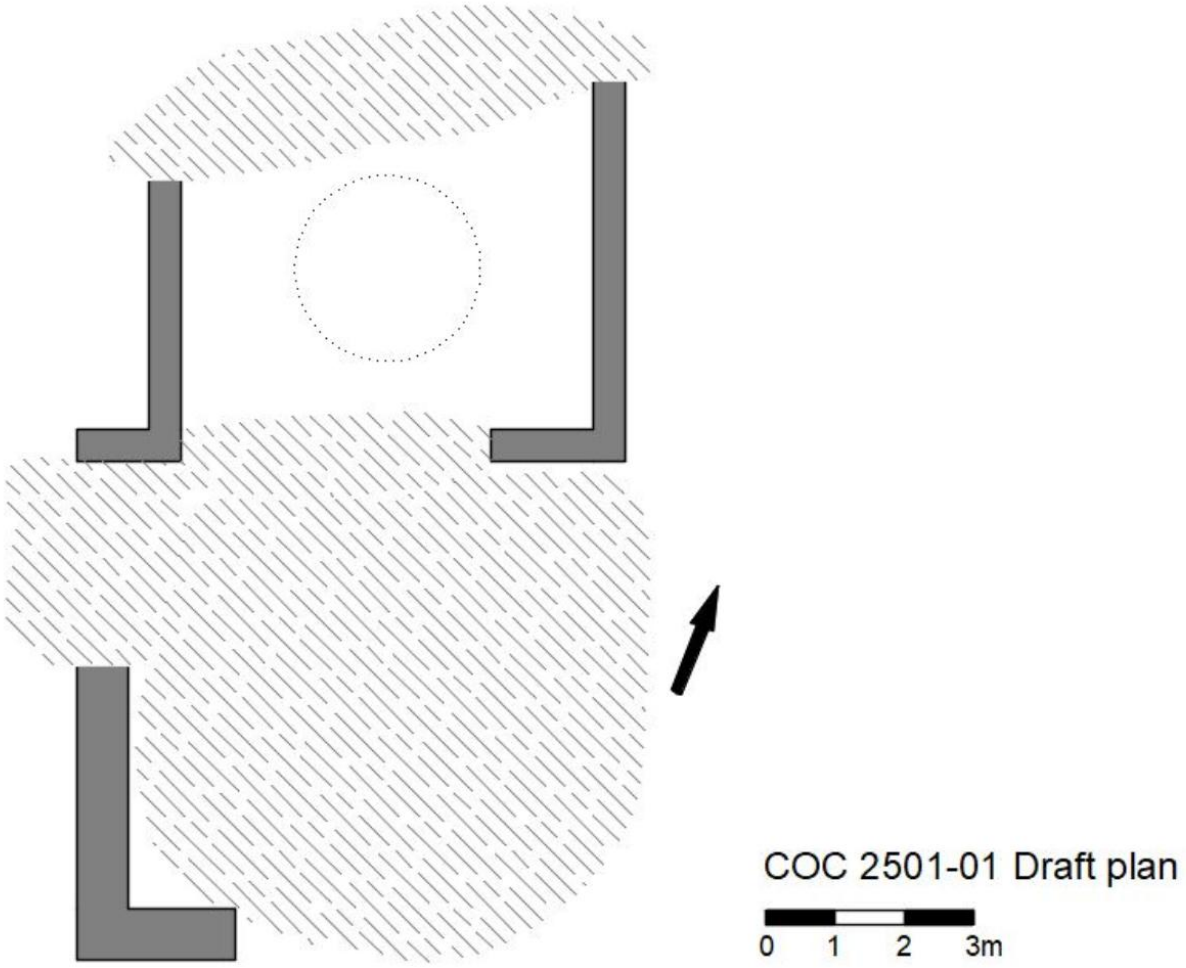


Top left: *COC2501-01 view to north to the dome* **|** ***Right:*** *COC2501-01 details of the building materials of the dome from inside*

Bottom left: *COC2501-01 view to the north to the southwest corner of the upper room* **|** ***Right:*** *COC2501-01 details of the building materials*

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Draft architectural plan of the site




Site Plan - COC2501-01
Job №: COC2501
Coordinate System: GDA94 MGA Zone 50
Date: 18/07/2025
Author: PemaWangdi
Scale
1:134
0 1.6 3.2 4.8 6.4
Meters
N
TERRA ROSA CONSULTING
Overview
COC2501-01
Legend
Preliminary Heritage Place
383820 383825 383830 383835 383840 383845 383850
6447490 6447485 6447480 6447475 6447470 6447465 6447460

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Version Control

Version	Date	Change Log	Author(s)
0.1	30/07/2025	Document drafted	I. Omeri

Attachments

COC2501 Report

COC2501 Spatial Data (zipped folder)

DRAFT

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