APPENDIX 9: FAUNA ASSESSEMENT

Yalyalup Mineral Sands Mine
Proposed Expansion
Fauna Assessment

Foraging evidence by Baudin's Black-Cockatoo on Marri nuts (Photo: J. Wadey).

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Executive Summary

Introduction

Doral Mineral Sands Pty Ltd (Doral) is proposing to expand their current mining operations at Yalyalup Mineral Sands Mine. Bamford Consulting Ecologists was commissioned to conduct a 'Basic' or Level 1 fauna assessment and a targeted black-cockatoo and Western Ringtail Possum assessment of the project area, which is located c. 10 km east of Busselton, Western Australia, adjacent to the existing Yalyalup mine site. The project area encompasses c. 960 ha of mostly cleared agricultural land and scattered mature trees with c. 35 ha of remnant native vegetation. This report presented the findings of the Basic fauna assessment and targeted black cockatoo and Western Ringtail Possum assessments. The key objectives of the study are to:

1. Conduct a literature review based on previous fauna studies in the area and searches of Commonwealth and State fauna databases;
2. Undertake field investigations to provide information on the presence of fauna in the survey area with a focus on significant species, with targeted assessments on the three black-cockatoo species and the Western Ringtail Possum – field investigations were undertaken in August 2023 and with a follow-up to check on potential black-cockatoo nest trees on January 2024;
3. Review the list of fauna expected to occur in the light of fauna habitats present;
4. Identify any ecological processes in the survey area upon which fauna may depend; and
5. Identify general patterns of biodiversity within or adjacent to the survey area.

Summary of fauna values

Vegetation and Substrate Associations (VSAs)

There were eight VSAs identified in the project area: Paddocks with scattered mature trees (VSA 8) was the dominant VSA. The key fauna values of this VSA were in the mature trees, most of which were large native remnant trees (e.g. Marri) with multiple hollows. Mixed Marri woodland and Stream with mixed Marri (VSAs 1 and 2) were represented along road verges, in patches, and along the stream in the east; this is native remnant vegetation and likely supports the highest biodiversity due to the floristic and structural diversity. There were patches of Melaleuca dampland (VSA 6) which will support a unique suite of species. The Flooded Gum stands (VSA 3), Planted Eucalypts (VSA 4) and Stream with planted Eucalypts (VSA 5) likely provides foraging, roosting and connectivity value, while the Planted garden (VSA 7) likely supports more common garden species.

Fauna assemblage

The desktop study identified 221 vertebrate fauna species as potentially occurring in the project area: 10 fishes, nine frogs, 28 reptiles, 150 birds (four introduced), 18 native mammals and six introduced mammals. A further 16 species (10 mammals, two birds, two reptiles and two fish) are considered locally extinct. The assemblage is typical of that expected in similar rural areas of the Swan Coastal Plain. Although a large number of species is expected in the project area, only one third of these are expected as residents; more species would be expected as residents in the project area if land clearing, habitat fragmentation and habitat degradation were less extensive. The assemblage is likely to be incomplete for all fauna groups, particularly so for mammals.

Species of conservation significance

The extant assemblage includes 56 species of conservation significance and 16 locally extinct species of conservation significance. Most notable for the project are the three black-cockatoo species, which are likely to use the project area for foraging and roosting, and possibly nesting, and the Western Ringtail Possum, which is expected to be a regular visitor or resident in the area.

Black-cockatoos

All three species of black-cockatoo present in the South-West are expected to be regular visitors to the project area. During the field investigations, a flock of three Carnaby's Black-Cockatoos was flushed from a stand of trees near the existing mining area (from what may be a day roost) and foraging evidence of Baudin's Black-Cockatoo was recorded across the project area.

A large proportion of the project area is VSA 8 (paddocks with mature trees), and this VSA has a low foraging value of 3 out of 10 for all species. The presence of scattered mature trees is key to even this foraging value. The highest foraging values for all species are in VSAs 1 and 2 which contain Marri; these provide a moderate foraging value for the Carnaby's Black-Cockatoo (6 out of 10) and high foraging value for the Baudin's and Forest Red-tailed Black-Cockatoos (7 out of 10).

In the August 2023 survey, 720 trees were recorded that met the potential nest-tree criterion of a DBH of at least 500 mm. Of these, 34 were ranked 3, 47 were ranked 4 and 639 were ranked 5. This is a relatively large number of rank 3 trees (trees which contain hollows considered suitable for immediate black-cockatoo use) for the project area size and reflects the large number of mature remnant trees across the project area. There were no trees ranked 1 or 2 (i.e., showing current or recent use by black-cockatoos).

In January 2024, 17 of the rank 3 trees which were within the proposed development (impact) area were re-assessed (using a pole camera). Only seven of these trees retained a rank of 3 following this re-examination. This resulted in a final total number of trees of 721, consisting of 24 rank 3 trees, 57 rank 4 trees and 640 rank 5 trees. The total number of trees increased to 721 due to changes in accessibility.

The project area contains suitable roosting habitat in the form of the many large trees present, and the presence of waterbodies nearby (an important feature of a black-cockatoo roost). BirdLife data returned seven confirmed roost sites within 25 km of the project area, with the closest being 1.3 km southwest of the project area.

Western Ringtail Possum

The Western Ringtail Possum (or evidence of the species) was not recorded in the project area. However, the species is known to be resident across the local area and has been recorded along McGibbon Track in the previous fauna survey for the existing mine (Harewood, 2020) and nearby, so is expected to be a regular visitor or resident. Suitable habitat for the species occurs in the project area, particularly along road verges and the Abba River.

Key ecological processes

The main ecological processes which may be influencing the fauna assemblage are:

- Existing habitat loss;
- landscape connectivity;
- the fire regime;
- the presence and abundance of feral species; and
- local hydrology.

Overall, the assemblage includes a large proportion of significant species including a suite of locally significant species that has declined nearby due to clearing, primarily on the coastal plain. Nest trees for black-cockatoos are a very important habitat feature, and remnant native vegetation on farmland is important for maintaining local biodiversity.

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1 Introduction

Doral Mineral Sands Pty Ltd (Doral) is proposing to expand its current mining operations at Yalyalup Mineral Sands Mine (Ministerial Statement 1168, EPBC 2017-8094). As part of the EPA and EPBC referrals, Doral are required to assess impacts to terrestrial fauna which includes a 'Basic' or Level 1 fauna assessment and a targeted black-cockatoo and Western Ringtail Possum assessment. Bamford Consulting Ecologists (BCE) was commissioned to conduct these fauna assessments within the proposed Northern Extension area ('project area'). The project area is located c. 10 km east of Busselton, Western Australia, adjacent to the existing Yalyalup mine site (Figure 1-1). The project area encompasses c. 960 ha of predominantly cleared agricultural land and scattered mature trees with c. 35 ha of remnant native vegetation. This report presents the findings of the Basic fauna assessment, and targeted black-cockatoo and Western Ringtail Possum assessments.

1.1 Study objectives

The scope provided by Doral includes the following:

1. "*Conduct a desktop study and Level 1 Fauna Survey in accordance with Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016h) and Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016) for Terrestrial Fauna within the Development Envelope.*
2. *Conduct a targeted Western Ringtail Possum assessment in areas containing suitable habitat within the Development Envelope in accordance with relevant EPA and Commonwealth guidance.*
3. *Conduct a targeted black-cockatoo assessment in areas containing suitable habitat within the Development Envelope in accordance with relevant EPA and Commonwealth guidance.*
4. *Describe the terrestrial fauna including conservation significant and migratory species that occur or likely to occur within the Development Envelope.*
5. *Conduct targeted surveys for any other significant species, communities or habitats identified by the desktop study and Level 1 survey as potentially being present.*"

Note Development Envelope refers to the project area boundary given in the following section.

Based on this scope and the outline in Section 1.1, the key objectives of the study are to:

6. Conduct a literature review based on previous fauna studies in the area and searches of Commonwealth and State fauna databases;
7. Undertake field investigations to provide information on the presence of fauna in the survey area with a focus on significant species, with targeted assessments on the three black-cockatoo species and the Western Ringtail Possum;
8. Review the list of fauna expected to occur in the light of fauna habitats present;
9. Identify any ecological processes in the survey area upon which fauna may depend; and
10. Identify general patterns of biodiversity within or adjacent to the survey area.

Note that this assessment considers vertebrates only; a separate assessment of conservation significant invertebrates (listed and/or considered to be short range endemic (SRE)) has previously been conducted (Phoenix Environmental 2020). This was a desktop review only and found that just 16 invertebrate species of conservation interest have been recorded within ca. 40 km of the project area. These included one trapdoor spider listed as Priority 4, two millipedes confirmed as SRE species

(limited range), and 13 species considered to be potential SREs (range uncertain but possibly restricted). None of the species had been recorded within the project area, with a land snail (*Bothriembryon irvineanus*) and a trapdoor spider (*Aname* MYG184) recorded within about 10 km. The report noted that there has been a lack of sampling of invertebrates in the area, but that it provides little habitat with the potential to support significant invertebrates, with the only area of remnant vegetation considered of high potential to be retained and not impacted.

1.2 Description of project area and background environmental information

1.2.1 Project area

The project area is located in Western Australia's South West region (DBCA, 2023b), approximately 190 km south of Perth and 10 km east of Busselton (Figure 1-1). It is located immediately north of the existing Yalyalup Mine. It is approximately 960 ha in size, and has been extensively cleared for agriculture, with scattered mature native and planted trees, lines of trees (windbreaks and road verges) and c. 35 ha of scattered native vegetation (e.g., paperbark wetlands).

A range of terms is used through this report to refer to the spatial environment including and around the project area; these are defined below and illustrated in Figure 1-1:

- Project area – the project area boundary was provided by Doral and is comprised of a mixture of land over which Doral has tenure and adjacent private property. It is the area to which the results of the desktop analysis are directed and the area within which field investigations were conducted.
- Study area – the outermost boundary of the desktop assessment area that is almost always a specified buffer distance (see Section 2.3.1 below) around the project area. The study area thus encompasses the project area but includes the area from which database records are sourced for the desktop assessment. For the current report, this is a 25 km buffer around the centroid of the Yalyalup project area.

Note that for the purposes of context and mapping, a 15 km buffer from the centroid of the project area is sometimes used; this is based upon guidance for regional context from the EPA (EPA, 2016c). Project and study area boundaries are illustrated in Figure 1-1.

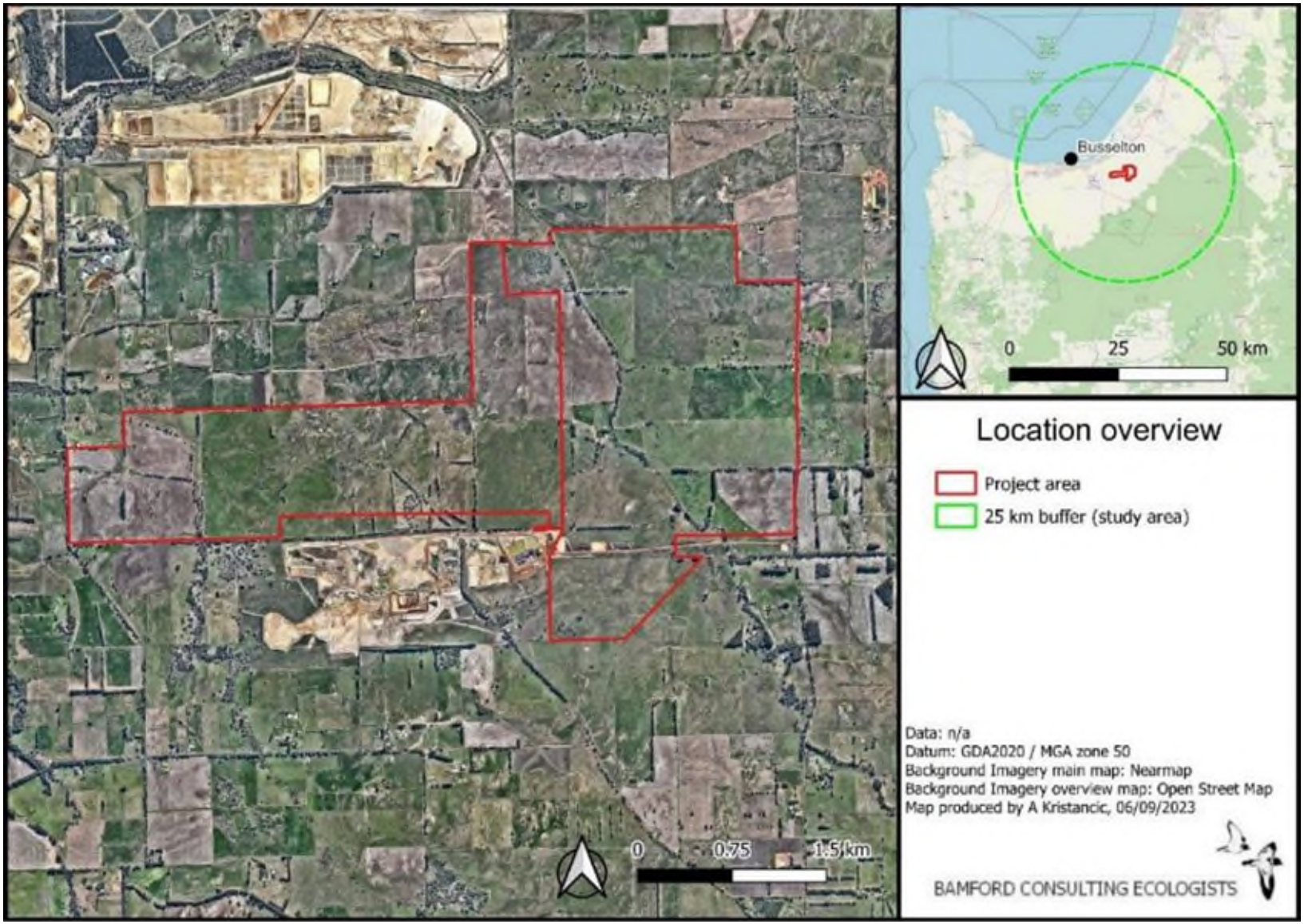

Figure 1-1. Location of project area and study area boundaries

1.2.2 Recognised sensitive sites

The Vasse-Wonnerup Wetland System is approximately 5 km from the project area and stretches along c. 18 km of land to the north-west of the project area (see Figure 1-2). This area is classified as an Important Wetland (DBCA, 2023c) and several parts of the Vasse-Wonnerup System are recognised as a Ramsar Site (DBCA, 2023e). The threats relevant to this system include: salinity, water abstraction, livestock farming, pastoralism, pollution (household, industrial, agriculture), urban development, mining, roads and rail (DBCA, 2023c). Several fauna species of conservation significance are associated with this system; these include Western Ringtail Possum, Curlew Sandpiper, Blue-billed Duck and Quenda (DBCA, 2023c). This system also includes the Threatened Ecological Community of the Subtropical and Temperate Coastal Saltmarsh (Vulnerable under EPBC Act). McCarley's Swamp is c. 9 km north of the project area and is also categorised as an Important Wetland. There are no other Important Wetlands or Ramsar Sites within 25 km of the project area.

Threatened Ecological Communities within 25 km of the project area are displayed in Figure 1-3 and include:

- Subtropical and Temperate Coastal Saltmarsh (c. 8 km north-west)
- Shrublands on southern Swan Coastal Plain ironstones (less than 5 km east and c. 15 km south-west)
- Tuart Woodlands and Forests of the Swan Coastal Plain ecological community (scattered throughout area west of the scarp)
- Banksia Woodlands of the Swan Coastal Plain ecological community (scattered throughout area west of the scarp)
- Clay Pans of the Swan Coastal Plain (scattered throughout area west of the scarp)

There are multiple areas, mostly along the foothills of the scarp and near the wetland system on the coast, that are categorised as Priority Ecological Communities (DBCA, 2023g, 2023f) (Figure 1-3). There are several areas within 25 km that are categorised as Environmentally Sensitive Areas (ESAs; DWER, 2023b, 2023a), many of which line up with otherwise recognised sensitive sites such as TECs, nature reserves, and Important Wetlands (Figure 1-3). There are three points categorised as ESAs within the project area (Figure 1-3). Excluding marine parks, there are 27 'protected reserves' (DCCEEW, 2020, 2023f) within 25 km of the project area (shown in Figure 1-4)(DCCEEW, 2020, 2023f). These include one 5(1)(h) Reserve, three privately owned Conservation Covenants, one Conservation Park, two National Parks, and 20 Nature Reserves.

The Vasse-Wonnerup Wetland System and surrounds (c. 5 km from the boundary of the project area) is also recognised internationally as a Key Biodiversity Area (KBA), named the Busselton Wetlands (Key Biodiversity Areas Partnership, 2023a). This area is categorised based on the Global KBA criterion of D1a; which means that it supports "more than or equal to 1% of the global population size of a species, over a season, and during at least 1 key stage in the life cycle" (KBA, 2023). There is one additional KBA within 25 km of the project area; this is the Margaret River KBA, a large area (30,401 ha) encompassing terrestrial and freshwater ecosystems. This area is categorised as a KBA based on the A1e criterion (Key Biodiversity Areas Partnership, 2023b) which is related to the threatened species sub-category of the threatened biodiversity category (KBA, 2023); this criterion indicates that this area supports "effectively the entire population size of a CR/EN species" (KBA, 2023).

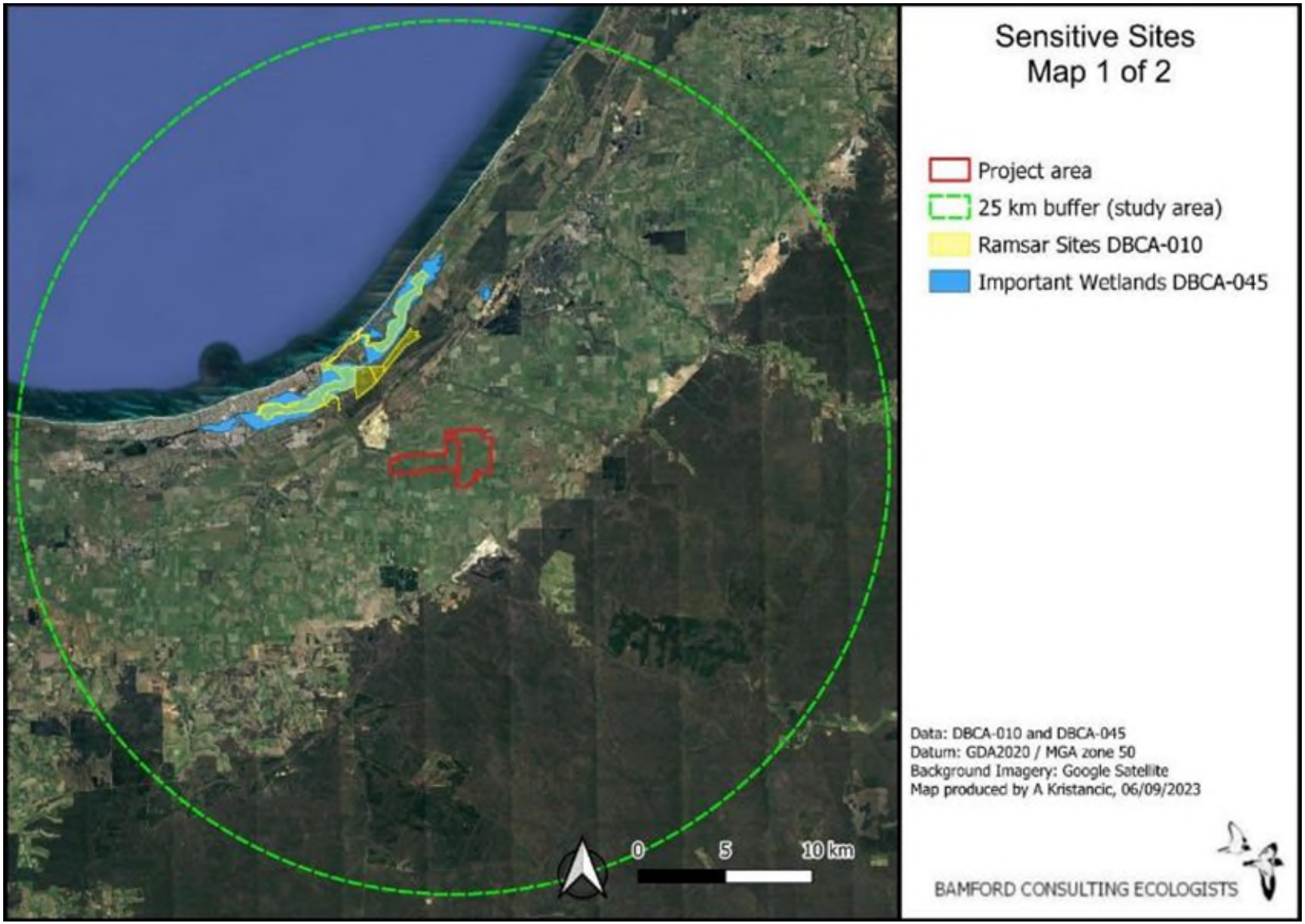

Figure 1-2. Important Wetlands (DBCA, 2023c) and Ramsar Sites (DBCA, 2023e) within 25 km of the project area.

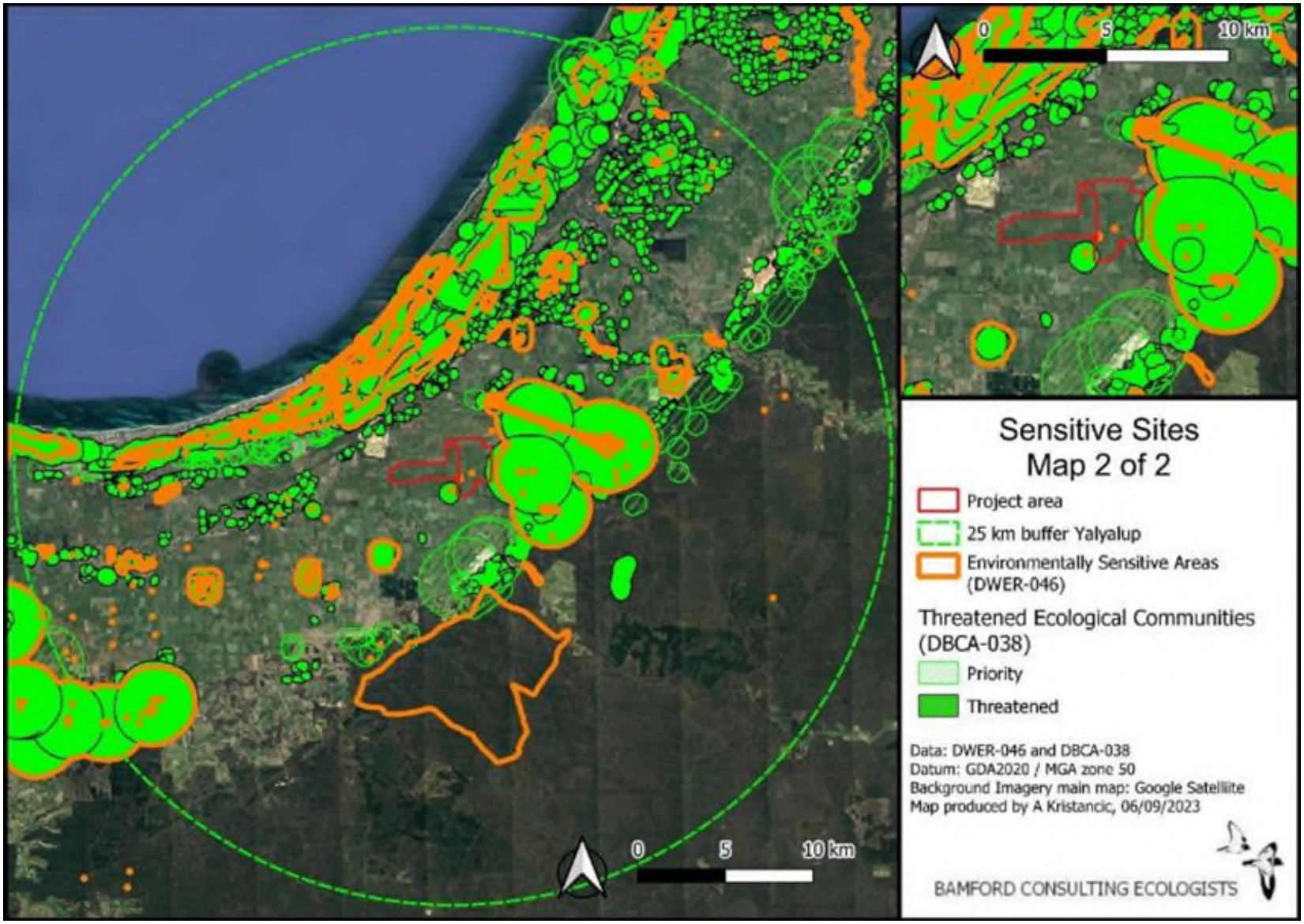

Figure 1-3. Environmentally Sensitive Areas (DWER, 2023a) and Priority and Threatened Ecological Communities (DBCA, 2023g) within 25 km of the project area.

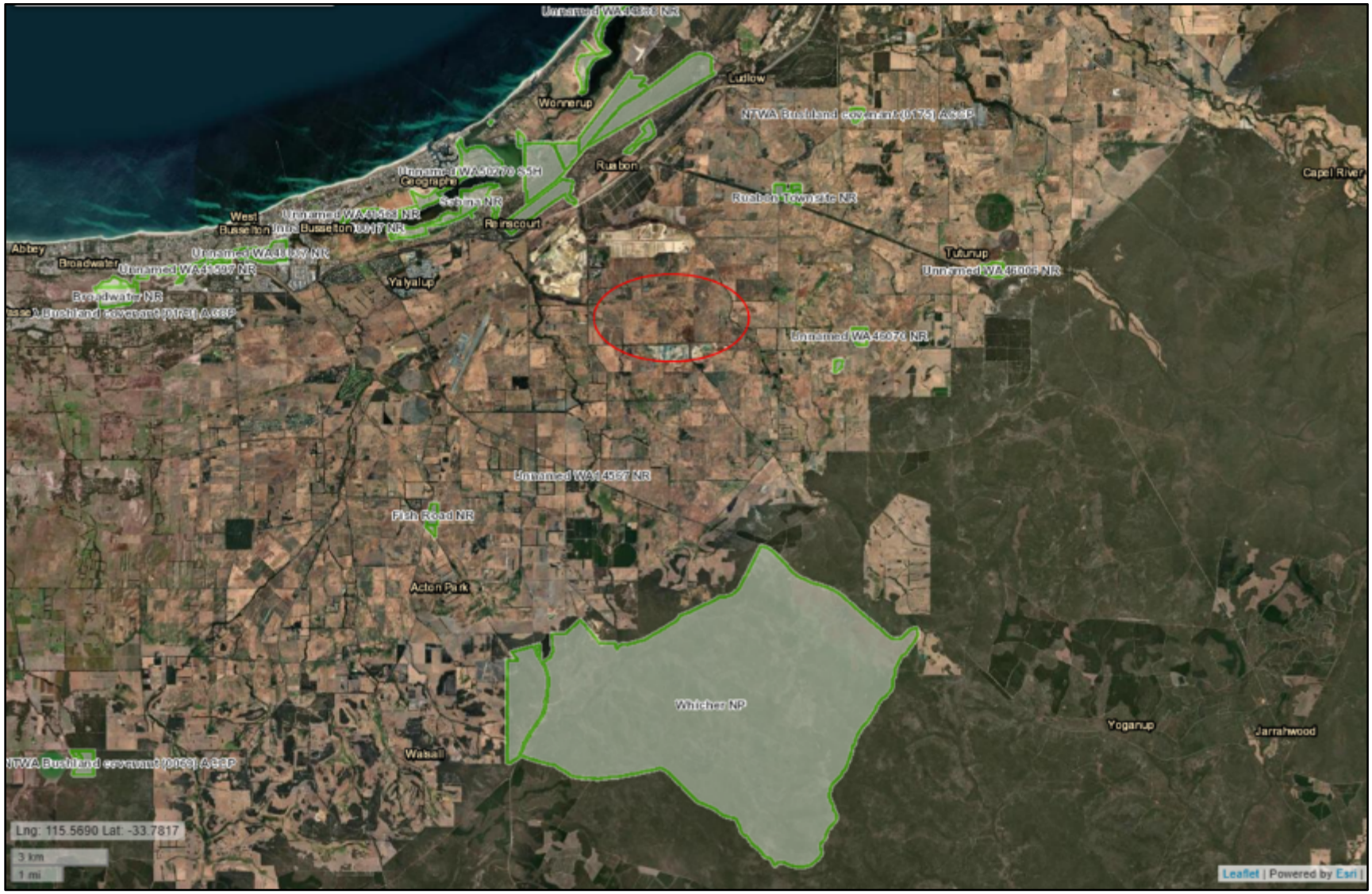

Figure 1-4. Protected areas in the region of the project area, as per the Collaborative Australian Protected Areas Database (CAPAD; DCCEEW, 2020). Map displayed is from the Protected Matters Search Tool (Protected Areas – Terrestrial)(DCCEEW, 2023f). Red oval indicates approximate location of the project area.

1.2.3 Interim Biogeographic Regionalisation of Australia (IBRA) and landscape characteristics

The Interim Biogeographic Regionalisation of Australia (IBRA) has identified 26 bioregions in Western Australia which are further divided into subregions (DCCEEW, 2023a). Bioregions are classified on the basis of climate, geology, landforms, vegetation and fauna (Thackway & Cresswell, 1995). IBRA Bioregions are affected by a range of different threatening processes and have varying levels of sensitivity to impact (EPA, 2016c). The project area lies within the Swan Coastal Plain (SWA02) subregion of the Swan Coastal Plain bioregion (Figure 1-5). This bioregion low lying coastal plain, mainly covered in woodlands of banksia or Tuart on sandy soils, with some *Allocasuarina obesa* on outwash plains and paperbark in swampy areas (Mitchell *et al.*, 2003). The Perth subregion was described by Mitchell *et al*. (2003) and a summary of their work follows here.

The Swan Coastal Plain (SWA02) subregion is composed of colluvial and aeolian sands, alluvial river flats and coastal limestone, with heath and/or Tuart woodlands on limestone, banksia and Jarrah-banksia woodlands on Quaternary marine dunes and Marri on colluvial and alluvial sands. This subregion contains a complex series of seasonal wetlands, and includes several islands.

1.2.4 Land use and tenure

The dominant land uses for the SWA02 subregion are agriculture, conservation, UCL and crown reserves, urban, rural residential, plantations, roads and easements. Smaller areas within the subregion are used for mining and defence lands (Mitchell *et al*., 2003). At the local scale, the project area is surrounded by rural land with remnant vegetation patches and/or trees, and is adjacent to the existing mine. There are some areas of nature reserve and lines of vegetation as road verges and wind breaks.

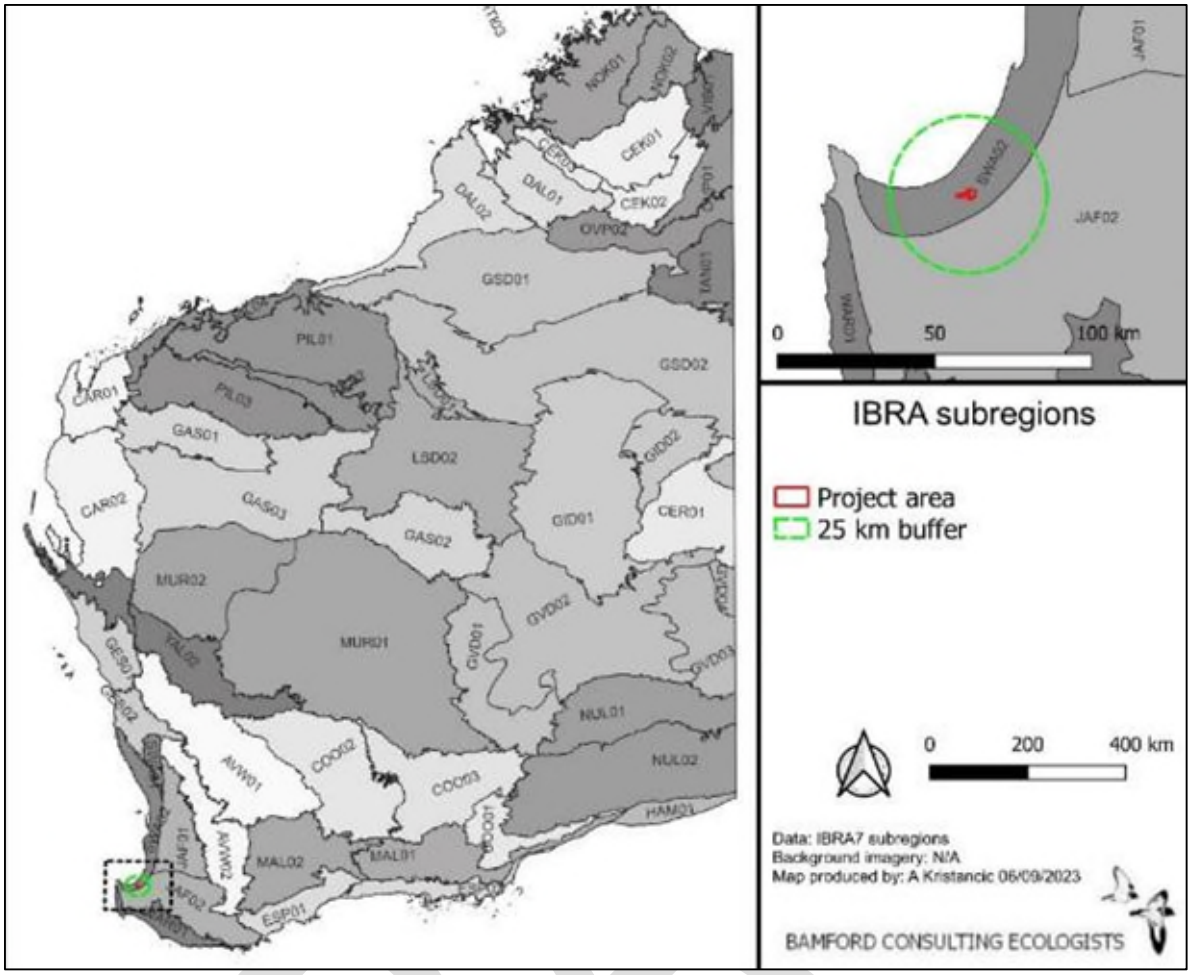

Figure 1-5. The project area in relation to IBRA subregions in Western Australia.

1.2.5 Soil-Landscape Mapping, Pre-European Vegetation and Vegetation Complexes

Mapping of a project area in relation to broad scale datasets can provide useful context regarding the current and historical landscape of the project area and surrounds. A dataset of soil-landscape mapping across Western Australia is provided by DPIRD (2023c). Heddle *et al.* (1980) and Webb *et al.* (2016) have defined and described broad vegetation complexes for the Swan Coastal Plain and South West Forest region and the mapping of these is provided by DBCA (2023i, 2023h). Beard *et al.* (2013) have described and mapped the original vegetation presumed to have existed across Western Australia prior to European settlement and this dataset is provided by DPIRD (2023b). The project area in relation to these datasets is shown in Figure 1-6, Figure 1-7 and Figure 1-8.

The landscape surrounding the project area is a complex mosaic of a variety of soil-landscape types (DPIRD, 2023c)); a summary of the soil landscape types within 15 km and 5 km of the centroid of the project area is shown in Figure 1-6. Further details are provided only for the six subsystems that

overlap with the project area. The project area lies across six subsystems/phases of the Abba Plains Land System, as detailed below:

- Abba Flats phase - Flats and low rises with sandy grey brown duplex (Abba) and gradational (Busselton) soils. This is scattered throughout most of the project area.
- Abba very wet saline flats phase - Poorly drained depressions with some areas which become saline in summer. Shallow sands over clay subsoils (i.e. Abba Clays). There is a large section of this phase through the centre of the project area.
- Abba wet flats phase - Winter wet flats and slight depressions with sandy grey brown duplex (Abba) and gradational (Busselton) soils. This makes up the bulk of the north-eastern portion of the project area, as well as the western extent of the project area.
- Abba wet ironstone flats phase - Winter wet flats and slight depressions with shallow red brown sands and loams over ironstone (i.e. bog iron ore soils). This occurs in the central southern part of the project area.
- Abba wet vales phase - Small narrow swampy depressions along drainage lines. Alluvial soils. This area appears to exist in the stream along the west of the project area.
- Jindong flats phase - Well drained flats with sandy gradational grey brown (Busselton) soils, some red brown sands and loams (Marybrook Soils). This occurs in two small areas along the southern boundary of the project area.

The landscape within 15 km of the project area encompasses 25 vegetation complexes of the Swan Coastal Plain, Whicher Scarp, and Blackwood Plateau and Plain (Figure 1-7), while the project area itself lies entirely within the Abba Complex (open forest and woodland) of the Swan Coastal Plain (DBCA, 2023i).

Prior to European arrival, the landscape within 15 km of the project area is thought to include 10 vegetation types, as well as areas of 'salt lake, lagoon or claypan' and 'dune sands' (Beard *et al*., 2013; DPIRD, 2023b)(Figure 1-8). Details are provided here only for those vegetation types which overlap the project area. The majority of the project area lies within vegetation type 3 (Medium Woodland) of Beard *et al.* (2013). Historically, this area would have been covered by woodland dominated by Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Wandoo (*E. wandoo*). A smaller section in the central north portion of the project area lies within vegetation type 6 (Low Forest), which would have comprised of wattle (*Acacia rostellifera*), Rottnest Pine (*Callitris preissii*) and Moort (*Eucalyptus platypus*). Some remnants of these vegetation types may remain, although the project area itself largely consists of cleared land.

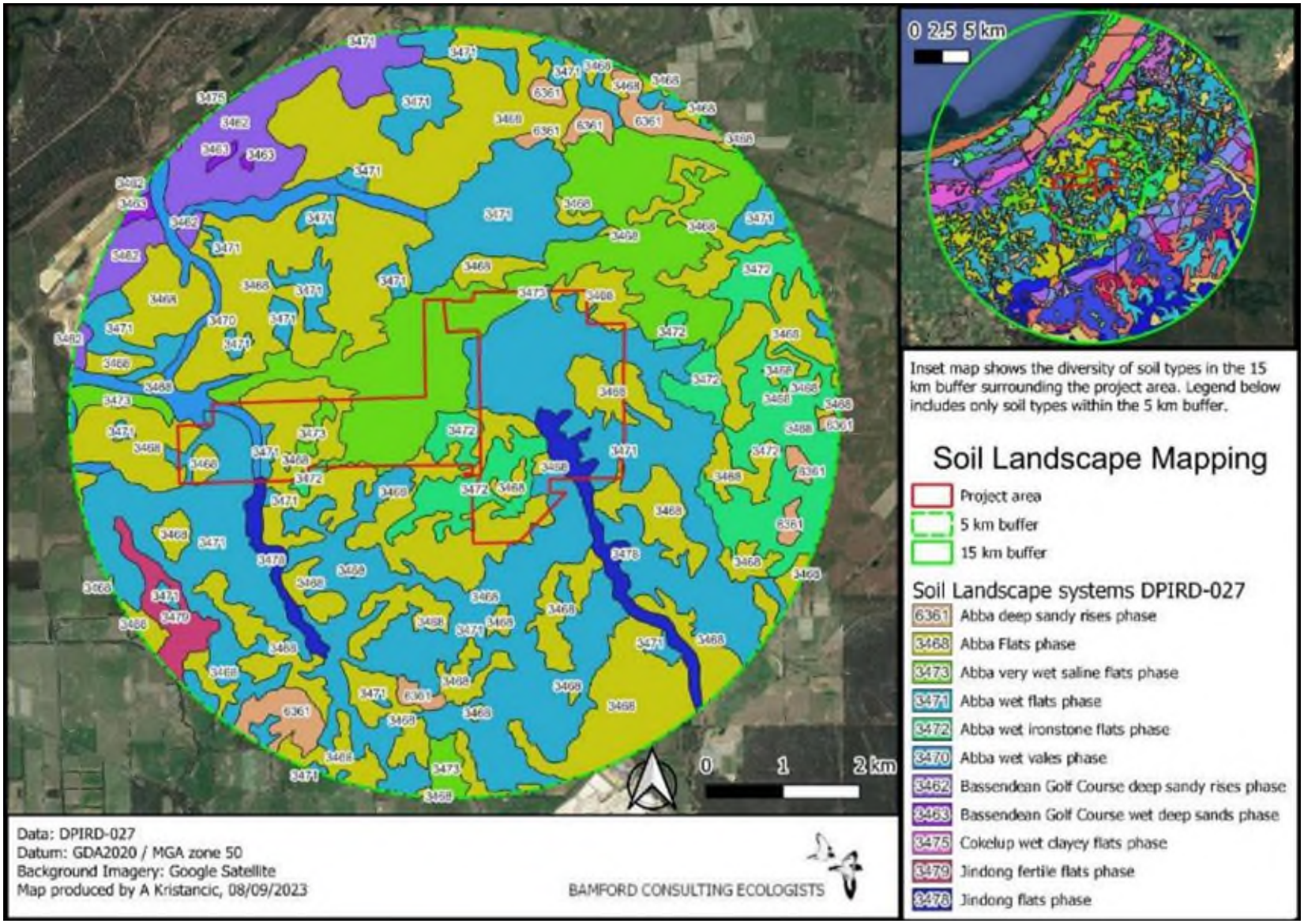

Figure 1-6. Soil-landscape mapping (DPIRD, 2023c) within 5 km and 15 km of the project area.

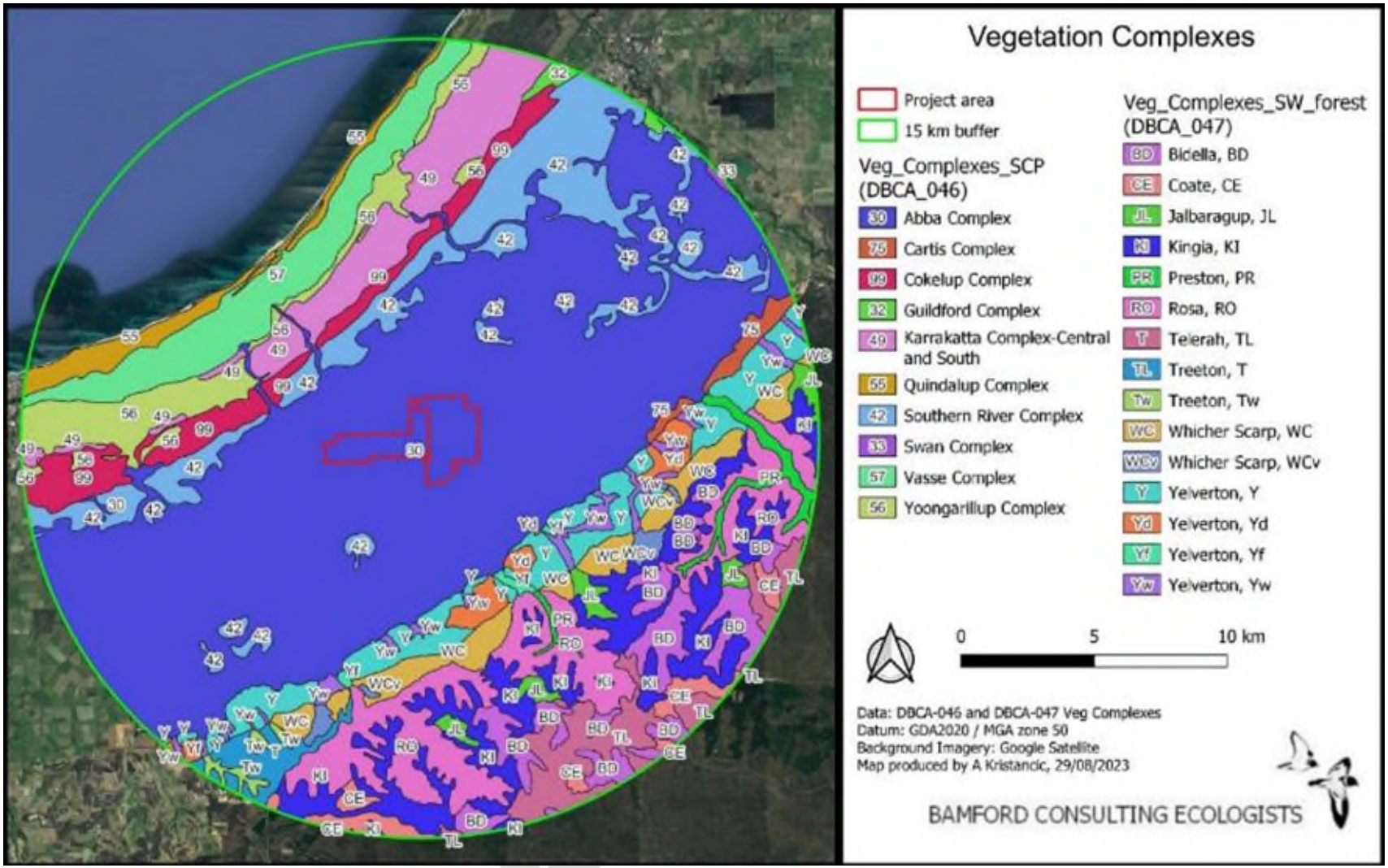

Figure 1-7. Vegetation complexes (DBCA, 2023i, 2023h) within 15 km of the project area.

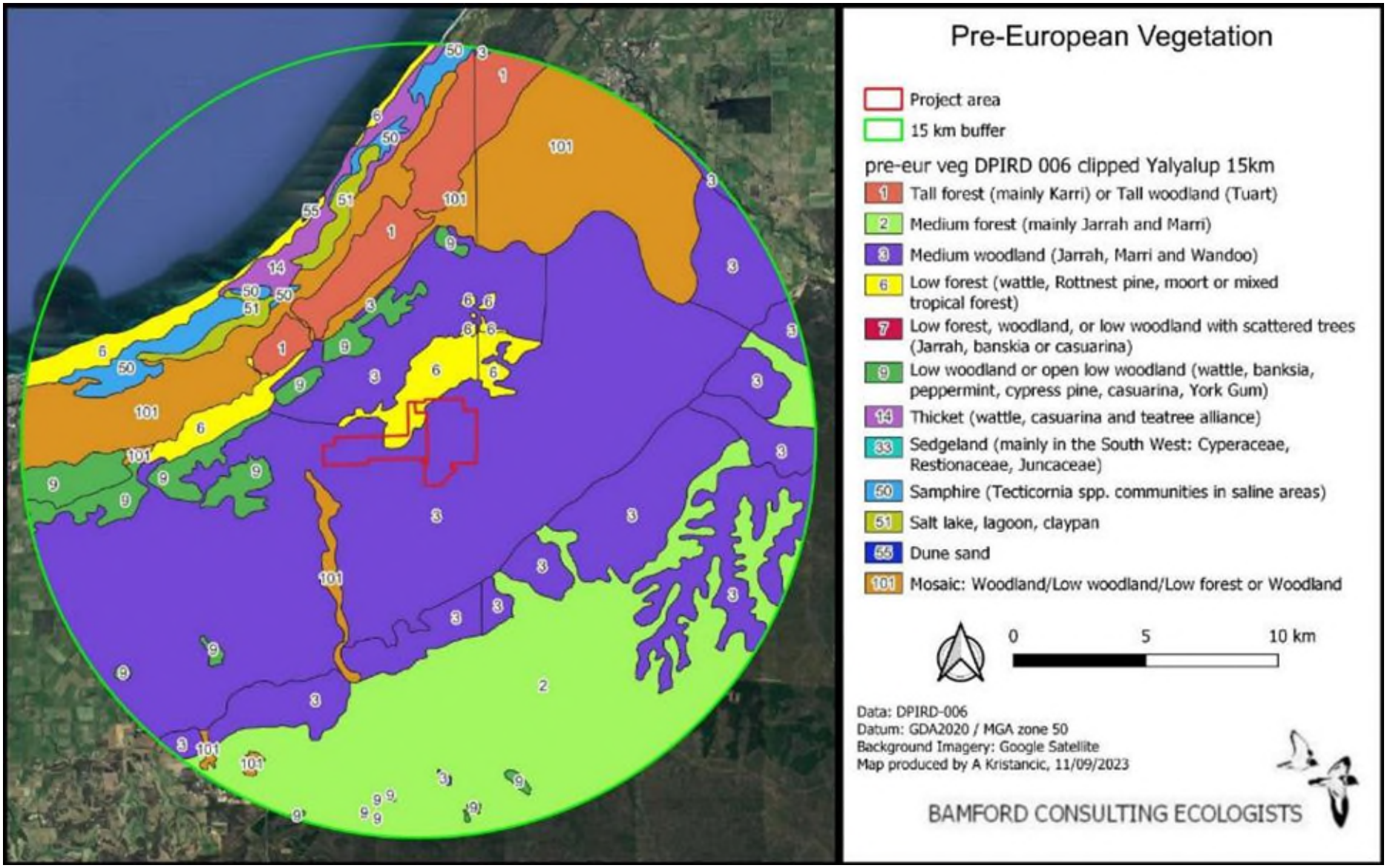

Figure 1-8. Pre-European vegetation types (DPIRD, 2023b) within 15km of the project area.

1.2.6 Regional development

The project area is surrounded by a highly fragmented landscape that has been largely cleared for agriculture, grazing and residential use and includes a network of sealed and unsealed roads. The exception to this is the large area of intact native vegetation of the Whicher Scarp, c. 5 km south-east of the project area. Figure 1-9 illustrates the existing extent of land clearing and development in a 15 km buffer around the project area. Within this buffer, c. 23, 650 ha of native vegetation remains (DPIRD, 2023a); therefore existing land clearing or development (c. 39, 342 ha) impacts c. 62 % of the total land area (excluding ocean) in this buffer (c. 62, 992 ha). According to the native vegetation extent dataset from DPIRD (2023a), only a few small areas of native vegetation occur within the project area boundary; 13.4 ha in total (Figure 1-9). This native vegetation extent dataset is a broad indication of vegetation remaining in the project area and surrounding landscape. To provide more detail concerning areas that provide habitats for fauna, BCE describes and provides maps of vegetation and substrate associations (VSAs) observed during site inspections. This is described in more detail in Section 2.2.

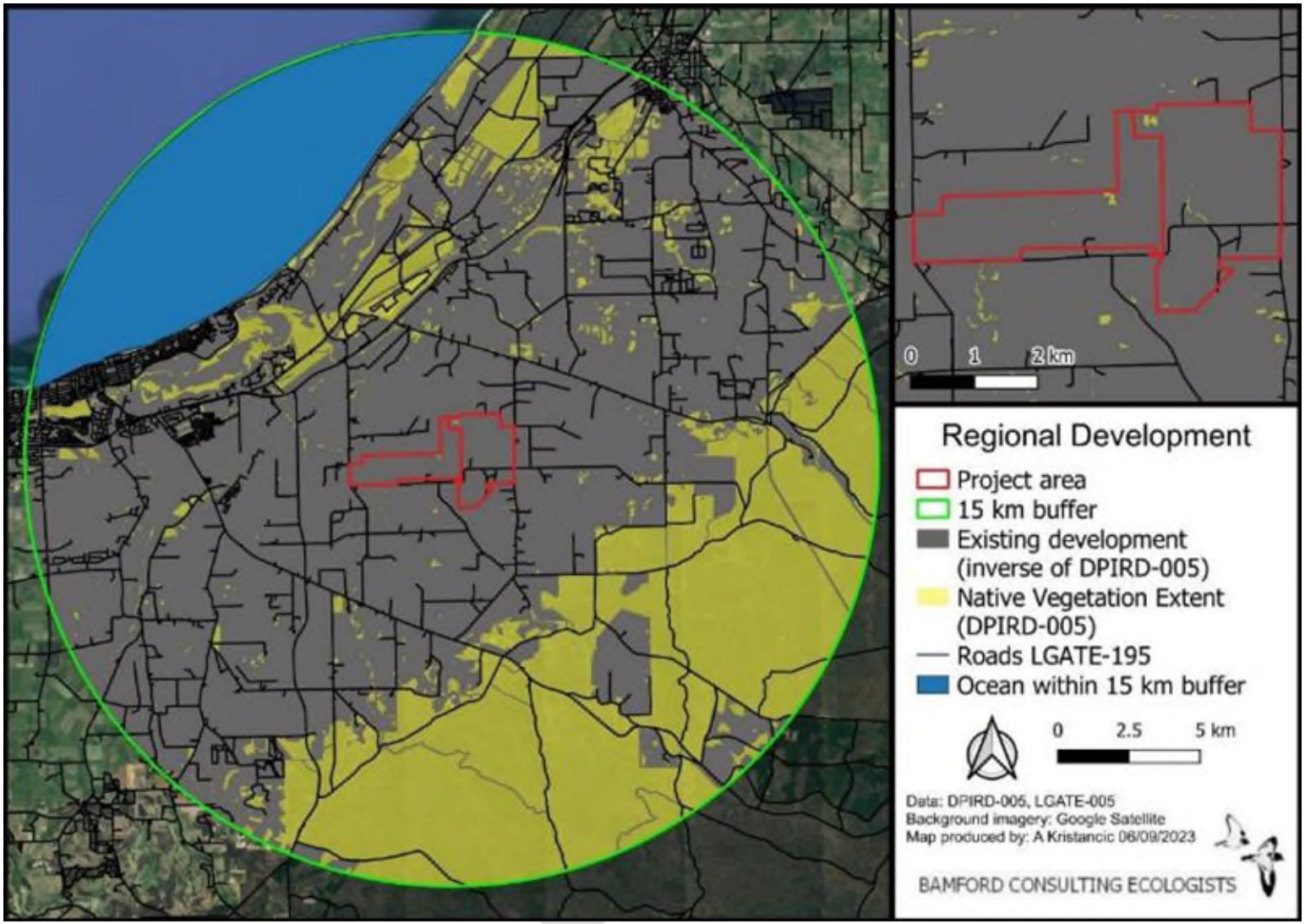

Figure 1-9. Estimated existing development within 15 km of the project area. Native vegetation extent is from DPIRD (2023a).

2 Methods

2.1 Overview

The methods used for this assessment involves the identification of values to fauna that depend on the habitats available, particularly for conservation significant species. This approach has been developed with reference to guidelines and recommendations set out by the Western Australian Environmental Protection Authority (EPA) on fauna surveys and environmental protection (EPA, 2002, 2016a, 2016b, 2020), and Commonwealth biodiversity legislation (DotE, 2013; DSEWPaC, 2013). The EPA (2020) recommends three levels of investigation that differ in their approach for field investigations;

- Basic – a low-intensity survey, conducted at the local scale to gather broad fauna and habitat information (formerly referred to as 'Level 1'). The primary objectives are to verify the overall adequacy of the desktop study, and to map and describe habitats. A basic survey can also be used to identify future survey site locations and determine site logistics and access. The results from the basic survey are used to determine whether a detailed and/or targeted survey is required. During a basic survey, opportunistic fauna observations should be made and low-intensity sampling can be used to gather data on the general faunal assemblages present. While referred to as 'basic', this level of survey is involved and powerful, and should be considered the primary level of assessment. Other levels of assessment (where deemed necessary) add information to inform this primary level.
- Detailed – a detailed survey to gather quantitative data on species, assemblages and habitats in an area (formerly referred to as 'Level 2'). A detailed survey requires comprehensive survey design and should include at least two survey phases appropriate to the biogeographic region (bioregion). Surveys should be undertaken during the seasons of maximum activity of the relevant fauna and techniques should be selected to maximise the likelihood that the survey will detect most of the species that occur, and to provide data to enable some community analyses to be carried out.
- Targeted – to gather information on significant fauna and/or habitats, or to collect data where a desktop study or field survey has identified knowledge gaps. Because impacts must be placed into context, targeted surveys are not necessarily confined to potential impact areas. A targeted survey usually requires one or more site visits to detect and record significant fauna and habitats. For areas with multiple significant species there may not be a single time of year suitable to detect all species. In these cases, multiple visits, each targeting different species or groups, should be conducted.

The level of assessment recommended by the EPA (2020) is determined by geographic position, with a generic statement that detailed surveys are expected across all of the state except the south-west, but also recommending that site and project characteristics be considered, such as the survey objectives, existing available data, information required, the scale and nature of the potential impacts of the proposal and the sensitivity of the surrounding environment in which the disturbance is planned. These aspects should be considered in the context of the information acquired by the desktop study. When determining the type of survey required, the EPA (2020) suggested that the following be considered:

- level of existing regional knowledge;

- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

Guidance for field investigation methods for vertebrate fauna is provided by the EPA (2016c, 2020) and by Bamford *et al.* (2013).

The approach and methods utilised in this report for the Detailed assessment are divided into two sections, which differ in their objectives, and are used in combination to summarise the fauna values of the project area:

- **Desktop assessment**. The purpose of the desktop review is to produce a species list that can be considered to represent the vertebrate fauna assemblage of the survey area based on unpublished and published data using a precautionary approach.

- **Field investigations.** The purpose of the field investigations is to gather information on this assemblage: confirm the presence of as many species as possible (with an emphasis on species of conservation significance), place the list generated by the desktop review into the context of the environment of the survey area, collect information on the distribution and abundance of this assemblage, and develop an understanding of the survey area's ecological processes that maintain the fauna. Note that field investigations cannot confirm the presence of an entire assemblage, or confirm the absence of a species. This requires far more work than is possible (or recommended) for studies contributing to the EIA process because fauna assemblages vary seasonally and annually, and often have high levels of variation even over short distances (Beta diversity). For example, in an intensive trapping study, How and Dell (1990) recorded in any one year only about 70% of the vertebrate species found over three years. In a study spanning over two decades, Bamford *et al.* (2010) found that the vertebrate assemblage varies over time and space, meaning that even complete sampling at a set of sites only defines the assemblage of those sites at the time of sampling.

2.2 Identification of vegetation and substrate associations (VSAs)

Vegetation and substrate associations (VSAs) combine vegetation types, the soils or other substrate with which they are associated, and the landform. In the context of fauna assessment, VSAs are the environments that provide habitats for fauna.

BCE deliberately makes the distinction between 'habitat' (a species-specific term that may encompass the whole or part of one or more VSAs and is the physical subset of an ecosystem that a given species, or species group, utilises) and 'VSA' (a general, discrete and mutually exclusive spatial division of a target area, based on soil, vegetation and topography). It is recognised, however, that, within the broader EIA literature/guidance, the former term is used more or less synonymously to indicate the latter (e.g.' habitat assessment' used by EPA, 2020). Further discussion is provided in Appendix 1.

2.3 Desktop assessment of expected species

2.3.1 Sources of information

As per the recommendations of EPA (2020), information on the fauna assemblage of the project area was drawn from a range of sources including databases (as listed in Table 2-1). A buffer of 25 km was used for each of these in an attempt to keep records as relevant to the project area as possible, since the environment varies over short distances in the region. Information from these sources was supplemented with species expected in the area based on general patterns of distribution. Sources of information used for these general patterns are listed in Table 2-2.

Table 2-1. Databases searched for the desktop review; accessed August 2023.

Database	Type of records held in database	Area searched
Atlas of Living Australia (ALA, 2023)	Fauna records from Australian museums and conservation/research bodies.	25 km radius around centroid of project area
NatureMap (DBCA, 2023d)	Records from the Western Australian Museum (WAM) and Department of Biodiversity, Conservation and Attractions (DBCA) databases, including historical data.	25 km radius around centroid of project area
DBCA Threatened and Priority Fauna (DBCA, 2023a)	Records from the DBCA Threatened and Priority species database, including black-cockatoo nesting/roosting data.	25 km radius around centroid of project area
BirdLife Australia databases (BirdLife Australia, 2023b, 2023a, 2023c)	Records from Bird Life Australia, including birdata and black-cockatoo datasets	25 km radius around centroid of project area
EPBC Protected Matters Search Tool (DCCEEW, 2023f)	Records on MNES protected under the EPBC Act.	25 km radius around centroid of project area
Index of Biodiversity Surveys for Assessment (IBSA) (DWER, 2023c)	Flora and fauna data contained in EIA biodiversity survey reports.	25 km radius around centroid of project area

Table 2-2. Sources of information used for general patterns of fauna distribution.

Taxa	Sources
Fish	Morgan *et al.* (1998), Allen *et al.* (2003), Morgan *et al.* (2014), DoF (2023).
Frogs	Tyler and Doughty (2009), Anstis (2017).
Reptiles	Storr *et al*. (1983, 1990, 1999, 2002) , Bush *et al.* (2010), Wilson and Swan (2021).
Birds	Johnstone and Storr (1998, 2005), Menkhorst *et al*. (2017).
Mammals	Van Dyck and Strahan (2008), Churchill (2009), Menkhorst and Knight (2011).

2.3.2 Previous fauna surveys

There are two recent fauna surveys which are of particular relevance to the present project due to their close proximity: a 'Detailed' fauna assessment in Tutunup conducted by BCE and a 'Basic and targeted' fauna assessment in Yalyalup conducted by Greg Harewood. The Tutunup survey area was located less than 5 km east of the project area and the environments included farmland (as in Yalyalup) and forested areas. During 2019, 2020 and 2022, BCE conducted detailed surveys here including pitfall traps, funnel traps and spotlighting (McCreery *et al*., 2023). Biota (2009) also conducted surveys at this location in 2009. The Yalyalup assessment was for the existing Doral mineral sands mine immediately south of the project area; the assessment was conducted in 2017 and 2019 (Greg Harewood, 2020). All areas of the project area from the 2020 report are within c. 3 km of the current project area boundary. The environments present at the site are very similar to those of the current project area. Results from both of these assessments are presented in Section 3.2.3.

In addition, there were 28 previous fauna surveys listed within 25 km of the project area returned from the Index of Biodiversity Surveys for Assessments (IBSA) (DWER, 2023c). These are shown in Table 2-3. For 19 of these surveys reports and/or data were available and these were consulted. Of the reports for which resources were available, one assessed fauna habitat only (with no additional fauna surveys), eight were targeted assessments for species of conservation significance (black-cockatoos and/or Western Ringtail Possum), four were "Basic" (previously Level 1) fauna surveys, and five were "Basic" fauna surveys with additional habitat or targeted assessments. The remaining survey (GHD 2010) was not available via IBSA but the fauna observations were available in the appendix of another report (GHD 2017); thus, these data were able to be included. Where relevant, recorded fauna species from "Basic" and targeted surveys were added to the species list that forms the basis for the list of expected vertebrate species.

Table 2-3. Terrestrial fauna survey reports with resources available on IBSA, for a 25 km radius around the Yalyalup project area. Nine additional surveys were found in the 25 km radius but resources were not available – these are listed in Appendix 2.

Author	Title	Type
GHD (2010) (report not available, but data presented in GHD, 2017)	Vasse Diversion Drain Upgrade Fauna and Flora Study,	Unclear, Data in GHD (2017)
Ecosystem Solutions (2014)	Level 1 Fauna and Level 2 Flora/Vegetation Assessment. Unpublished report prepared for City of Busselton.	Basic
Greg Harewood (2015b)	Black Cockatoo Habitat Assessment of Proposed Clearing Areas - Lot 914 and Lot 2699 Jamison's Road, Chapman Hill. Unpublished report prepared for B & J Catalano.	Targeted – black-cockatoos
Greg Harewood (2015c)	Fauna Habitat Assessment - Clearing Permit Application CPS 6588/1 Mallokup Road, Capel. Unpublished report prepared for Shire of Capel.	Targeted – tree hollows
Greg Harewood (2015a)	Black Cockatoo Habitat Assessment of Proposed Clearing Areas Lot 2992 Price Road. Unpublished report prepared for B & J Catalano.	Targeted – black-cockatoos
GHD (2017b)	Vasse Diversion Drain Upgrade Flora and Fauna Study	Basic and Targeted
GHD (2017a)	Vasse Diversion Drain Fauna and Vegetation Assessment -Additional Survey	Targeted – black-cockatoos and Western Ringtail Possum
Ecosystem Solutions (2017)	Reconnaissance Flora, Vegetation and Fauna Survey, Busselton Strategic Network Corridors, prepared for City of Busselton C/- Strategen Environmental, Dunsborough, Western Australia.	Basic
SW Environment (2017)	Black Cockatoo Habitat Assessment - Lots 2 & 3 Nuttman Road, Chapman Hill. Unpublished report prepared for Leeuwin Civil.	Targeted – black-cockatoos
Greg Harewood (2017)	Fauna Habitat Assessment of Proposed Clearing Areas, Lot 2626 Jamison's Road Chapman Hill. Unpublished report prepared for B & J Catalano.	Targeted – South-western Brush-tailed Phascogale and black-cockatoos
GHD (2018)	Vasse Diversion Drain Proposal Variation Summary Report, prepared for the Water Corporation	Fauna habitat

Author	Title	Type
SW Environmental (2018)	Yoongarillup Road (5.15-8.57 SLK), Sabina River: Habitat Tree Survey. Unpublished report prepared for City of Busselton.	Targeted – black-cockatoos, phascogales, Western Ringtail Possum
Natural Area Consulting Management Services (2018)	Shire of Capel, Hansen Road - Fauna Assessment. Unpublished report prepared for Shire of Capel.	Basic and Targeted – black-cockatoos
Greg Harewood (2020)	Fauna Assessment - Yalyalup Mineral Sands Project - Unpublished report for Doral Mineral Sands Pty Ltd.	Targeted – black-cockatoos and Western Ringtail Possum
SW Environmental (2019)	Flora and Fauna Survey Yoongarillup Road (SLK 0.00 to 3.15), Sabina River. Unpublished report to City of Busselton.	Basic and Targeted – black-cockatoos
Ecosystem Solutions (2019b)	Flora and Fauna Significance Assessment, Cape Tutunup Road, Tutunup. Unpublished report prepared for City of Busselton	Basic
Ecosystem Solutions (2019a)	Flora and Fauna Significance Assessment (2019), Don Road, Chapman Hill, Unpublished report prepared for The City of Busselton.	Basic
Ecoedge (2019)	Fauna Assessment (CPS 8424/1) – Wonnerup South Road (SLK 1.40 to SLK 8.88) Abba River. Unpublished report for City of Busselton	Basic and Targeted – black-cockatoos and Western Ringtail Possum)
SW Environmental (2020)	Black Cockatoo Survey Kaloorup Road SLK 3.23 - 3.26 SLK	Targeted – black-cockatoos

2.3.3 Nomenclature and taxonomy

As per the recommendations of the EPA (2020), the nomenclature and taxonomic order presented in this report are generally based on the Western Australian Museum's (WAM) Checklist of the Fauna of Western Australia 2020. The authorities used for each vertebrate group were: fish (Morgan *et al*., 2014), frogs (Doughty, 2022a), reptiles (Doughty, 2022b), birds (Gill *et al*., 2023), and mammals (Travouillon, 2022). In some cases, more widely-recognised names and naming conventions have been followed, particularly for birds where there are national and international naming conventions in place (e.g. the BirdLife Australia working list of names for Australian Birds (BirdLife Australia, 2022), and the International Ornithological Congress' 'World Bird List'). Similarly, the group name 'black-cockatoo' is consistently used for all three taxa in the South-West. English common names of species, where available, are used throughout the text; Latin names are presented with corresponding English names

in tables in the appendices. The use of subspecies is limited to situations where there is an important (and relevant) geographically distinct population, or where the taxonomic distinction has direct relevance to the conservation status or listing of a taxon.

2.3.4 Interpretation of species lists

2.3.4.1 Expected occurrence

Species lists generated from the review of sources of information are generous as they include records drawn from a large region (the study area, see Figure 1-1) and possibly from environments not represented in the project area. Therefore, some species that were returned by one or more of the database and literature searches have been excluded because their ecology, or the environment within the project area, determined that it is highly unlikely that these species will be present. Such species can include, for example, seabirds that might occur as extremely rare vagrants at a terrestrial, inland site, but for which the site is of no importance. Species returned from the databases and not excluded on the basis of ecology or environment are therefore considered potentially present or expected to be present in the project area at least occasionally, whether or not they were recorded during field surveys, and whether or not the project area is likely to be important for them. This list of expected species is therefore subject to interpretation by assigning each a predicted status, the expected occurrence, in the project area. The status categories used are:

- **Resident:** species with a population permanently present in the project area.
- **Regular visitor:** species that occur within the project area regularly in at least moderate numbers, such as part of an annual cycle (thus includes migrants).
- **Irregular Visitor:** species that occur within the project area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the project area in at least moderate numbers and for some time.
- **Vagrant:** species that occur within the project area unpredictably, in small numbers and/or for very brief periods. Therefore, the project area is unlikely to be of importance for the species.
- **Locally extinct:** species that would have been present but has not been recently recorded in the local area and therefore is almost certainly no longer present in the project area.
- **Probably absent:** species that are very unlikely to persist in the area due to the very high habitat loss which has occurred in the area. Such species are usually those with poor powers of dispersal (many reptiles, small mammals; some sedentary birds). The category is used to help distinguish between sites that may have relictual populations due to the retention of some habitat and/or connectivity, and sites where the level of habitat loss and loss of connectivity has been extreme.

These status categories make it possible to distinguish between vagrant species, which may be recorded at any time but for which the project area is not important in a conservation sense, and species which use the project area in other ways but for which the site is important at least occasionally. This is particularly useful for birds that may naturally be migratory or nomadic, and for some mammals that can also be mobile or irruptive, and further recognises that even the most detailed field survey can fail to record species which will be present at times. The status categories are assigned conservatively based on the precautionary principle. For example, a lizard known from the general area is assumed to be a resident unless there is very good evidence the project area will

not support it, and even then, it may be classed as a vagrant rather than assumed to be absent if the site might support dispersing individuals. It must be stressed that these status categories are predictions only and that often very intensive sampling would be required to confirm a species' status. It should be noted that the aim of the desktop assessment and field investigations is not to confirm the presence or absence of species in the project area. By using a precautionary approach, the expected species assemblage represents a conservative estimate of the species assemblage that may use the project area, with errors of inclusion rather than exclusion.

The results of the database searches were reviewed and interpreted, and obvious errors and out of date taxonomic names were deleted.

2.3.4.2 Conservation significance

All expected species were assessed for conservation significance as detailed in Appendix 1. Three broad levels of conservation significance are used in this report:

- Conservation Significance 1 (CS1) – species listed under State or Commonwealth Acts such as the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Biodiversity Conservation Act 2016* (BC Act);
- Conservation Significance 2 (CS2) – species listed as Priority by DBCA but not listed under State or Commonwealth Acts; and
- Conservation Significance 3 (CS3) – species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution. In the Wheatbelt region, a large proportion of what might otherwise be considered common species are of local significance as they are reliant on the very small areas of remnant native vegetation. In a different context, this principle was used by Dell and Banyard (2000) to recognise species of conservation significance in urban landscapes.

See Appendix 1 for an expanded discussion of these categories and Appendix 23 for a description of the categories used in the legislation (EPBC and BC Acts) and by the DBCA.

2.4 Field Investigation

2.4.1 Overview

The site visit involved two personnel driving around and walking across as much of the project area as possible. GPS tracks are indicated on Figure 2-1. Areas which do not contain GPS tracks were visible and assessed from afar. Within the project area, field investigations that were conducted included:

- identification of VSAs (that provide fauna habitats);
- searching for conservation significant species or evidence;
- targeted black-cockatoo assessment involving nesting tree, foraging and roosting assessment;
- targeted Western Ringtail Possum assessment; and
- opportunistic fauna observations (birds and other fauna, including signs such as diggings, scats and tracks).

2.4.2 Dates and Personnel

The project area was visited on 18th, 21st, 22nd, 23rd, 24th and 31st August 2023, and 17th January 2024. Personnel involved in the field investigations and report preparation (including desktop review) are listed in Table 2-4.

Table 2-4. Personnel involved in the field investigations and report preparation.

Personnel	EIA/Wildlife Survey Experience	Field Investigations	Report Preparation
Dr Jamie Wadey *BSc (Zoology/Ecology), Hons (Ecology), PhD (Movement Ecology)*	7 years	+	+
Natalia Huang *BEnvSc (Zoology), Hons (Conservation Biology), MBA*	17 years	+	+
Dr Amanda Kristancic *BSc (Zoology/Biochemistry), Hons (Zoology), PhD (Parasitology)*	2 years		+
Mary-Ruth Low *BSc and Hons (Life Sciences), MSc (Ecol. Economics)*	9 years		+
Mandy Bamford *BSc and Hons (Zoology)*	42 years	+	
Dr Mike Bamford *BSc (Biology), Hons (Biology), PhD (Biology)*	45 years		+

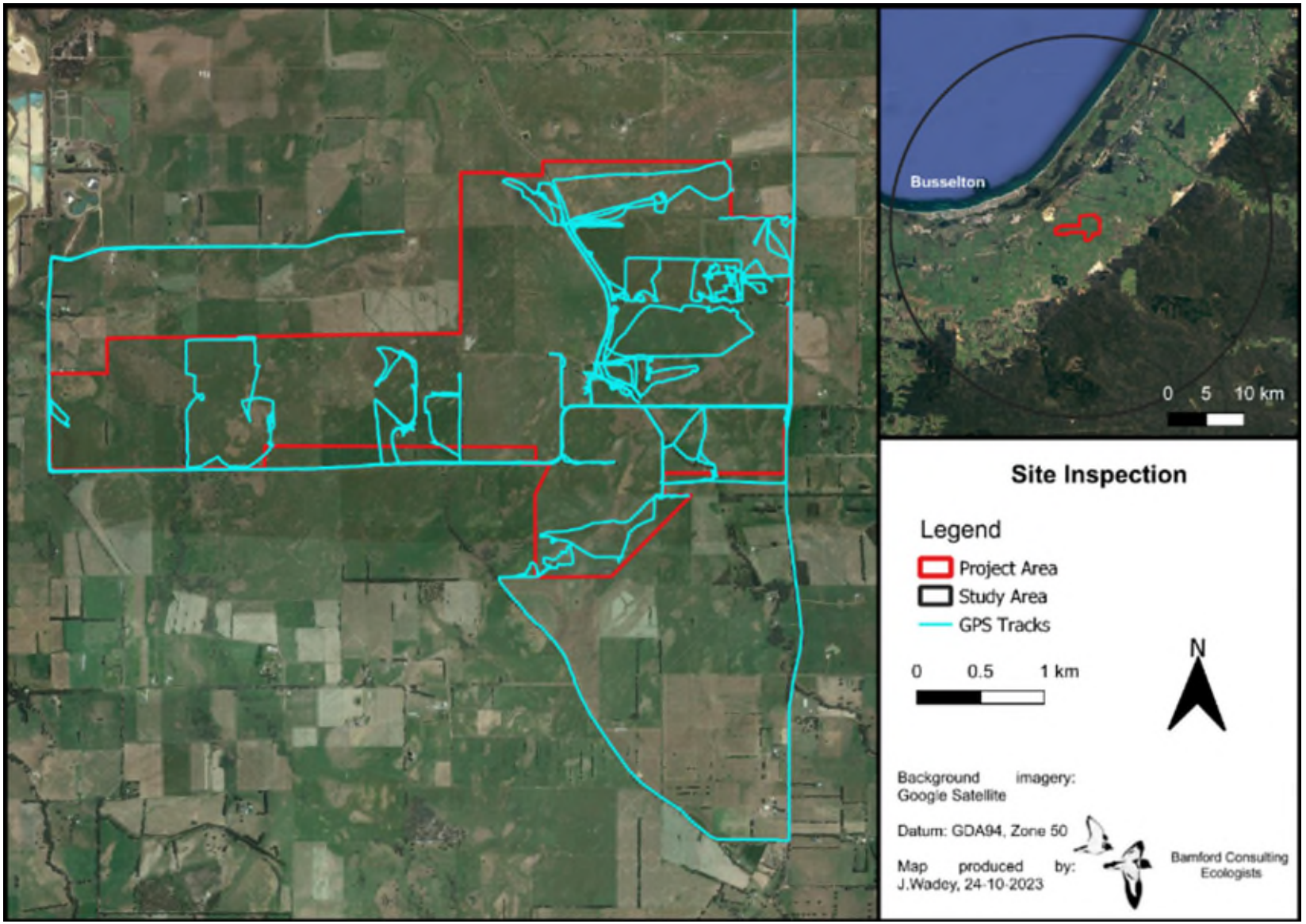

Figure 2-1 GPS tracks of field personnel during August 2023 site inspections

2.4.3 Vegetation and Substrate Associations

Vegetation and Substrate Associations (VSAs) in the survey area were assessed during the desktop assessment and field investigations. Within the survey area, all major VSAs were visited to develop an understanding of major fauna habitat types present and to assess the likelihood of conservation significant species being present in the area. VSAs are described in section 3.1.

2.4.4 Black-cockatoo habitat analysis

2.4.4.1 Guidelines

The Department of Climate Change, Energy, the Environment and Water (DCCEEW, formerly DAWE) provides guidelines for the referral of actions that may result in impacts to black-cockatoos (for assessment under the EPBC Act) (DAWE, 2022). The survey and analysis reported here have been conducted with reference to both the referral guidelines provided by DSEWPaC (2012) and DAWE (2022) and recommendations listed on the DAWE's Species Profile and Threats Database (DCCEEW, 2023b, 2023d, 2023c). Ecological values for black-cockatoos within the site were based on the definitions of breeding, foraging and roosting habitat as per the EPBC Act referral guidelines for black-cockatoos (DSEWPaC, 2012). Actual scoring of foraging value and assessment of potential breeding habitat was based on systems developed by BCE that are outlined below. The Department of Biodiversity, Conservation and Attractions (DBCA) has indicated that the methods developed and applied previously by BCE are an acceptable approach.

2.4.4.2 Foraging

The foraging value of the project area was assessed by calculating a foraging score for areas of similar vegetation type/condition (see Appendix 4). The foraging score provides a numerical value that reflects the significance of vegetation as foraging habitat for black-cockatoos, and this numerical value is designed to provide the sort of information needed by the federal DCCEEW, the state Department of Water and Environmental Regulation (DWER) and the WA Environmental Protection Authority (EPA) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area, and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed in Appendix 4. These three components are drawn from the DCCEW offset calculator (DCCEEW, undated) but with the scoring approach developed by BCE:

- A score out of six for the vegetation composition, condition and structure.
- A score out of three for the context of the site.
- A score out of one for species density.

Foraging value can thus be assigned a score out of six, based upon site vegetation characteristics, or a score out of 10 (the Habitat Quality core; HQS) if context and species density are also considered. A higher score represents better foraging value. A score out of 10 is presented for the purposes of aiding offset calculations. The approach to assigning scores for vegetation, context and species density are outlined in Appendix 4. Foraging value scores are calculated differently for the three black-cockatoo species (Appendix 4) depending upon the vegetation present; thus a separate score is given for each VSA for each species.

Black-cockatoo foraging signs were also recorded in conjunction with the breeding tree surveys and general site inspections. If foraging signs were observed, the location, tree species and approximate age of the foraging evidence were recorded. Black-cockatoo foraging evidence may persist for some months or years after the foraging event. There is currently no published evidence documenting the deterioration process of foraging evidence. Factors that help to establish the time since foraging include: the colour of nuts/foliage, the degree of weathering or decay of debris, the presence of small fragments of nut debris, the position/compression of the foraging debris relative to surrounding vegetation and leaf litter, and the strength of the eucalypt smell emitted. Despite the absence of empirical data, four categories of foraging activity are recognised in the approach used by BCE, based on the time since foraging:

(i) Active – where birds were observed in the act of foraging;

(ii) Recent – foraging signs (e.g. chewed nuts or vegetation) were 'fresh' (i.e. foraging was likely to have occurred within days to weeks). Recent foraging signs were typically green and/or with very little sign of weathering. Approximately less than four weeks old;

(iii) Intermediate – foraging was likely to have occurred within weeks to months previously. Approximately one to six months old; and

(iv) Old – foraging was likely to have occurred months to years previously. Approximately more than six months old.

2.4.4.3 Breeding

The aim of the breeding surveys was to record all potential hollow-bearing trees (suitable for black-cockatoo nesting) within the project area. The following information was recorded for every suitable tree[1] with a diameter at breast height (DBH) equal to or greater than 500 mm (or 300 mm for Wandoo/Salmon Gum):

- tree location;
- tree species;
- life status;
- DBH; and
- nest-tree rank: trees were assessed (from the ground) for the potential presence/quality of nest-hollows and allocated a nesting rank (developed by BCE) as described in Appendix 4.

The January 2024 site visit involved revisiting 17 Rank 3 trees (identified by the client as likely to be in the development area) to inspect the hollows with a pole camera and confirm their rank categories; trees revisited are indicated in Appendix 10. Trees are to remain a rank three if the hollow was close to vertical and a depth of >50cm. In addition, a rank three remained if the hollow cannot be accessed. Trees were downgraded to a rank four if the hollow appeared shallow <50cm or blocked.

The DBCA threatened species database (DBCA, 2023a) was queried for black-cockatoo breeding sites and these are presented in the relevant section below.

[1] the draft revised EPBC Act study guidelines (DEE, 2017) stress that <u>any</u> tree species may provide suitable hollows.

Table 2-5. Ranking system for the assessment of potential nest-trees for black-cockatoos.

As per information from DAWE (2023d, 2023c, 2023b), a potential nest-tree is any tree with a diameter at breast height >500 mm (or >300 mm for *Eucalyptus salmonophloia* and *E. wandoo*). Note that black-cockatoos favour vertical hollows for the nest chamber, but the hollow entrance may be vertical (a chimney hollow), have a side entrance or have a horizontal spout entrance.

Rank	Description of tree and hollows/activity
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow. Can also be used for a known nest tree active in the previous 12 months (although this should be noted in the description). Note that activity at a hollow does not absolutely mean that breeding is occurring unless a young bird in hollow is observed.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present - as suggested by structure of tree, such as large, vertical trunk broken off at a height of >8m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5m so in a Wheatbelt breeding site a lower criterion may be more appropriate.
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows (nest chamber) are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by black-cockatoos. Trees with low but otherwise suitable hollows can also be assigned a rank or 4, depending on the species of black-cockatoo likely to be present.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

2.4.4.4 Roosting

As the breeding and foraging surveys were conducted, areas likely to be used as roosting sites (e.g., sites adjacent to watercourses with large trees) were noted. In the late afternoon to evening of the spotlighting event (24th August 2023), a roost survey was conducted. This involved being in the area before, during and after sunset, when birds would be heard or seen arriving if there was a roost nearby. BirdLife Australia's black-cockatoo roosting dataset (BirdLife Australia, 2023b) was queried for black-cockatoo roosting sites and these are presented in the relevant section below.

2.4.5 Targeted Western Ringtail Possum assessment

Throughout the field investigations, trees were searched for the distinctive dreys made by the possum and the base of trees were examined for scats of the species. A spotlighting event was conducted on 24th August 2023 in the hour following sunset to search for the possum in areas of suitable habitat; these were in dense woodland along the stream and along Peppermint stands on verges. The areas visited during the spotlighting survey are shown in Figure 2-2.

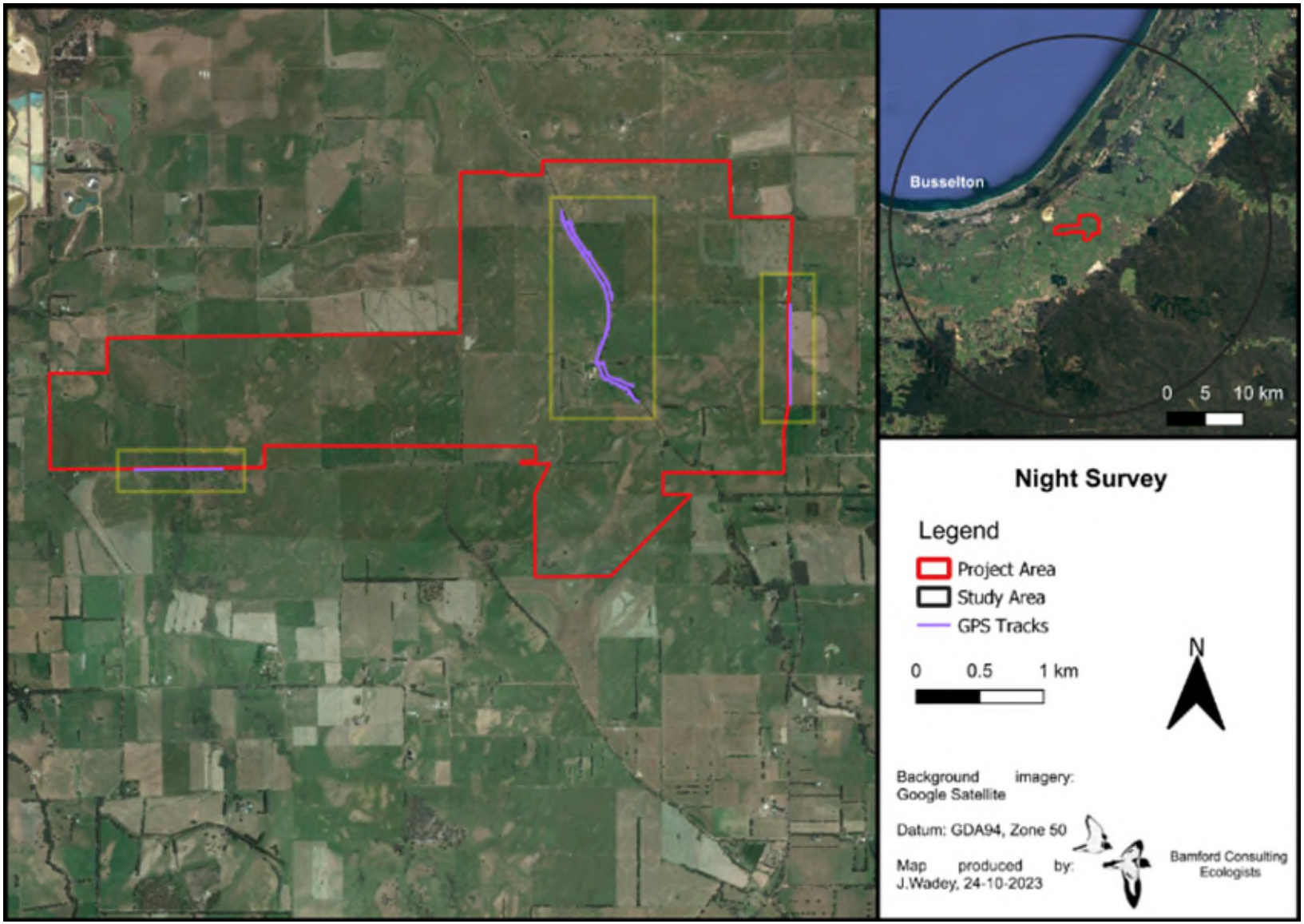

Figure 2-2 Locations of spotlighting survey for Western Ringtail Possum

2.4.6 Opportunistic observations

At all times during the field assessment, observations of fauna were noted when they contributed to the accumulation of information on the fauna of the site. These included casual observations such as birds and reptiles seen, or frogs heard calling while the ecologists traversed the site. Evidence of species, such as nests, diggings (such as for conservation significant Quenda) and tracks were also recorded.

2.5 Survey Limitations

The EPA Guidance Statement 56 (2004) and the EPA (2020) outline a number of limitations that may arise during field investigations for Environmental Impact Assessment. These survey limitations are discussed in the context of the BCE investigation of the survey area Table 2-6.

Table 2-6. Survey limitations as outlined by EPA.

EPA Limitation	Comment
Level of survey.	Basic and targeted black-cockatoo and Western Ringtail Possum survey. Survey intensity was deemed adequate due to the condition of the survey area, the scale of the project and the existing data records available in the region.
Competency/experience of the consultant(s) carrying out the survey.	The ecologists have had extensive experience in conducting fauna surveys and several fauna studies within the region, focussing on relevant conservation significant species.
Scope. (What faunal groups were sampled, and were some sampling methods unable to be employed because of constraints?)	The survey focussed on fauna values and conservation significant species.
The proportion of fauna identified, recorded and/or collected.	All animals observed were identified.
Sources of information, e.g., previously available information (whether historic or recent) as distinct from new data.	Abundant information from databases, e.g., DBCA, EPBC and nearby previous studies, e.g. *Harewood (2020), McCreery et al. (2023).*
The proportion of the task achieved and further work which might be needed.	All work was completed.
Timing/weather/season/cycle.	Assessment was conducted in August 2023.
Disturbances (e.g., fire, flood, accidental human intervention etc.) that affected results of survey.	None
Intensity. (In retrospect, was the intensity adequate?)	Intensity was deemed adequate. All potential black-cockatoo nesting trees were visited; all VSAs were visited.

EPA Limitation	Comment
Completeness (e.g., was relevant area fully surveyed).	Project area was fully surveyed.
Resources (e.g., degree of expertise available in animal identification to taxon level).	Field personnel have extensive experience with fauna and habitat in the region.
Remoteness and/or access problems.	There were no remoteness/access problems encountered.
Availability of contextual (e.g., biogeographic) information on the region.	Extensive regional information was available and was consulted.

3 Results and Discussion

3.1 Vegetation and Substrate Associations

Vegetation and Substrate Associations (VSAs) are considered typical of the Swan Coastal Plain with a mix of degraded and remnant vegetation. Eight VSAs were documented and their descriptions are below. Photographs of each VSA are shown in Plates 1 to 14, and Figure 3-1, Figure 3-2 and Figure 3-3 show VSAs. VSA descriptions are:

VSA 1. Mixed Marri Woodland. Closed woodland of Marri (*Corymbia calophylla*) with scattered Jarrah (*Eucalyptus marginata*), Flooded Gum (*Eucalyptus rudis*) and Swamp Mahogany (*Eucalyptus robusta*) over a sparse midstorey of *Kunzea sp, Agonis flexuosa*, *Xanthorrhoea pressii*, and *Banksia grandis* with a disturbed understory of introduced grasses on grey to white sand.

VSA 2. Stream with mixed Marri. Closed remnant woodland with Marri (*Corymbia calophylla*) and patches of *Eucalyptus rudis* over open midstorey of *Agonis flexuosa* and *Melaleuca rhaphiophylla* with an understorey of exotic grasses and sedges on grey sand along stream banks.

VSA 3. Flooded Gum stand. Open stand of Flooded Gum (*Eucalyptus rudis*) with no midstorey and understorey consisting of invasive grasses and weeds on grey to white sand.

VSA 4. Planted Eucalypts. Open woodland or stand of scattered planted mature eucalypt trees (often exotic) such as *Eucalyptus camaldulensis* and *Corymbia maculata* over a grassy understorey on grey to white sand.

VSA 5. Stream with Planted Eucalypts. Human-made stream (irrigation channel) with introduced eucalypts on banks with no midstorey or understorey over introduced grasses on grey to white sand.

VSA 6. Melaleuca Dampland. Ranges from open to closed dampland with *Melaleuca rhaphiophylla* with midstorey of scattered *Kunzea* and understorey of invasive weeds and grasses on dark grey sand. Appears to be seasonally inundated.

VSA 7. Planted Garden. Ornamental species in proximity to dwellings with scattered introduced eucalypts, remnant and planted *Agonis flexuosa*, pine trees (*Pinus pinaster*) on grey to white sand.

VSA 8. Paddocks with scattered mature trees. Previously cleared paddocks planted with exotic planted grasses, used for grazing, with scattered mature trees, mostly native remnant and some planted, on grey to white sand.

Plate 1. VSA 1: Mixed Marri Woodland.

Plate 2. VSA 2: Stream with Mixed Marri.

Plate 3. VSA 3: Flooded Gum Stand.

Plate 4. VSA 4: Planted Eucalypts.

Plate 5. VSA 5: Stream with Planted Eucalypts.

Plate 6. VSA 6: Melaleuca Dampland.

Plate 7. VSA 7: Planted Garden.

Plate 8. VSA 8: Paddocks with scattered mature trees.

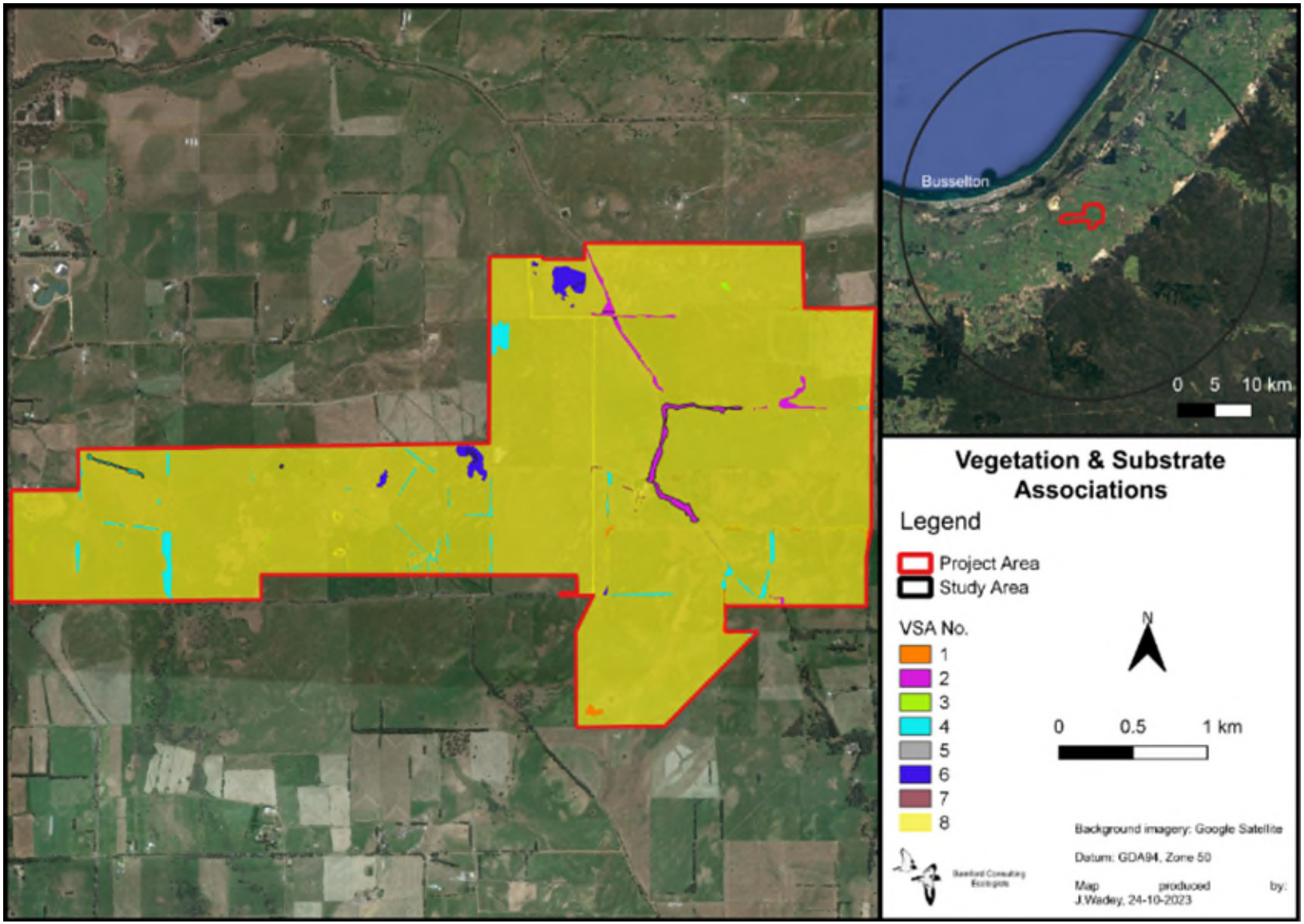

Figure 3-1 VSA map overview

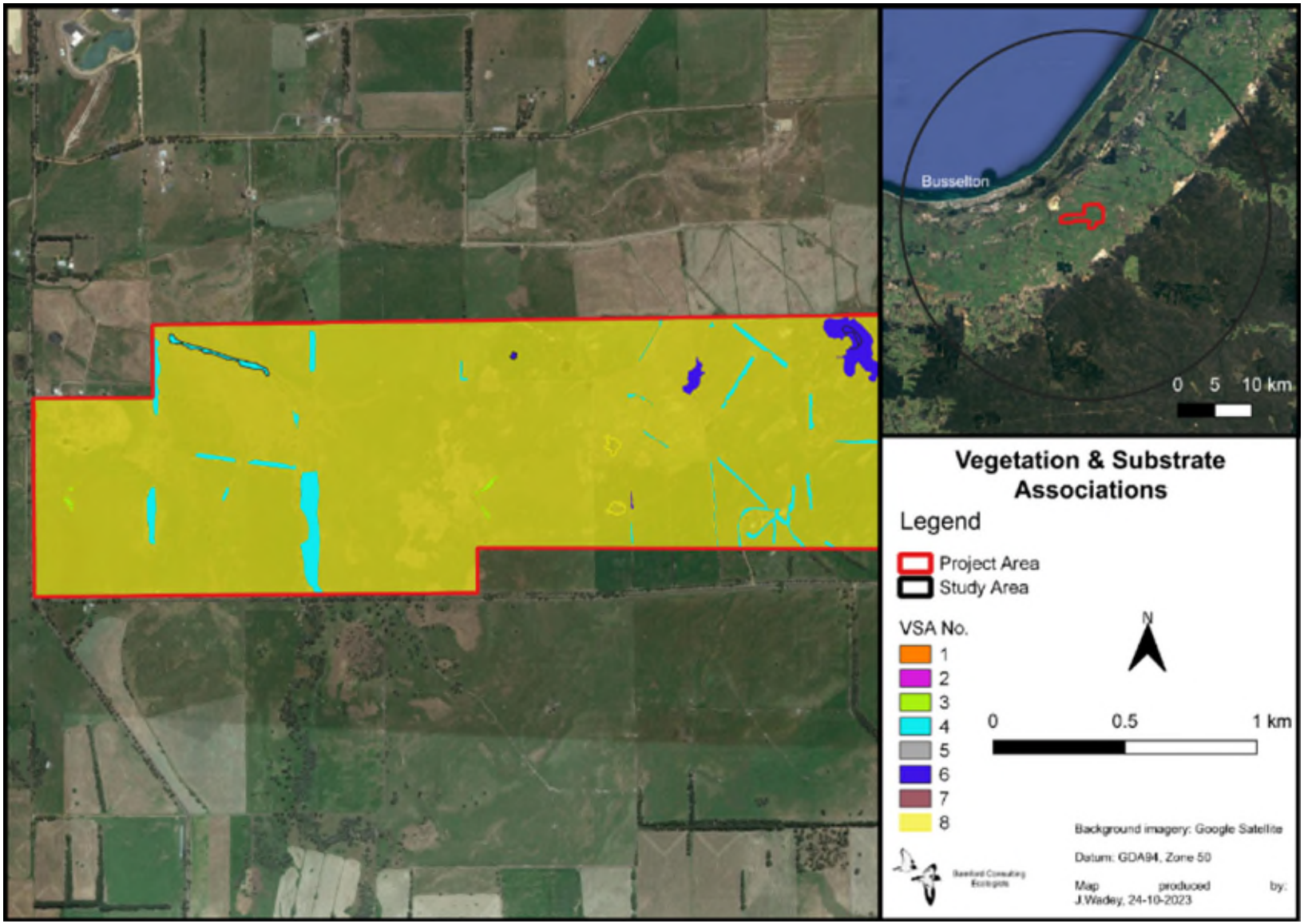

Figure 3-2 VSA map west

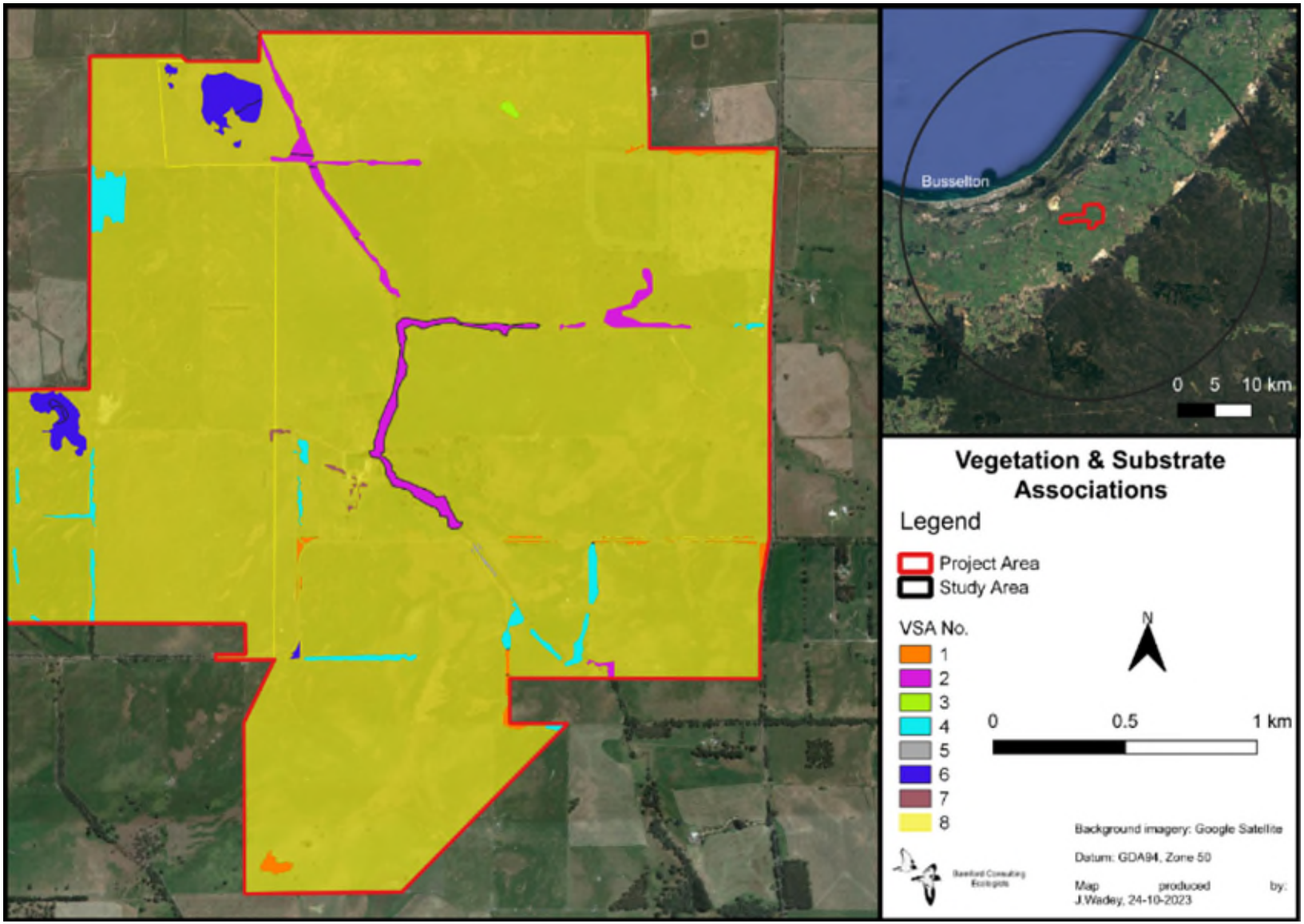

Figure 3-3 VSA map east

3.2 Fauna assemblage

3.2.1 Overview of fauna assemblage

The desktop study identified 221 vertebrate fauna species as potentially occurring in the survey area (Table 3-1 and Appendix 5): 10 fishes, nine frogs, 28 reptiles, 150 birds (four introduced), 18 native mammals and six introduced mammals. A further 16 species (10 mammals, two birds, two reptiles and two fish) are considered locally extinct; these are listed in Appendix 8.

Note that the expected extant assemblage comes from databases and includes species that may only occur occasionally in the survey area, but for which it is not important (such as birds that rarely fly overhead). Many species may also occur as vagrants at the site. Hence, expected occurrence in the project area is assigned to describe how each species is expected to utilise the project area (Section 2.3.4). The majority of the expected vertebrate fauna assemblage are expected as visitors (94 regular visitors and 42 irregular visitors), with about a third (72 species) expected as residents and the remaining 13 species expected as vagrants. The composition of the expected vertebrate fauna assemblage is summarised in Table 3-1.

There were 29 species recorded as present at the site; 28 of these were observed during field investigations (Appendix 6). The 29 species observed at the site comprised of one frog, 24 birds, and four mammals. The majority of observed species are considered residents; the exception being 10 birds and one mammal that are considered regular visitors.

In addition, 430 species that were returned from databases and literature were excluded from the expected species assemblage based on habitat or range limitations, or because they are domesticated, and are presented in Appendix 7.

Table 3-1. Composition of the vertebrate fauna assemblage in the survey area.

*NB: locally extinct species are not included in total numbers of species.

Taxon	Number of species*	Number of species in each status category				
		Resident	Migrant or regular visitor	Irregular visitor	Vagrant	*Locally extinct*
Fish	10	0	9	1	0	*2*
Frogs	9	9	0	0	0	*0*
Reptiles	28	27	0	1	0	*2*
Birds	150	24	78	37	11	*2*
Native Mammals	18	7	7	2	2	*10*[+]
Introduced Mammals	6	5	0	1	0	*0*
Total	**221**	**72**	**94**	**42**	**13**	***16***

[+] includes the Dingo, considered 'naturalised'

3.2.2 Expected vertebrate fauna

Freshwater fish. There is some habitat for freshwater fish in the project area, in the form of melaleuca damplands, which may be seasonally inundated, as well as a minor ephemeral river (Abba River) that intersects the eastern portion of the project area. There are 10 fish species (seven native and three introduced) in the expected assemblage list, and one (Pouched Lamprey) is of conservation significance and discussed in Section 3.2.5. None of the fish species is expected to be resident in the project area; six are expected as regular visitors and one as an irregular visitor. Two species of native, conservation significant fish (the Black-striped Dwarf Galaxias and Mud Minnow) may once have occurred in the area but are now almost certainly locally extinct.

Frogs. Up to nine species may be present in the area and all are considered resident. All frog species are likely to be locally common and are regionally widespread in the south-west, and can be expected to breed in damplands in the project area. All the frog species rely on seasonal freshwater for breeding and are therefore sensitive to changes in hydrology and water quality. None of the frogs is of conservation significance.

Reptiles. Up to 28 reptile species are known from the general area, but distributions can be patchy and therefore not all species may be present in the survey area. Reptiles are known to persist in small patches of remnant native vegetation. Bamford and Calver (2012) have documented the persistence of some species (about 25% of the original assemblage) at the level of the urban garden, but also found that some species disappear from small reserves due to cat predation. Under the precautionary principle, most are expected to be residents (27 species), while one (the South-west Carpet Python) is expected as an irregular visitor.

Two reptile species that were returned from the database search are likely to be locally extinct in the project area. One of these, the conservation significant (P3) Coastal Plain Skink *Ctenotus ora,* is known from the region and was recently found to be common at Tutunup, c. 5 km from the eastern boundary of the project area (Dec 2022; McCreery *et al*. 2023). However, this species is expected to be locally extinct in the project are due to a lack of sufficient suitable habitat; it was present only in extensive remnant native vegetation at Tutunup. The conservation significant (P3) Lined Skink *Lerista lineata* has been excluded from the species list as the nearest records are in coastal sands near Busselton, and experience elsewhere (Binningup, Yalgorup, Perth) suggests that it is confined to near coastal or at least distinct dune systems on the coastal plain (M. Bamford pers. obs.).

Birds. The expected species assemblage includes 150 species of birds, however the majority are expected as visitors (78 regular visitors and 37 irregular visitors) or vagrants (11 species), with only 24 species expected to be resident to the project area. Forty-three bird species are of conservation significance (six CS1, three CS2 and 34 CS3) and are discussed in Section 3.2.5. None of the CS1 or CS2 species is expected to be resident in the project area; four are expected as regular visitors, three as irregular visitors and two as vagrants. A large number of bird species are of local significance (CS3) due to the high levels of fragmentation and isolation of remnant vegetation in the surrounding area.

Mammals. Eighteen native and six introduced mammals are expected to occur in the project area, while a further ten native mammal species (including one 'naturalised', the Dingo) are expected to be locally extinct. Most of the introduced mammals are expected to be resident to the project area, although one is expected as an irregular visitor. Of the extant native mammals, seven are expected as residents, seven as regular visitors, two as irregular visitors and two as vagrants. Nine mammals are of conservation significance: three CS1, four CS2 and two CS3. These are discussed in Section 1.1.4.

Summary

The key features of the fauna assemblage expected in the survey area are:

- Uniqueness: The fauna assemblage is typical of that expected in similar rural areas of the Swan Coastal Plain region of Western Australia. The assemblage is likely to be represented elsewhere in the region.
- Completeness: The assemblage is likely to be incomplete for fishes, frogs, reptiles, and birds, and depauperate for mammals. This is due to the fragmented, isolated, and degraded nature of the remnant vegetation on the site.
- Richness: The expected assemblage is rich but the expected resident species are relatively poor in the local context due to the high level of land clearing that has occurred, and the subsequent fragmentation and degradation of remnant vegetation in the project area and surrounds. Although a relatively large number of species are expected in the project area, only one third of these are expected as residents; more species would be expected as residents in the project area if land clearing, habitat fragmentation and habitat degradation were less extensive. As a comparison, a nearby area with more intact remnant vegetation had a similar overall number of expected species, but more than half were expected to be resident to the project area (McCreery et al., 2023).

3.2.3 Results from nearby assessments

The BCE study at Tutunup (c. 5 km east of the project area; McCreery *et al*. 2023) recorded one hundred and thirty-seven fauna species during the four surveys (see Section 2.3.2 for details of the surveys). This included 43 species of conservation significance (five CS1, four CS2 and 34 CS3). CS1 and CS2 fauna records from these surveys are summarised below:

Reptiles

- Coastal Plains Ctenotus (*Ctenotus ora*) CS2 (P3). Recorded by BCE in 2019 and 2022, in remnant coastal plain vegetation on farmland and adjacent forest areas of the Wicher Range (different to the environments in the Yalyalup project area).

Birds

- Forest Red-tailed Black-Cockatoo *(Calyptorhynchus banksii naso)* CS1 (VU, S3); Baudin's Black-Cockatoo (*Zanda (Calyptorhynchus) baudinii*) CS1 (EN, S2); and Carnaby's Black-Cockatoo (*Zanda (Calyptorhynchus) latirostris*) CS1 (EN, S2). Foraging evidence of all three species was observed throughout the Tutunup project area. Individuals of all three species were observed, and flocks of white-tailed black-cockatoos were seen on several occasions drinking from stock water troughs in the project area. Database results showed six known roost locations within 10 km of the project area, including one within the project area (which was not confirmed as being used at the time of BCE surveys). Six trees that had hollows recently used (or attempted to be used) by black-cockatoos were identified in the project area, with the majority of these in forest but two in farmland similar to the environment present in the Yalyalup project area.

Mammals

- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) CS1 (S6). Recorded in forested area.
- Quenda (*Isoodon fusciventer*) CS2 (P4). Appeared to be widespread in the Tutunup area in areas with dense understorey but was not recorded on farmland.
- Western Ringtail Possum (*Pseudocheirus occidentalis*) CS1 (CR, S1). Multiple individuals were observed during each BCE survey (2019, 2020, and 2022).
- Brush Wallaby (*Notamacropus irma*) CS2 (P4). Observed in very low numbers in forest nearby, and in agricultural areas of the Tutunup project area.
- Western False Pipistrelle (*Falsistrellus mackenziei*) CS2 (P4). Recorded in the southern portion of the Tutunup project area, in remnant bushland.

The Harewood study at Yalyalup (immediately south of the project area; Harewood 2020) recorded 52 native species and five introduced species at the site during day and night surveys. This included four species of conservation significance:

- Western Ringtail Possum (individuals and dreys). All dreys and observations were in vegetation along the northern section of the McGibbon Track (see Section 3.4 for locations in relation to current project area).

- Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo, Forest Red-tailed Black-Cockatoo. Three individuals of the Forest Red-tailed Black-Cockatoo observed in 2019 and foraging evidence from all three species of black-cockatoo was observed, and a large number of potential nesting hollows were identified throughout the project area. Note these locations are captured in the DBCA threatened species dataset, shown in Section 3.3.

3.2.4 Fauna of conservation significance

Of the 221 species of vertebrate fauna expected to occur in the project area, 56 are considered to be of conservation significance: one fish (CS2), three reptiles (all CS3), 43 birds (six CS1, three CS2, 34 CS3), and nine mammals (three CS1, four CS2, and two CS3). A summary of the categories is presented in

Table 3-2 and the species are detailed in Table 3-3. Species classed as CS1 are those listed under legislation (EPBC Act and WA Biodiversity Conservation Act), while those classed as CS2 are listed as Priority by the Department of Biodiversity Conservation and Attractions (DBCA), but not listed under legislation. The CS3 class is more subjective but includes locally significant species that have declined extensively in an area due to natural or human-induced impacts, and species that occur at the edge of their range. This makes their presence in the project area significant as populations on the edge of a species' range are often less abundant and more vulnerable to extinction than populations at the centre of the range (Curnutt et al., 1996). Large numbers of CS3 species are recognised due to extensive clearing in the project area and surrounding landscape, which means that any populations using the project area are significant. In many cases, these are species recognised by the DEP as declining in developed landscapes (Dell & Banyard, 2000).

A total of 57 species were returned from the DBCA threatened species database search. Of these, 41 were of species which have been excluded from the expected list because they are out of range, suitable habitat is not present, or they are locally extinct; the locations of these excluded species are shown in Appendix 9. Records of black-cockatoos are shown in Section 3.3.1; records of the Western Ringtail Possum are shown in Section 3.4. The locations of the remaining expected twelve conservation significant species returned from the DBCA threatened species database are shown in Figure 3-4. Their locations are discussed in the species accounts in the section below.

Sixteen species are considered locally extinct, and therefore not included in the expected fauna assemblage. These include two fish, two reptiles, two birds and 10 mammals; these species are presented in Appendix 8.

The field investigations recorded the presence of at least five conservation significant species, consisting of two CS1 birds, 2 CS3 birds and 1 CS2 mammal (see Table 3-3 and Appendix 5).

Table 3-2. Composition of extant conservation significant vertebrate fauna expected within the project area.

Taxon	Conservation Significant fauna			Total
	CS1	CS2	CS3	
Fishes	-	1	-	1
Frogs	-	-	-	0
Reptiles	-	-	3	3
Birds	6	3	34	43
Mammals	3	4	2	9
Total	**9**	**8**	**39**	**56**

Table 3-3. Conservation significant fauna species expected to occur within the project area.

Species are listed in taxonomic order.

CS1, CS2, CS3 = (summary) levels of conservation significance. See Appendix 1 for full explanation.

EPBC Act listings: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory (see Appendix 23).

Biodiversity Conservation Act 2016 listings: S1 to S3 = Schedules 1 to 3, D1 to D3 = Divisions 1 to 3 (see Appendix 23).

DBCA Priority species: P1 to P5 = Priority 1 to 5 (see Appendix 23).

*Species recorded during field investigations are indicated in bold.

Latin Name	Common Name	Status	Expected occurrence*
FISH			
Geotria australis	Pouched Lamprey	CS2 (P3)	Regular visitor
REPTILES			
Chelodina oblonga	South-west Long-necked Tortoise	CS3	Resident
Egernia luctuosa	Mourning Skink	CS3	Resident
Morelia spilota imbricata	South-west Carpet Python	CS3	Irregular visitor
BIRDS			
Dromaius novaehollandiae	Emu	CS3	Irregular visitor
Oxyura australis	Blue-billed Duck	CS2 (P4)	Irregular visitor
Stictonetta naevosa	Freckled Duck	CS3	Irregular visitor
Phaps elegans	Brush Bronzewing	CS3	Irregular visitor
Cacomantis flabelliformis	Fan-tailed Cuckoo	CS3	Regular visitor
Chalcites basalis	Horsfield's Bronze-Cuckoo	CS3	Regular visitor
Chalcites lucidus	Shining Bronze-Cuckoo	CS3	Regular visitor
Heteroscenes pallidus	Pallid Cuckoo	CS3	Regular visitor
Plegadis falcinellus	Glossy Ibis	CS1 (MI, S1D2)	Irregular visitor
Ixobrychus flavicollis australis	Black Bittern (southwest subpop.)	CS2 (P2)	Vagrant
Turnix varius	Painted Button-quail	CS3	Irregular visitor
Glareola maldivarum	Oriental Pratincole	CS1 (MI, S1D2)	Vagrant
Tyto novaehollandiae novaehollandiae	Masked Owl (southwest)	CS2 (P3)	Irregular visitor
Lophoictinia isura	Square-tailed Kite	CS3	Irregular visitor
Merops ornatus	Rainbow Bee-eater	CS3	Regular visitor
Falco berigora	Brown Falcon	CS3	Irregular visitor

Latin Name	Common Name	Status	Expected occurrence*
Falco peregrinus	Peregrine Falcon	CS1 (S1D3)	Regular visitor
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	CS1 (VU, S2D3)	Regular visitor
Zanda baudinii	**Baudin's Black-Cockatoo**	**CS1 (EN, S2D2)**	**Regular visitor**
Zanda latirostris	**Carnaby's Black-Cockatoo**	**CS1 (EN, S2D2)**	**Regular visitor**
Platycercus icterotis	Western Rosella	CS3	Irregular visitor
Polytelis anthopeplus	Regent Parrot	CS3	Regular visitor
Climacteris rufus	Rufous Treecreeper	CS3	Vagrant
Malurus elegans	Red-winged Fairy-wren	CS3	Irregular visitor
Malurus splendens	**Splendid Fairy-wren**	**CS3**	**Resident**
Stipiturus malachurus	Southern Emu-wren	CS3	Irregular visitor
Melithreptus chloropsis	Gilbert's Honeyeater	CS3	Irregular visitor
Acanthiza apicalis	Inland Thornbill	CS3	Resident
Acanthiza inornata	Western Thornbill	CS3	Regular visitor
Sericornis maculatus	Spotted Scrubwren	CS3	Resident
Daphoenositta chrysoptera	Varied Sittella	CS3	Regular visitor
Falcunculus frontatus	Crested Shrike-tit	CS3	Vagrant
Colluricincla harmonica	Grey Shrike-thrush	CS3	Regular visitor
Pachycephala occidentalis	Western Whistler	CS3	Regular visitor
Pachycephala rufiventris	**Rufous Whistler**	**CS3**	**Resident**
Artamus cyanopterus	Dusky Woodswallow	CS3	Regular visitor
Myiagra inquieta	Restless Flycatcher	CS3	Irregular visitor
Eopsaltria griseogularis	Western Yellow Robin	CS3	Irregular visitor
Melanodryas cucullata	Hooded Robin	CS3	Irregular visitor
Microeca fascinans	Jacky Winter	CS3	Irregular visitor
Petroica boodang	Scarlet Robin	CS3	Regular visitor
Quoyornis georgianus	White-breasted Robin	CS3	Irregular visitor
Stagonopleura oculata	Red-eared Firetail	CS3	Irregular visitor
MAMMALS			
Tachyglossus aculeatus	Echidna	CS3	Irregular visitor
Dasyurus geoffroii	Chuditch	CS1 (VU, S2D3)	Vagrant
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	CS1 (S1D1)	Vagrant
Isoodon fusciventer*	**Quenda**	**CS2 (P4)**	**Regular visitor**
Pseudocheirus occidentalis	Western Ringtail Possum	CS1 (CR, S2D1)	Regular visitor/ possible resident
Notamacropus irma	Brush Wallaby	CS2 (P4)	Irregular visitor
Hydromys chrysogaster	Rakali	CS2 (P4)	Regular visitor
Rattus fuscipes	Bush Rat	CS3	Resident
Falsistrellus mackenziei	Western False Pipistrelle	CS2 (P4)	Regular visitor

*Note Quenda is an anecdotal record from farm manager who has observed it in the project area.

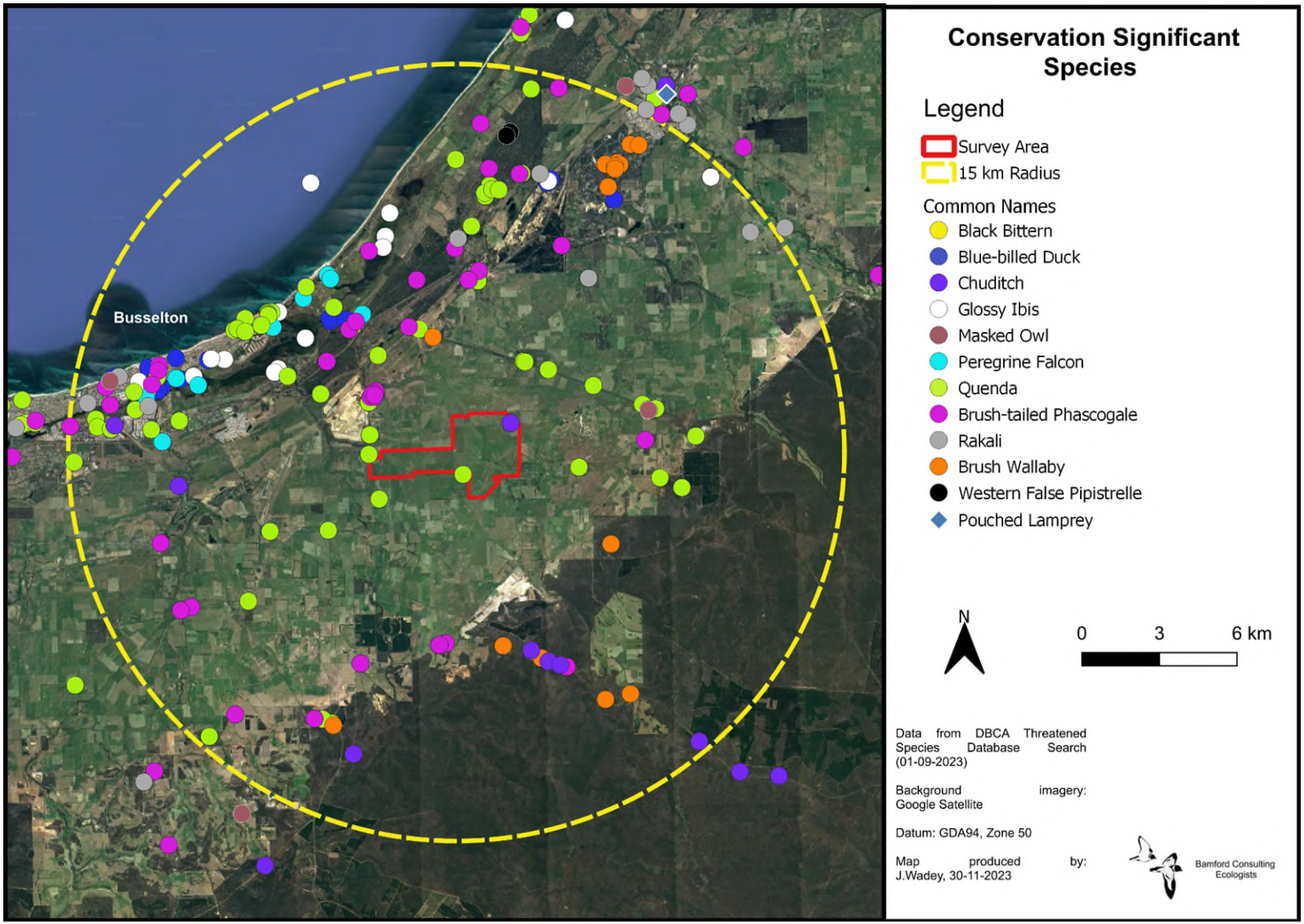

Figure 3-4 Locations of records of expected conservation significant species returned from the DBCA threatened species database within the vicinity of the project area; black-cockatoo and Western Ringtail Possum records are presented in relevant sections below.

3.2.5 Conservation significant species accounts

A list of all conservation significant species expected within the project area is provided in Table 3-3; these comprise one fish, three reptiles, 43 birds, and nine mammals (see Section 0). Information on the conservation status, distribution and habitat, salient ecology and expected occurrence within the project area is provided below for species or groups of species expected as resident, regular visitor or irregular visitor. Vagrants and locally extinct species are generally not discussed.

Note: the record of Chuditch in the project area as shown in Figure 3-4 is a historical record from 1970; the species is now expected as a vagrant to the project area.

3.2.5.1 Conservation Significance 1

Glossy Ibis *(Plegadis falcinellus)* — CS1 (MI, S1D2)

Conservation status:	Migratory under the EPBC Act and Schedule 1 Division 2 under the BC Act.
Distribution and habitat:	The Glossy Ibis is most abundant on wet grasslands across northern Australia but occasionally appears from the Pilbara and south.
Ecology:	The Glossy Ibis feeds mainly on invertebrates on the margins of wetlands and on damp grassland.
Expected occurrence:	**Irregular visitor.** DBCA database contains several records within 5 km of the project area boundary (Figure 3-4). May visit the project area when paddocks or damplands are seasonally-inundated and/or along the stream.

Peregrine Falcon (*Falco peregrinus*) — CS1 (S1D3)

Conservation status:	Schedule 1 Division 3 under the BC Act.
Distribution and habitat:	More or less cosmopolitan throughout Australia (Menkhorst *et al.* 2017). This species occurs in a variety of habitats but is usually reliant on cliff faces or tall trees for nesting (Debus, 2019).
Ecology:	A highly adept aerial predator that predominantly forages on birds, although will also occasionally take invertebrates, fish, reptiles and mammals (Debus, 2019). Mostly diurnal or crepuscular.
Expected occurrence:	**Regular visitor.** The Peregrine Falcon is known from the general region, with more than 20 records within 15 km of the project area from the DBCA database (Figure 3-4). The project area is likely to be within the home range of a pair and does contain many tall trees which may be suitable for nesting.

Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) CS1 (V, S2D3)

Conservation status: Vulnerable under the EBPC Act and Schedule 2 Division 3 under the BC Act.

Distribution and habitat: Endemic to the deeper south-west of Western Australia, from around Gingin in the north, east to Mount Helena, North Bannister and Mount Saddleback, and south to around Albany (Johnstone and Storr 1998). In recent years there appears to have been a distinct expansion of the range of this species on to the Swan Coastal Plain, including many suburbs within the Perth metropolitan area. Generally restricted to areas of Jarrah-Marri forest, farmlands with remnant trees and urban landscapes. Forest Red-tailed Black-Cockatoos are currently considered not to undergo regular migration (DCCEEW, 2023b). Two other sub-species occur in Western Australia: *C. b. escondidus* in the western mid-west and Pilbara, and *C. b. macrorhynchus* in the Kimberley (Johnstone & Storr, 1998). Neither of these are conservation significant species.

Ecology: Diurnal granivore, feeding predominantly on the seeds of Jarrah and Marri (Johnstone *et al*., 2013b; Johnstone & Kirkby, 1999) but is also adapting to foraging on urban (introduced) plant species. Reliant on large tree-hollows in eucalypts (especially Marri) for breeding (DCCEEW, 2023b; Johnstone et al., 2013a). Threatened by habitat loss, habitat degradation, nest hollow shortage, and competition for available nest hollows from other parrots and feral Honeybees (DCCEEW, 2023b).

Expected occurrence: **Regular visitor.** The project area provides suitable foraging, breeding and roosting habitat, and the species was observed in 2019, 2020 and 2022 by BCE during surveys c. 5 km east (McCreery *et al.*, 2023). See following section for more detail. The DBCA database contains a few records on farmland within a few km of the project area boundary.

Baudin's Black-Cockatoo (*Zanda baudinii*) CS1 (EN, S2D2)

Conservation status: Endangered under the EBPC Act and Schedule 2 Division 2 under the BC Act.

Distribution and habitat: Endemic to the south-west of Western Australia, from around Perth to around Albany. In recent years there appears to have been a distinct expansion of the range of this species on to the Swan Coastal Plain, including many suburbs within the Perth metropolitan area. Generally restricted to areas of Jarrah-Marri forest and farmlands with remnant trees or pine plantations.

Ecology: Diurnal. Feeds predominantly on the seeds of Jarrah and Marri, as well as other native and cultivated species (TSSC, 2018). Reliant on large tree-hollows in eucalypts (especially Marri) for breeding (DCCEEW, 2023c; TSSC, 2018). Threatened by habitat loss, habitat degradation, nest hollow shortage, and competition for available nest hollows from other parrots and feral Honeybees (DCCEEW, 2023c; TSSC, 2018).

Expected occurrence: **Regular visitor.** The project area provides suitable foraging, breeding and roosting habitat and this species is regularly seen in the local area, including by BCE at Tutunup, c. 5 km from the Yalyalup project area (McCreery et al., 2023). There are more than 50 records within 15 km of the project area in the DBCA database. Foraging evidence by the species was recorded in several locations across the project area. See following section for more detail.

Carnaby's Black-Cockatoo (*Zanda latirostris*) CS1 (E, S2D2)

Conservation status: Endangered under the EPBC Act and Schedule 2 Division 2 under the BC Act.

Distribution and habitat: Endemic to south-western Western Australia, from Kalbarri in the north, east to Merredin and Ravensthorpe, and then further east along the south coast to the Esperance area (DCCEEW, 2023d; Johnstone & Storr, 1998). Breeds (July to December) predominantly in the east of its range with a migration to coastal areas in the non-breeding period. In recent years, however, the species has expanded its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain (DCCEEW, 2023d). Heavily reliant on areas of Banksia woodland and proteaceous shrubland/heath for foraging (DCCEEW, 2023d; Johnstone & Storr, 1998).

Ecology: Diurnal granivore, feeding predominantly on the seeds of the Proteaceae (especially banksias) but also known to feed on a very wide variety of plants, including non-native ornamentals and plantation species such as pine (DCCEEW, 2023d; DPaW, 2013; Groom, 2011; Johnston et al., 2016; Valentine & Stock, 2008). Reliant on large tree-hollows in eucalypts (especially smooth-barked species such as Wandoo and Salmon Gum) for breeding (DCCEEW, 2023d; Johnstone & Storr, 1998; Saunders, 1974). Threatened by habitat loss, habitat degradation, nest hollow shortage, and competition for available nest hollows from other parrots and feral Honeybees, illegal shooting and illegal trade (Burbidge, 2004; DCCEEW, 2023d).

Expected occurrence: **Regular visitor.** The project area provides some suitable foraging habitat, and potentially breeding and roosting habitat, and this species is regularly seen in the local area, including by BCE at Tutunup, c. 5 km from the Yalyalup project area (McCreery *et al.*, 2023). There are more than 100 records within 15 km of the project area in the DBCA database. Three individuals were recorded in what may be a day roost during the field investigations. See following section for more detail.

Western Ringtail Possum (*Pseudocheirus occidentalis*) CS1 (CR, S2D1)

Conservation status: Critically Endangered under the EPBC Act and Schedule 2 Division 1 under the BC Act.

Distribution and habitat: The Western Ringtail Possum has suffered a range contraction of up to 90% since European settlement (DPaW, 2017). The threatening processes are complex, interactive and often population specific and include habitat loss and fragmentation, predation, climate change, fire, timber harvesting and tree hollow competition (DPaW, 2017). The Western Ringtail Possum Recovery Plan (DPaW, 2017) identified critical habitat for its survival. These include areas with availability to high nutrient foliage food, suitable structures for nesting and protection, a continuous canopy for predator avoidance and linkages between suitable habitat patches for long term survival.

Ecology: Nocturnal, leaf-eating herbivore endemic to south-western Australia, primarily feeding on peppermint, Marri and Jarrah (although in urban areas may feed on introduced species) (DPaW, 2017). The home range of this species is thought to be less than 5 hectares, and in peppermint stands in the Busselton area, this species can occur at densities as high as 20 possums per hectare (DPaW, 2017).

Expected occurrence: **Regular visitor (possibly resident).** The Busselton area is recognised as a stronghold for the species and it has been recorded nearby in Tutunup and by Harewood (2020) adjacent to the project area. There are more than 150 records within 5 km of the centroid of the project area (in the DBCA database), including 8 records (within the last 6 years) less than 1 km from the project area boundary. While no evidence of the species was found during field investigations, there are so many records nearby that it is likely the species is a regular visitor if not resident (albeit in small numbers; reflecting the limited amount of habitat available). See Section 3.4 for more detail.

3.2.5.2 Conservation Significance 2

Pouched Lamprey (*Geotria australis*) CS2 (P3)

Conservation status: Listed as Priority 3 by DBCA. Adversely affected by declining water quality, declining rainfall and barriers across drainage systems.

Distribution and habitat: Occurs in south-eastern and south-western Australia, but the south-western population is confined to rivers and creeks from south of Perth to around Albany, and is declining (Morgan et al., 1998).

Ecology: Adult lampreys are marine but enter rivers and swim upstream to breed. The larvae live in sediment and filter-feed until they metamorphose into a juvenile that then swims downstream to enter the ocean.

Expected occurrence: **Regular visitor.** The Pouched Lamprey occurs in rivers and streams in the region and therefore individuals may enter the minor river in the project area. There is one record in the DBCA database search area, c. 15 km from the project area boundary (Figure 3-4).

Blue-billed Duck (*Oxyura australis*) CS2 (P4)

Conservation status: Listed as Priority 4 by DBCA.

Distribution and habitat: A diving duck that occurs in deep water wetlands (fresh) of south-eastern and south-western Australia (Johnstone & Storr, 1998; Menkhorst et al., 2017).

Ecology: Forages under water on aquatic invertebrates and even small fish (Johnstone & Storr, 1998; Menkhorst et al., 2017). Moves readily between wetlands as conditions change; usually flying at night.

Expected occurrence: **Irregular Visitor.** May occasionally visit the project area when damplands are inundated or the river contains water. There are more than 40 records in the DBCA database within c. 5-10 km of the project area boundary (Figure 3-4).

Masked Owl (south-west) (*Tyto novaehollandiae*) CS2 (P3)

Conservation status: Listed as Priority 3 by DBCA.

Distribution and habitat: Several populations across Australia in tall forests and woodlands. The south-west population was once moderately widespread but now appears to be restricted to small areas of tall forest.

Ecology: A nocturnal predator mainly of medium-sized mammals. Roosts and nests in very large tree hollows.

Expected occurrence: **Irregular visitor.** There are four records in the DBCA database within c. 16 km (Figure 3-4), and it has been recorded in the Ludlow Tuart Forest c. 5 km north-east of the project area (B. Wykes, M. Bamford, pers. obs.). The species may visit the project area occasionally when foraging and the area provides potential roosting and nesting habitat (large tree hollows).

Quenda (*Isoodon fusciventer*) CS2 (P4)

Conservation status: Listed as Priority 4 by DBCA.

Distribution and habitat: The Quenda formerly occurred across the south-west of Western Australia from Geraldton to east of Esperance, including the wheatbelt, but it now has a much-reduced range, with few records north of Yanchep/Muchea on the coastal plain, and it is more or less extinct across the Wheatbelt (Travouillon & Phillips, 2018; Van Dyck & Strahan, 2008). It persists around Perth, particularly in areas of dense vegetation around wetlands, and it remains locally common in suitable environments (Howard et al., 2014).

Ecology: Omnivorous and cathemeral (active throughout the day and night), Quenda feed on invertebrates, plant material and fungi (Van Dyck & Strahan, 2008). It is one of the few native, terrestrial mammals to persist in semi-urban landscapes in the south-west. Populations of this species have declined due to ongoing threats from feral predators and land-clearing (Howard et al., 2014; Van Dyck & Strahan, 2008).

Expected occurrence: **Regular visitor.** There are at least 20 records in the DBCA database within 5 km of the project area boundary; the closest within 100 m of the boundary (Figure 3-4). In a nearby area (McCreery *et al.*, 2023), the Quenda was found in dense, remnant vegetation on farmland, and in forest with a low, dense understorey. It is easily detected by its characteristic foraging holes. It is likely that individuals will visit the project area, especially in areas of dense understorey or riparian vegetation, but the project area does not provide high quality shelter habitat in the form of dense vegetation to support a resident population. The farm manager reported seeing Quenda in the project area.

Brush Wallaby (*Notamacropus irma*) CS2 (P4)

Conservation status: Listed as Priority 4 by DBCA.

Distribution and habitat: Endemic to the South-West more or less south of line from Geraldton to Esperance, although it has disappeared from much of the Wheatbelt due to clearing. Occurs in a wide range of vegetation types from Eucalypt Woodland to Banksia Woodland, Shrublands and Kwongan. Locally common in dry sclerophyll forest and woodland in the south-west however it has declined in recent decades due to predation and habitat destruction (Menkhorst & Knight, 2011).

Ecology: Based on detailed radio-tracking study in Banksia Woodland in Whiteman Park (Bamford & Bamford, 1999), a largely solitary species that browses on shrubs and bushes; rarely on grass. Rarely drinks free-standing water and rarely ventures from dense vegetation. Individuals occupy home ranges of up to c. 10ha; larger in males than females and those of females overlap.

Expected occurrence: **Irregular visitor.** There are 20 records in the DBCA database within 15 km, but all are restricted to relatively large or well-connected areas of remnant vegetation (Figure 3-4). This species was recorded at Tutunup (c. 5km away) in state forest but also in remnant native vegetation in agricultural areas (one record). As with several other mammal species, likely to be resident in nearby forest to the south-east but likely only an irregular visitor to the project area due to the lack of intact understorey, and isolation of the remnant vegetation.

Water-rat, Rakali (*Hydromys chrysogaster*) CS2 (P4)

Conservation status: Listed as Priority 4 by DBCA.

Distribution and habitat: Generally occurs in the vicinity of permanent fresh or brackish water sources (including lakes, rivers, swamps, mangroves and beaches) throughout much of Australia, with the exception of inland/central Western Australia, Northern Territory, South Australia and New South Wales (Van Dyck & Strahan, 2008). In the south of Western Australia Water-rats preferentially use wetland habitats characterised by dense, low-lying vegetation, low-density canopy cover and shallow, narrow water bodies (Speldewinde et al., 2013). Within the greater Perth area, Water-rats occurred in association with high value habitat quality characteristics such as high bank stability, habitat diversity, stream cover and foreshore vegetation (Smart *et al*., 2011).

Ecology: While most active around sunset (crepuscular), Water-rats are also known to forage during the day (Van Dyck & Strahan, 2008). They are generally carnivorous, feeding on aquatic invertebrates, fish and also terrestrial mammals, including birds but may also browse on plant material (Van Dyck & Strahan, 2008).

Expected occurrence: **Regular visitor.** There are more than 20 records within c. 20 km in the DBCA database, mostly associated with larger river systems in the region (Figure 3-4). The species is likely to be present in the general region, and the minor river in the project area provides suitable habitat for visiting individuals.

Western False Pipistrelle (*Falsistrellus mackenziei*) CS2 (P4)

Conservation status: Listed as Priority 4 by DBCA.

Distribution and habitat: Restricted to tall forests of the south-west with few recent records north of Dwellingup or on the coastal plain.

Ecology: A fast and high-flying insectivorous species that roosts in tree hollows.

Expected occurrence: **Regular visitor.** Two records in the DBCA database, within 10 km of the project area (Figure 3-4). This species was detected by BCE in remnant bushland at Tutunup in 2020 (McCreery *et al.*, 2023). Intact forest within the region provides suitable roosting and foraging habitat, and individuals are likely to visit the project area when foraging.

3.2.5.3 Conservation Significance 3

South-west Long-necked Tortoise (*Chelodina oblonga*) CS3

Conservation status: Threatened by habitat loss and degradation, and sensitive to changing climate and warming temperatures, which can alter sex ratio of offspring, as well as affect clutch size and hatching success (Climate Watch, 2023).

Distribution and habitat: This species is found in the south-west of WA, and in northern WA, NT, and QLD (ALA, 2023). Primary habitat is freshwater swamps and streams (Climate Watch, 2023).

Ecology: Diet is primarily fish, tadpoles, and aquatic invertebrates (Climate Watch, 2023).

Expected occurrence: **Resident.** There are scattered records throughout the south-west (ALA, 2023), including four within c. 15 km of the project area. The river and damplands within the project area will provide habitat, and sandy substrates within the project area may provide suitable nesting sites.

Mourning Skink (*Lissolepsis luctuosa*) CS3

Conservation status: The major threats to this species include urbanisation, wetland drainage and climate change (IUCN, 2023). This species is considered locally significant because it has a relatively limited distribution and is restricted to damp areas, which are being impacted by climate change.

Distribution and habitat: Locally common in suitable dampland habitat (IUCN, 2023) the Mourning Skink is found in the south-western WA, from Perth south and east to Cheynes Beach, and inland to Dwellingup, Jarrahwood, Pemberton and Chorkerup (ALA, 2023; Storr, 1978). Preferred habitat is damp areas with dense ground cover; this species is primarily associated with freshwater swamps, lakes and streams (Cogger, 2000).

Ecology: Possibly nocturnal (Storr, 1978). It likely eats invertebrates and plant material.

Expected occurrence: **Resident.** There is a single record within 25 km of the project area (ALA, 2023). A lack of records within or closer to the project area probably reflects a lack of survey effort, and this species is likely to be locally common where suitable habitat exists. In the project area, it is likely to be associated with the damplands and the fringing vegetation along the minor river.

Carpet Python (southwest) (*Morelia spilota imbricata*) CS3

Conservation status: This subspecies was formerly listed under the Western Australian *Wildlife Conservation Act 1950* as 'other specially protected fauna' but that status has, more recently, been removed in the WA *Biodiversity Conservation Act 2016* (DBCA, 2023a). It is likely to remain uncommon or at risk in the proximity of development. It is also sensitive to predation by the Red Fox.

Distribution and habitat: Patchily distributed through south-west Western Australia in a wide range of habitats including woodlands, heaths and rock outcrops (Bush et al., 2010; Wilson & Swan, 2021). It is particularly common in areas of exposed limestone, including offshore islands (Bush et al., 2010).

Ecology: Predominantly a nocturnal carnivore, the Carpet Python preys mainly on birds and mammals, although reptiles are occasionally taken (Bush et al., 2010).

Expected occurrence: **Irregular visitor.** No records in the DBCA database within 20 km. The Carpet Python occurs throughout the Jarrah/Marri forest of the region but appears to be at low densities. Individuals may occasionally visit the project area.

Locally significant birds of the Swan Coastal Plain (34 species; see Table 3-3) CS3

Conservation status: Most of these species have been noted by Dell and Banyard (2000) as either habitat specialists or wide ranging species with a reduced population on the Swan Coastal Plain and are, therefore, considered locally significant when present.

Distribution and habitat: Generally, species that require larger areas of intact native remnants to persist.

Ecology: There is a wide range of foraging strategies in this group but the majority of the species are small insectivores. Also includes ground-foraging granivores (e.g. Emu, bronzewings, button-quail) and nectarivores (honeyeaters).

Expected occurrence: **Four resident, 12 regular visitors, 16 irregular visitors, two vagrants.**
The species expected as residents in the project area are the Splendid Fairy-wren, Inland Thornbill, Spotted Scrubwren and Rufous Whistler. All are relatively small, mostly insectivorous species that will use resources for foraging, nesting and shelter in the remnant vegetation in the project area, particularly the denser vegetation along the minor river and along road verges. These species have reduced populations on the Swan Coastal Plain, with the main threats including habitat loss, fragmentation and feral predation.

Short-beaked Echidna (*Tachyglossus aculeatus*) CS3

Conservation status: Although widespread, the echidna is threatened by development, predominantly via habitat loss and vehicle strike. Echidnas have few natural predators as their spines offer good protection.

Distribution and habitat: Found across most of Australia, in deserts, rainforests, grasslands, woodlands and alpine habitats (Australian Geographic, 2023).

Ecology: Eats ants and termites. Females lay eggs; young are carried in the pouch for 2-3 months then placed in a burrow for protection (Australian Geographic, 2023).

Expected occurrence: **Irregular visitor.** There are scattered records in ALA in the south-west but none within 25 km of the project area, which probably reflects a lack of survey effort and reports, rather than an absence of the Short-beaked Echidna in this area. In support of this, the Short-beaked Echidna was recorded by BCE at Tutunup (c. 5 km away), via the presence of distinctive diggings at several locations within the forested areas (McCreery *et al*., 2023). There has been considerable habitat loss in the project area and surrounds, meaning there will be little resources for this species in the immediate vicinity of the project area and it is therefore only expected as an irregular visitor.

Moodit or Southern Bush Rat (*Rattus fuscipes fuscipes*) CS3

Conservation status: While locally common in suitable habitat, this species is struggling to persist in the vicinity of development (e.g. urban areas, agriculture, plantations etc.). It seems to have a patchy distribution in the south-west forests.

Distribution and habitat: The Moodit occurs along the south-west, southern and eastern coastlines of Australia in coastal scrubs, heaths, eucalypt forests and rainforests that provide dense cover (Van Dyck & Strahan, 2008). The western subspecies, occurs generally within 100 km of the coast between Geraldton and Israelite Bay, east of Esperance, in Western Australia (ALA, 2023).

Ecology: The Moodit is a nocturnal omnivore, feeding on fungi, seeds, fruits and invertebrates (Van Dyck & Strahan, 2008). The availability of food through the winter appears to limit populations of this species (Van Dyck & Strahan, 2008).

Expected occurrence: **Resident.** The species is known from the region, with several records within c. 20 km in the Atlas of Living Australia (ALA, 2023). This species was detected at Tutunup, c. 5 km away, in both intact and disturbed habitats (McCreery *et al*., 2023). In the project area it is likely to be associated with damp thickets such those along the minor river.

3.3 Targeted black-cockatoo assessment

3.3.1 Black-Cockatoo presence

Carnaby's Black-Cockatoo

Carnaby's Black-Cockatoo is expected to be a regular visitor to the project area and was recorded during field investigations; three individuals were flushed from a stand of planted eucalypts (a windbreak) located between the existing mine and the current project area (Figure 3-5). This may indicate the location of a day roost for this species. There are no known night roosts in the project area (see Section 3.3.3). In the DBCA database there are nearly 20 records of the species within 15 km of the project area centroid within the last 10 years. In addition, the species was observed directly by BCE at a site c. 5 km east of the current project area (during 2019, 2020 and 2022), in farmland similar to that found in the Yalyalup project area.

Baudin's Black-Cockatoo

Baudin's Black-Cockatoo was recorded via foraging evidence observed during field investigations but was not observed directly (Figure 3-5). It is expected to be a regular visitor the project area. In the DBCA database there is small number of records within 15 km of the project area centroid within the last 10 years. In addition, the species was observed directly by BCE at a site c. 5 km east of the current project area (during 2019, 2020 and 2022).

Forest Red-tailed Black-Cockatoo

The Forest Red-tailed Black-Cockatoo was not recorded during field investigations but is expected to be a regular visitor the project area. In the DBCA database there are nearly 20 records within 15 km of the project area centroid within the last 10 years. In addition, the species was observed directly by BCE at Tutunup, c. 5 km east of the current project area (during 2019, 2020 and 2022) in farmland similar to that found in the Yalyalup project area. At Tutunup in 2019, records of Forest Red-tailed Black-Cockatoos included several small groups comprised of a juvenile with an adult pair; this suggests that the species is breeding somewhere in the general region.

Records of all three species from previous surveys, as returned from the DBCA threatened species database search, are shown in Figure 3-6. This shows multiple records of each species within 15 km of the project area, with the majority of records being Carnaby's Black-Cockatoo.

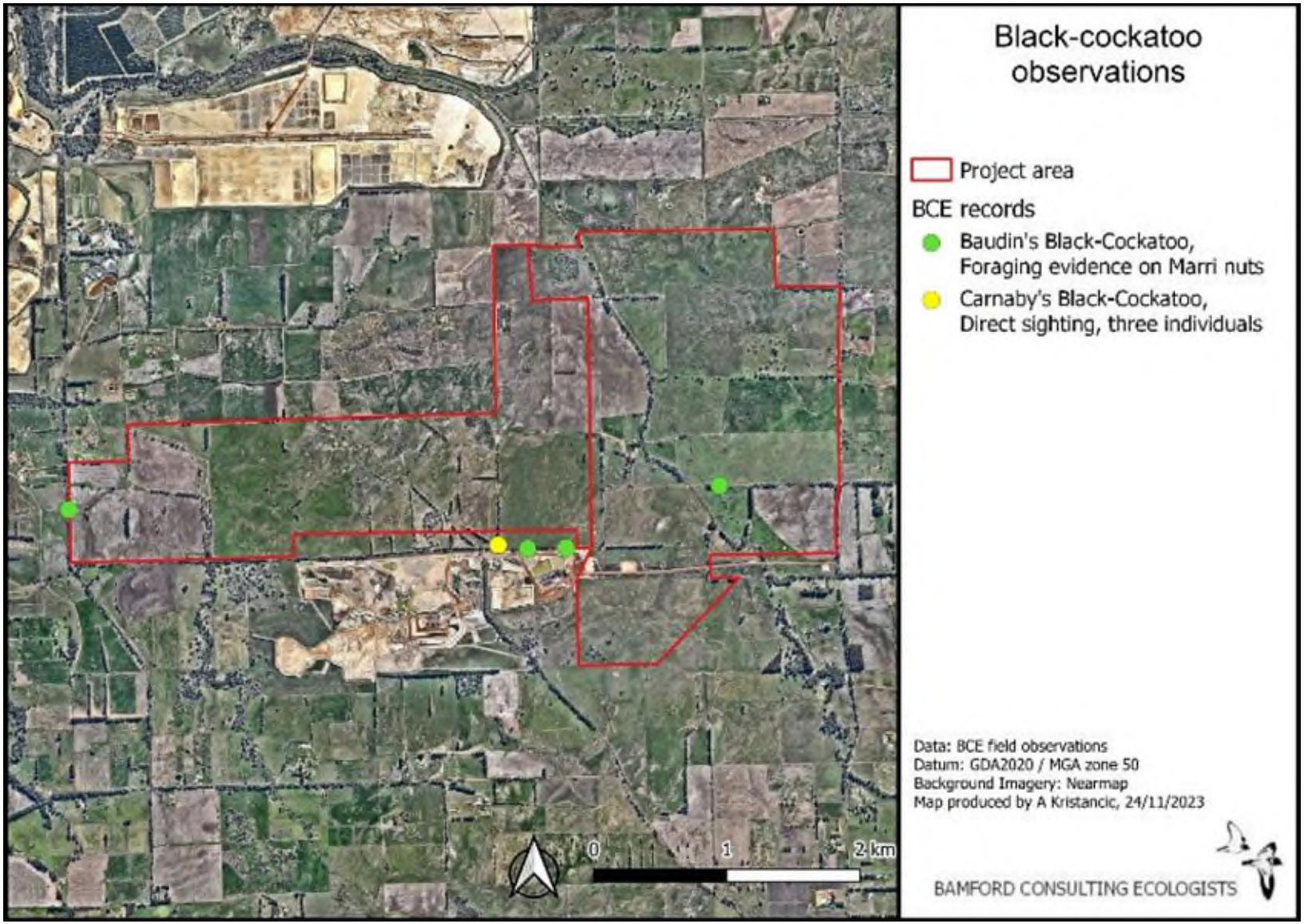

Figure 3-5. Locations of observations of black-cockatoos during field investigations.

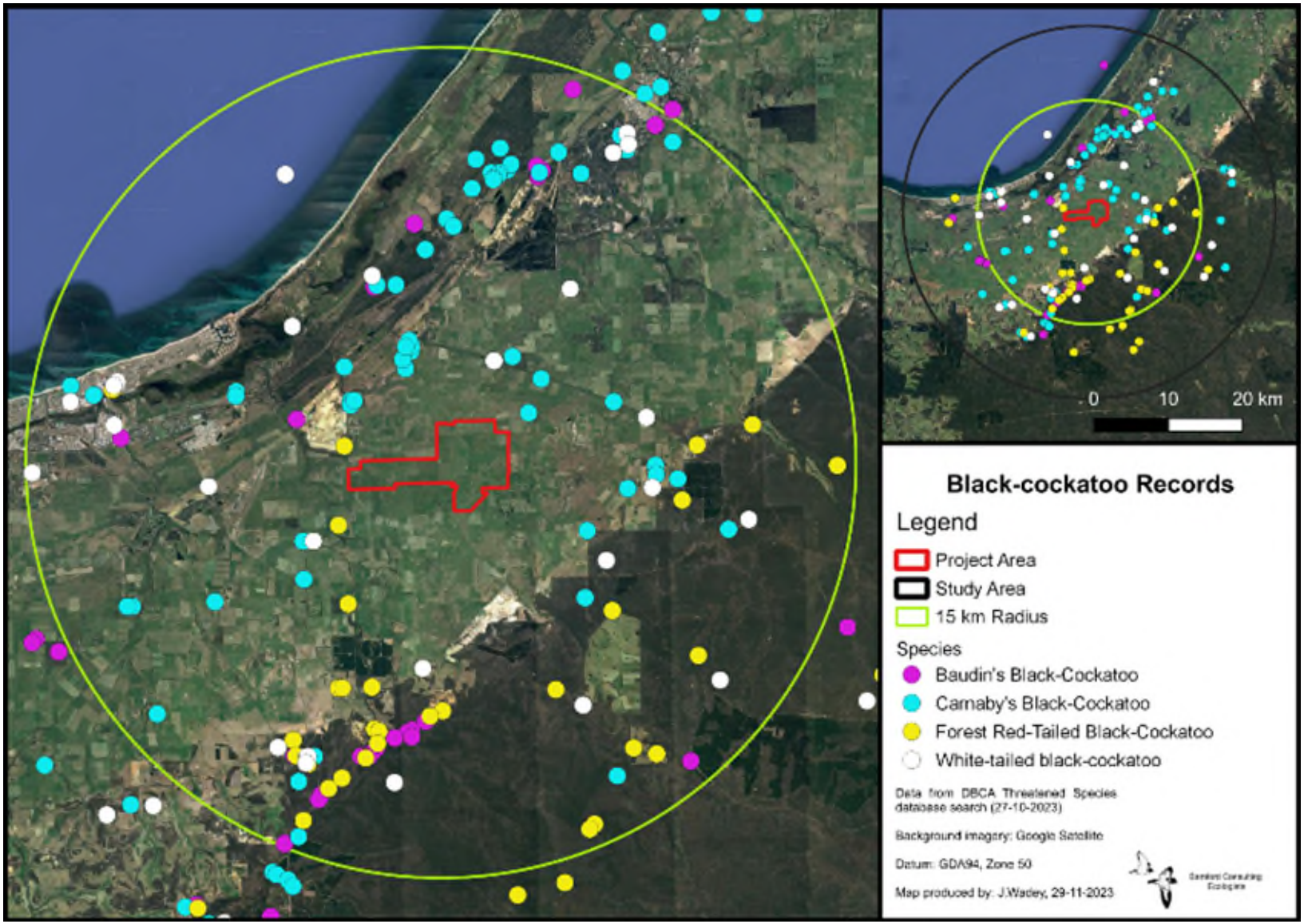

Figure 3-6. Locations of black-cockatoo records (sighitngs) from DBCA threatened species database.

3.3.2 Black-Cockatoo foraging habitat assessment

The project area in general consists of low to high foraging values for all three species of black-cockatoos; foraging values are discussed by species in the following sections. This shows foraging value based upon vegetation characteristics, with the total value including context and species density (as outlined in Appendix 4). The VSAs with the highest foraging values for all black-cockatoos were Mixed Marri Woodland (VSA 1) and Stream with Mixed Marri (VSA 2).

3.3.2.1 Carnaby's Black-Cockatoo

The foraging values for each VSA for the Carnaby's Black-Cockatoo is given in **Error! Reference source not found.**, with foraging values ranging from 1 to 6 out of 10, with most of the project area being paddocks and scoring 3 out of 10. The VSAs with the highest foraging value (6 out of 10) were VSAs 1 and 2, containing Marri trees. VSA 8 was given a site context score of 0 because this VSA is so widespread in the area, and a species stocking rate of 1 because it provides foraging habitat which black-cockatoos will use. Foraging values by VSA are shown in Figure 3-7 and Figure 3-8.

The species is expected to forage in the area regularly; Harewood (2020) found records of Carnaby's Black-Cockatoo foraging on marri nuts and pine cones in the immediate vicinity of the project area.

Table 3-4. Foraging scores for Carnaby's Black-Cockatoo, based upon vegetation characteristics, context and species density. The maximum score is 10.

VSA	VSA Name	Site Condition (out of 6)	Site Context (out of 3)	Species Stocking Rate (0 or 1)	Total (out of 10)
1	Mixed Marri Woodland	3	2	1	**6**
2	Stream with Mixed Marri	3	2	1	**6**
3	Flooded Gum Stand	1	1	0	**2**
4	Planted Eucalypts	1	1	0	**2**
5	Stream with Planted Eucalypts	1	1	0	**2**
6	Melaleuca Dampland	1	0	0	**1**
7	Planted Garden	2	1	0	**3**
8	Paddocks with scattered mature trees	2	0	1	**3**

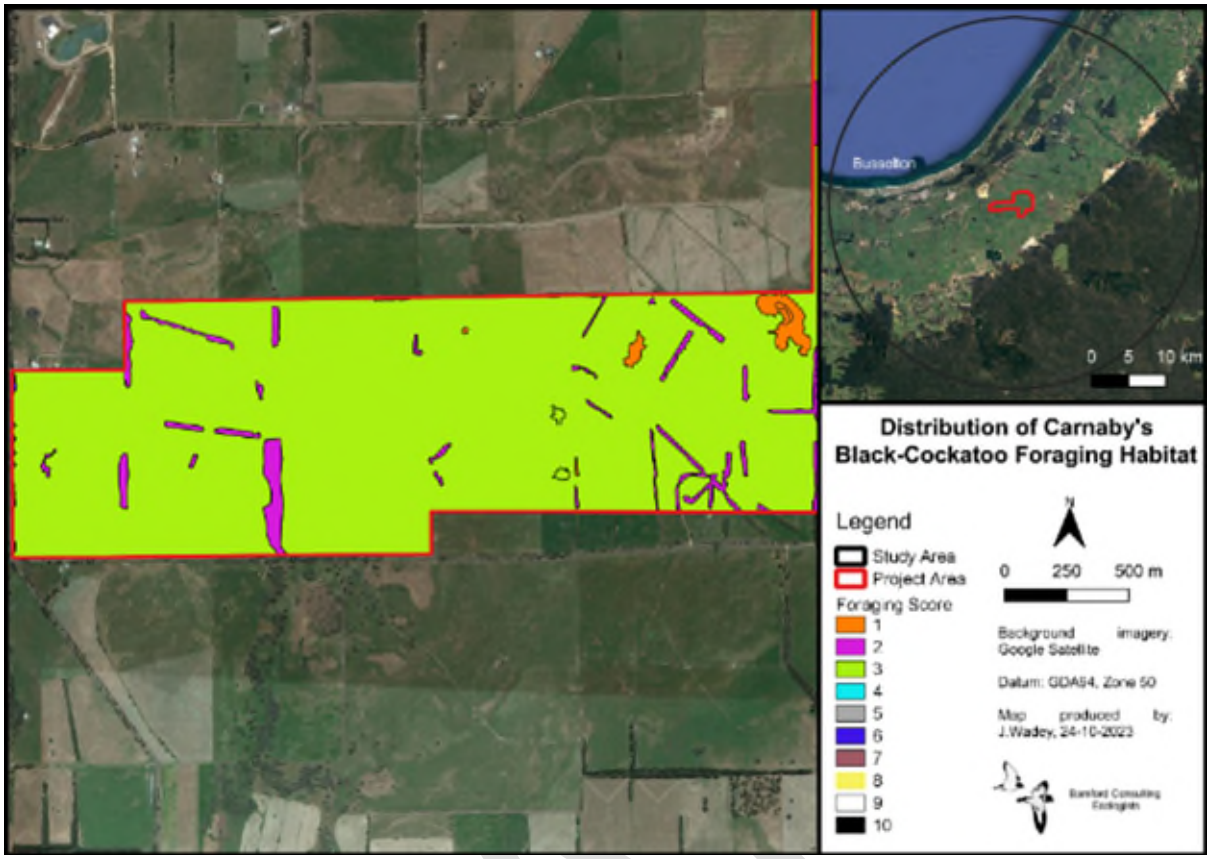

Figure 3-7 Foraging scores for Carnaby's Black-Cockatoo by VSA; west

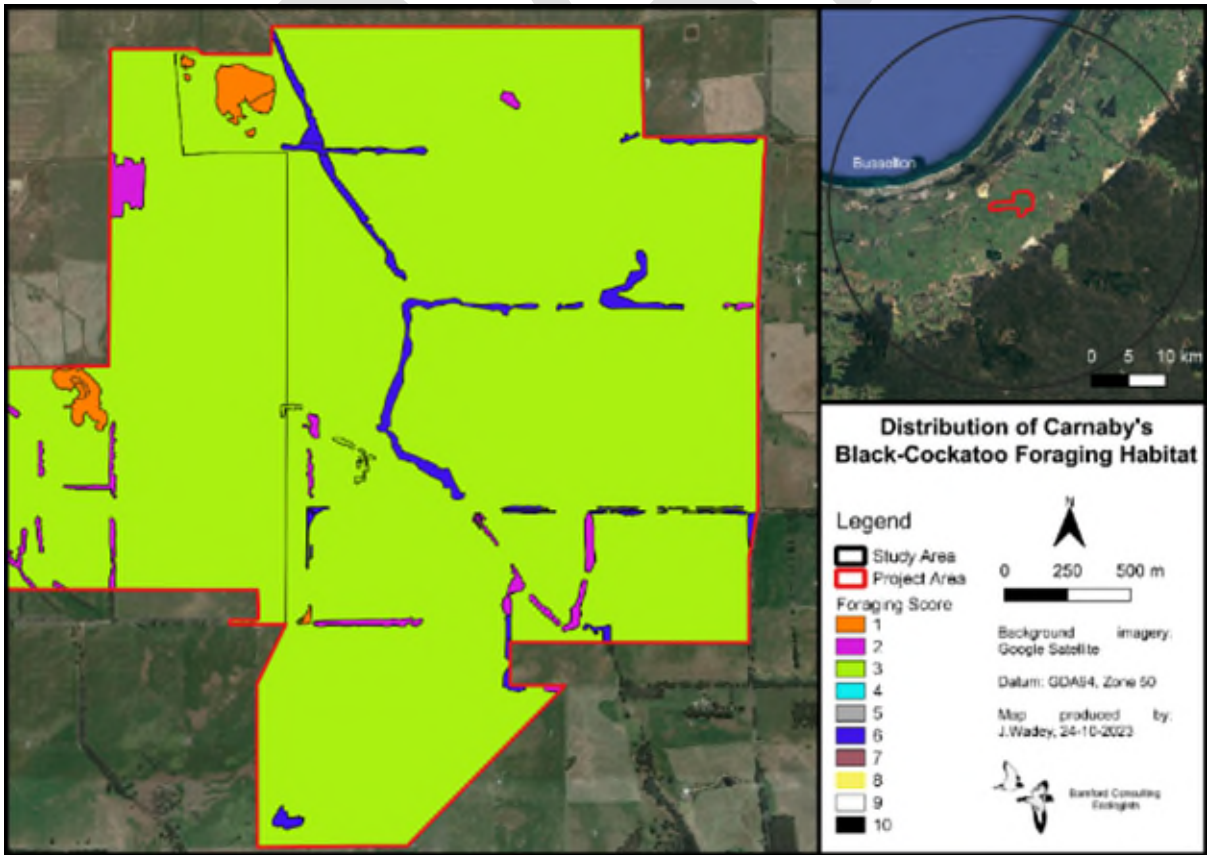

Figure 3-8 Foraging scores for Carnaby's Black-Cockatoo by VSA; east

3.3.2.2 Baudin's Black-Cockatoo

The foraging value for each VSA for the Baudin's Black-Cockatoo is given in **Table 3-5**, with foraging values ranging from 1 to 7 out of 10, and the majority of the project area being paddocks and scoring 3 out of 10. The VSAs with the highest foraging value (7 out of 10) were VSAs 1 and 2, containing Marri trees. Foraging values by VSA are shown in Figure 3-9 and Figure 3-10.

The species is expected to forage in the area when it visits; Harewood (2020) found records of Baudin's Black-Cockatoo foraging on Marri nuts in the immediate vicinity of the project area.

Table 3-5. Foraging scores for Baudin's Black-Cockatoo, based upon vegetation characteristics, context and species density. The maximum score is 10.

VSA	VSA Name	Site Condition (out of 6)	Site Context (out of 3)	Species Stocking Rate (0 or 1)	Total (out of 10)
1	Mixed Marri Woodland	4	2	1	**7**
2	Stream with Mixed Marri	4	2	1	**7**
3	Flooded Gum Stand	1	1	0	**2**
4	Planted Eucalypts	1	1	0	**2**
5	Stream with Planted Eucalypts	1	1	0	**2**
6	Melaleuca Dampland	1	0	0	**1**
7	Planted Garden	1	1	0	**2**
8	Paddocks with scattered mature trees	2	0	1	**3**

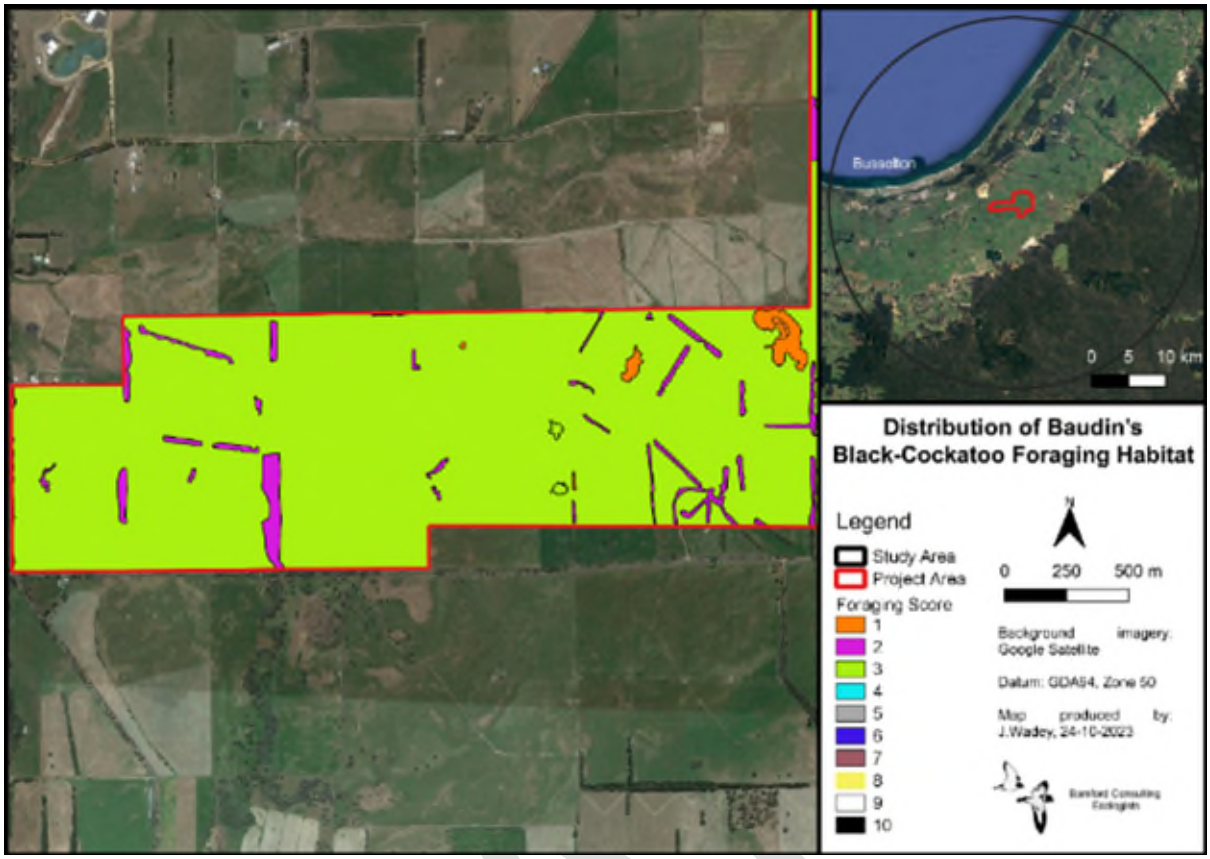

Figure 3-9 Foraging scores for Baudin's Black-Cockatoo by VSA; west

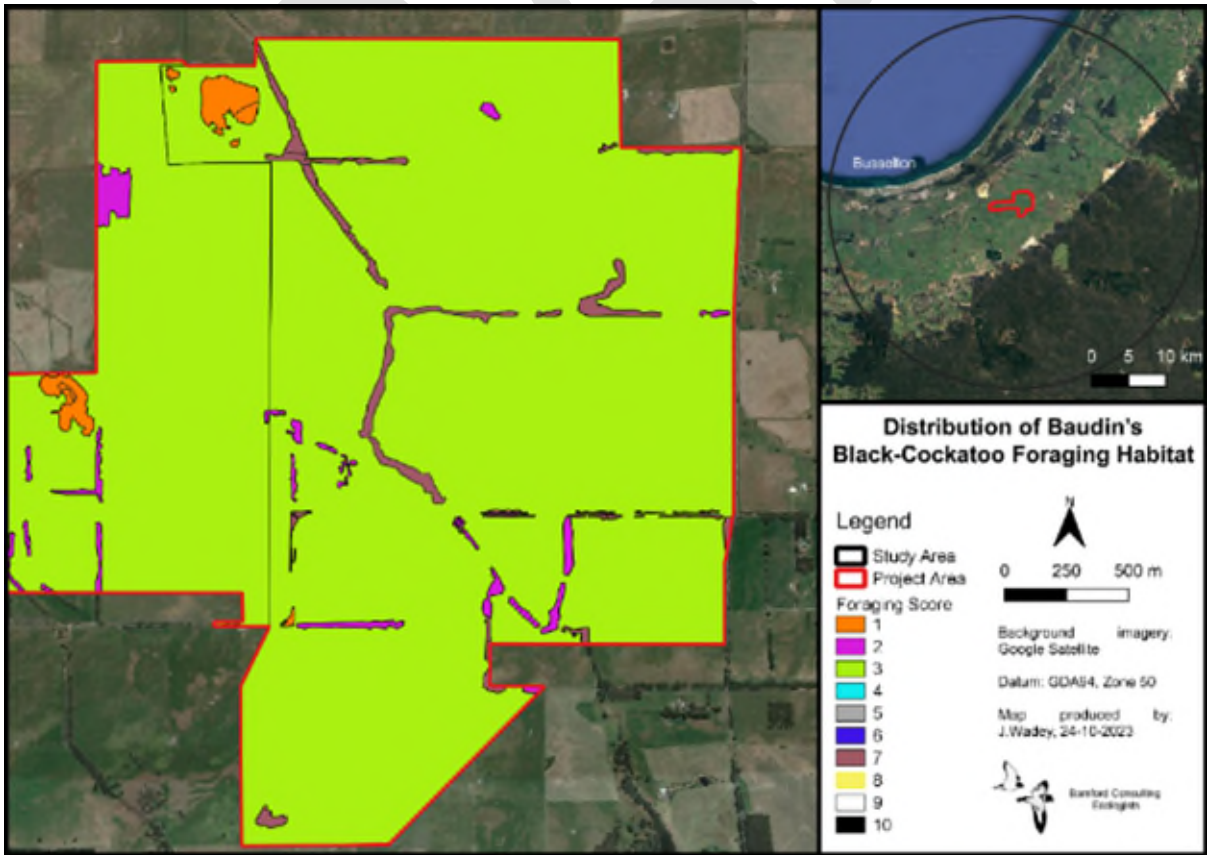

Figure 3-10 Foraging scores for Baudin's Black-Cockatoo by VSA, east

3.3.2.2 Forest Red-tailed Black-Cockatoo

The foraging values for each VSA for the Forest Red-tailed Black-Cockatoo are the same as those for the Baudin's Black-Cockatoo and are given in Table 3-6, with foraging values ranging from 1 to 7 out of 10 and the majority of the project area being paddocks and scoring 3 out of 10. The VSAs with the highest foraging value (7 out of 10) were VSAs 1 and 2, containing Marri trees. Foraging values by VSA are shown in Figure 3-11 and Figure 3-12. The species is expected to forage in the area regularly.

Table 3-6. Foraging scores for the Forest Red-tailed Black-Cockatoo, based upon vegetation characteristics, context and species density. The maximum score is 10.

VSA	VSA Name	Site Condition (out of 6)	Site Context (out of 3)	Species Stocking Rate (0 or 1)	Total (out of 10)
1	Mixed Marri Woodland	4	2	1	**7**
2	Stream with Mixed Marri	4	2	1	**7**
3	Flooded Gum Stand	1	1	0	**2**
4	Planted Eucalypts	1	1	0	**2**
5	Stream with Planted Eucalypts	1	1	0	**2**
6	Melaleuca Dampland	1	0	0	**1**
7	Planted Garden	1	1	0	**2**
8	Paddocks with scattered mature trees	2	0	1	**3**

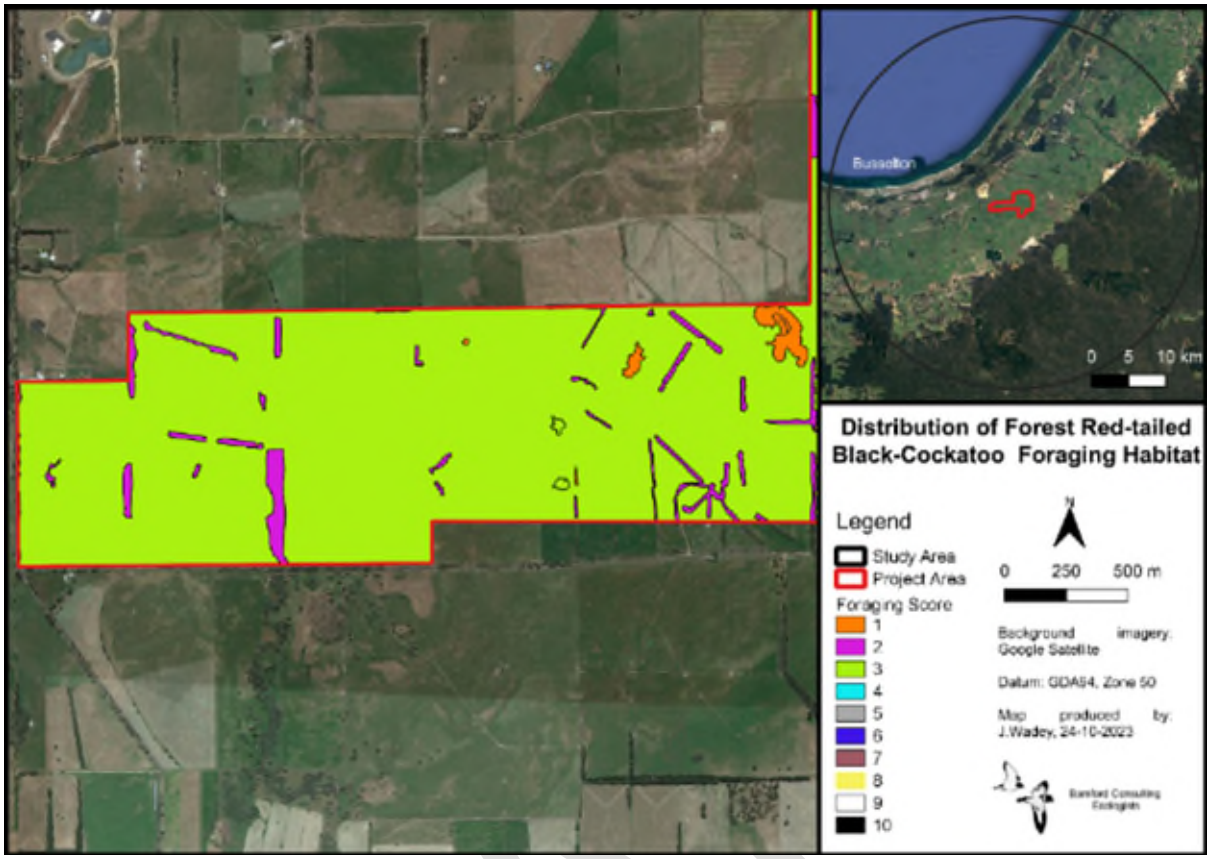

Figure 3-11 Foraging scores for Forest Red-tailed Black-Cockatoo; west

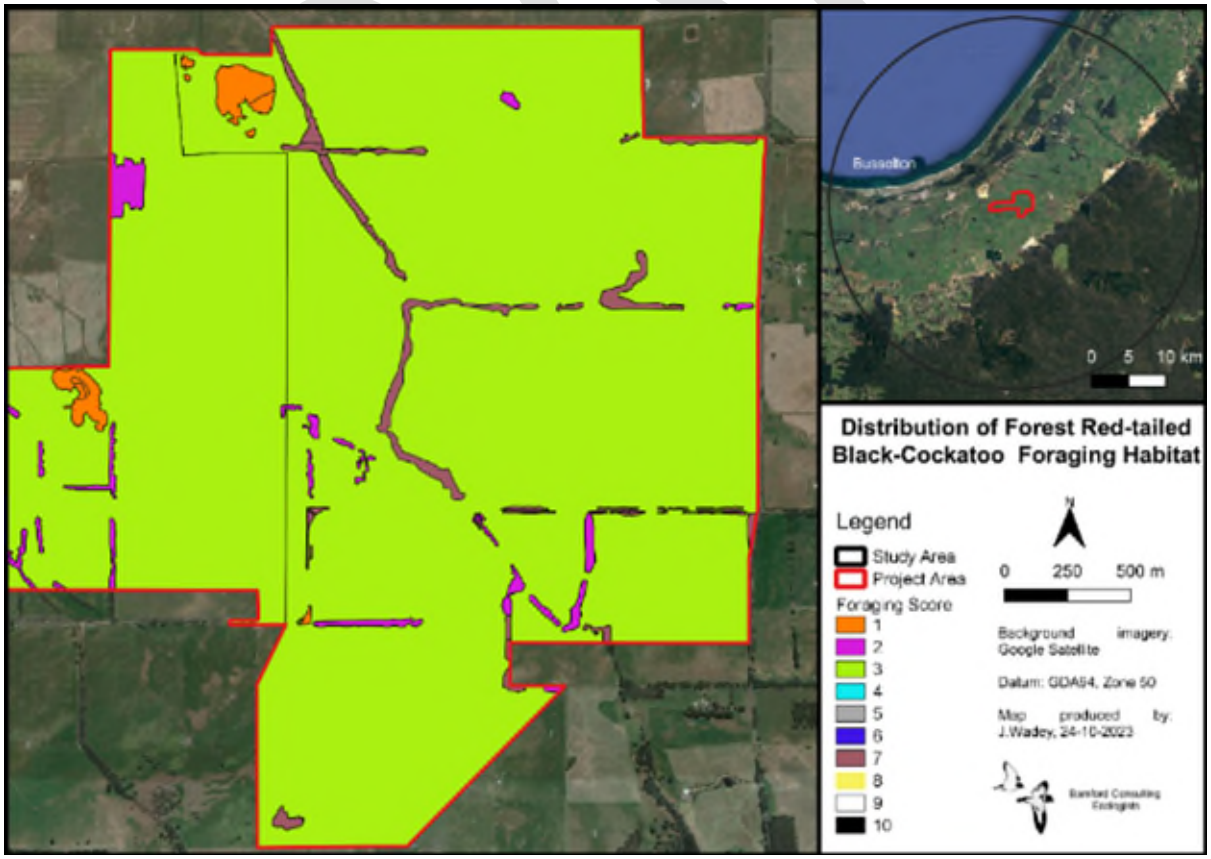

Figure 3-12 Foraging scores for Forest Red-tailed Black-Cockatoo; east

3.3.3 Black-cockatoo breeding

August 2023

Within the project area, 720 trees met the potential nest-tree criterion of DAWE and DEE (2017). Of these, 34 were ranked 3, 47 were ranked 4 and 639 were ranked 5. No trees ranked 2 (evidence of recent use) or 1 (in use) were found. The locations of the trees and their rankings are shown in **Error! Reference source not found.**. Details of each potential nesting tree, including GPS coordinates and rankings, are provided in Appendix 10. This is a relatively large number of rank 3 trees for the project area size and reflects the large number of mature remnant trees across the area.

January 2024

Seventeen of the rank 3 trees that lay within the development (impact) area were revisited and inspected with a pole camera. Seven of these were downgraded to a rank of 4 or 5 due to what appeared to be the hollow being solid wood or too small on closer inspection, while three trees were considered to possibly be rank 3 but possibly rank 4; one of these could not be reached with the pole camera, in another the entrance was blocked by bees and the third was too difficult to manoeuvre the camera to see into the hollow. In the case of the hollow that was too high to examine, it appeared the stem below the hollow was too narrow for a black-cockatoo (the stem was dead and thus would not grow). This left seven trees of rank 3 in the impact area, and 24 rank 3 trees overall. The final classifications are 24 rank 3 trees, 57 rank 4 trees and 640 rank 5 trees, with a total of 721 trees that met the potential nest-tree criterion. The total number of trees increased to 721 due to changes in accessibility.

The DBCA threatened species database returned three confirmed breeding hollows within 15 km of the project (Figure 3-14); these are of the Carnaby's Black-Cockatoo and were all natural breeding hollows (not artificial hollows). The closest breeding site to the project area was located 4.2 km northeast. In addition, McCreery *et al.* (2023) recorded highly likely breeding (several trees ranked 2) in the Tutunup area.

Table 3-7. Details of 17 rank 3 trees which were revisited in January 2024, including their updated ranks.

Waypoint	Easting	Northing	Tree Species	Common Name	Life Status	DBH	Updated Rank	Notes
191	359870	6271687	*Corymbia calophylla*	Marri	Dead	1000	3	A large Marri dead for about five years. Pair of Nankeen Kestrels present with two chicks in tree. One of these flying and second in a large, horizontal hollow. Both being fed grasshoppers. Other hollows in tree not examined due to need to avoid impacting Kestrels, and hollows possibly too high
248	356940	6271724	*Eucalyptus rudis*	Flooded Gum	Alive	800	3	Good hollow present
260	357186	6272109	*Eucalyptus rudis*	Flooded Gum	Alive	600	4	No suitable hollow. <50cm.
263	357098	6272268	*Eucalyptus rudis*	Flooded Gum	Alive	800	4	No suitable hollow. <50cm.
266	357039	6272115	*Eucalyptus rudis*	Flooded Gum	Alive	800	3	At least six hollows in a mostly-dead, multi-stemmed Flooded Gum. One hollow appears potentially suitable, and two further hollows are possibly two small but may be suitable in diameter and depth.
3684	361150	6273086	*Corymbia calophylla*	Marri	Alive	900	4	Hollow appears shallow <50cm
3685	361126	6273086	*Corymbia calophylla*	Marri	Alive	800	3	Large hollow with elongate entrance and many scuff marks round margin of entrance. Two Barn Owls flew out.
3686	361213	6273690	*Corymbia calophylla*	Marri	Alive	1000	3	Single and isolated large Marri in paddock without access. Could not be accessed. At least two potentially suitable hollows, one with rub marks

Waypoint	Easting	Northing	Tree Species	Common Name	Life Status	DBH	Updated Rank	Notes
3746	359849	6271801	*Corymbia calophylla*	Marri	Dead	900	5	Entire tree is hollow aka a 'chimney' from the ground to the spout 6m high. Has no potential to provide a nesting hollow. Tree is dead and likely to collapse within 10 years.
3988	357216	6271898	*Eucalyptus rudis*	Flooded Gum	Alive	600	4	No suitable hollow. <50cm.
3989	357207	6271919	*Eucalyptus rudis*	Flooded Gum	Alive	700	3	Suitable hollow >50cm.
3992	357220	6272137	*Eucalyptus rudis*	Flooded Gum	Alive	800	3	One hollow is shallow then solid wood. Two other hollows appear to lead into a common chamber about 20 degrees off vertical. Possibly too narrow but may be suitable.
3997	357203	6272123	*Eucalyptus rudis*	Flooded Gum	Alive	700	4	Stem appears to have several holes in it below entrance so unlikely to be suitable.
4066	359350	6270916	*Corymbia calophylla*	Marri	Alive	900	4	Three hollows. Two were shallow. Third hollow too high but stem probably too narrow and tree dead (so stem will not thicken).
4067	359422	6270990	*Corymbia calophylla*	Marri	Dead	1000	4	Only one obvious hollow and entrance <10cm. Stem below hollow probably too narrow. Tree is dead so stem will not thicken.
4069	359591	6271004	*Corymbia calophylla*	Marri	Dead	900	4	Three hollows examined. Two are solid wood. Third hollow might be deeper but had Bees blocking entrance.
4074	359385	6271009	*Corymbia calophylla*	Marri	Alive	800	4	Hollow is solid.

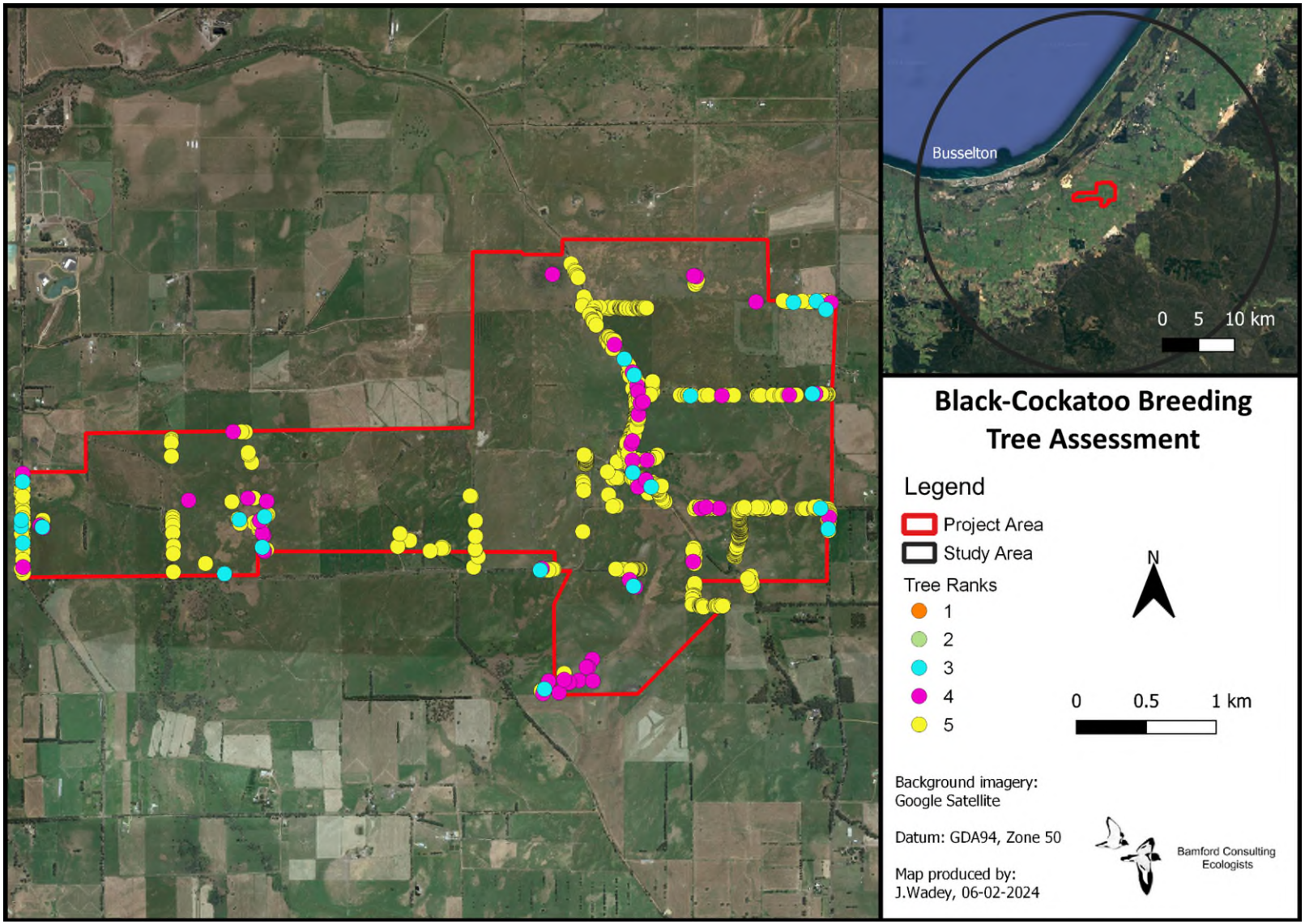

Figure 3-13. Potential black-cockatoo nesting trees and associated ranks

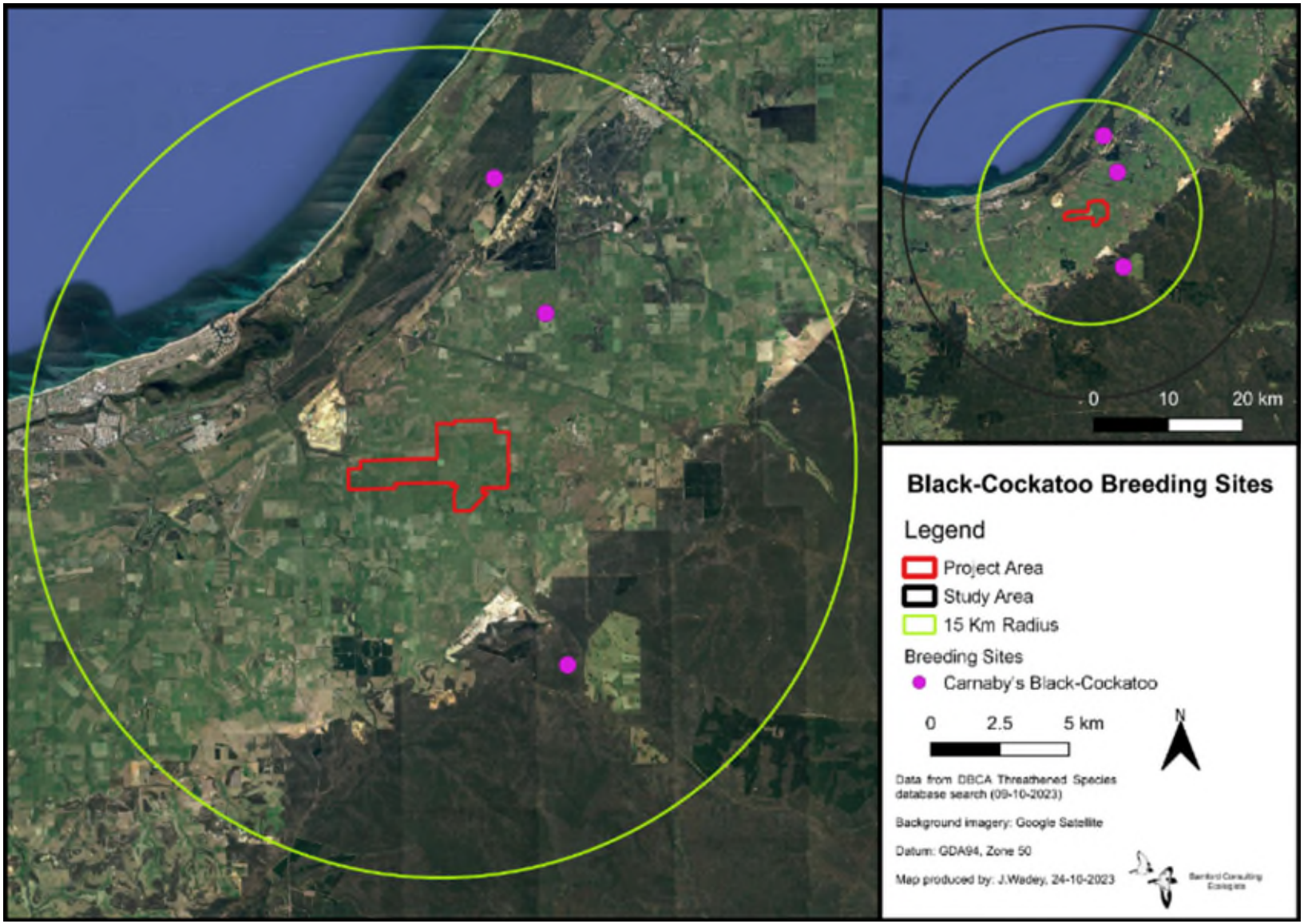

Figure 3-14 Black-cockatoo breeding sites (DBCA threatened species database)

3.3.4 Black-Cockatoo roosting

Within the project area, there are potential roost sites scattered throughout; effectively wherever there are tall trees (and there are at least 721 of DBH of 500mm or greater). Three Carnaby's Black-Cockatoos were flushed from a stand of planted eucalypts opposite the existing mine (see Figure 3-5). Their presence here in the middle of the day suggests it may be a day roost. There were no black-cockatoos heard nor seen during the roost survey, indicating there was no roost present within the project area, at least on that day.

The presence of a nearby water source is an important feature of a roost as the birds drink before roosting. There are several water sources present in the project area in the form of water troughs, dams and the stream in the west. The BirdLife database (which includes data from the Great Cocky Count) returned seven confirmed roosts within 25 km of the project area, with the closest roost site being of the Forest Red-tailed Cockatoo and located 1.3 km southwest of the project area in habitat similar to the project area's habitat. Figure 3-15 shows the locations of these roost sites.

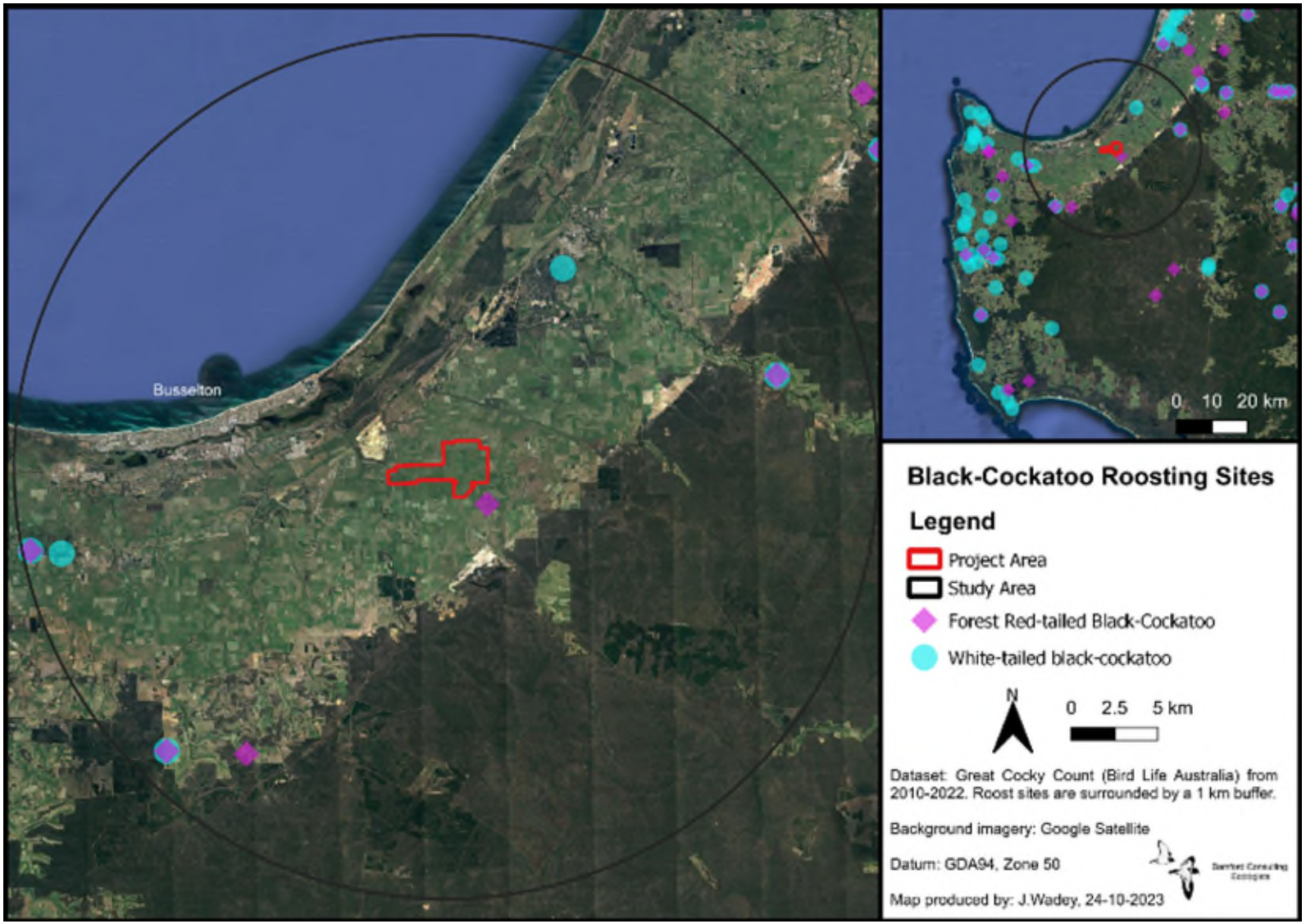

Figure 3-15. Black-cockatoo roosting sites (BirdLife Australia, 2023b). Note that roosts of white-tailed black-cockatoos will be Baudin's and/or Carnaby's Black-Cockatoo.

3.4 Western Ringtail Possum

There was no evidence of the Western Ringtail Possum in the project area; no dreys or scats were found, and no individuals were observed during spotlighting. However, this species is expected to be at least a regular visitor and possibly a resident (albeit in small numbers; reflecting the limited amount of habitat available) in the project area, as it is known from similar environments in the immediate vicinity and suitable habitat is present in the project area.

The Busselton area is recognised as a stronghold for the species with over 150 records returned from the DBCA threatened species database within 5 km of the project area (Figure 3-16). Harewood (2009) documented the species as occurring in remnant native vegetation in farmland in an area c. 5 km east of the project area. Multiple individuals were observed during BCE surveys at Tutunup in 2019, 2020, and 2022 (McCreery *et al*., 2023); locations are shown in Figure 3-16. The previous survey for the existing mine (Greg Harewood, 2020) found dreys and recorded one individual along the McGibbon Track, adjacent to the project area (Figure 3-16). These observations were from dense mixed Marri woodland, with similar habitat present (though less dense) along the stream in the current project area and along road verges. No records of the Western Ringtail Possum have been reported by Doral during operations of the mine (C. Bovell, pers. comm.).

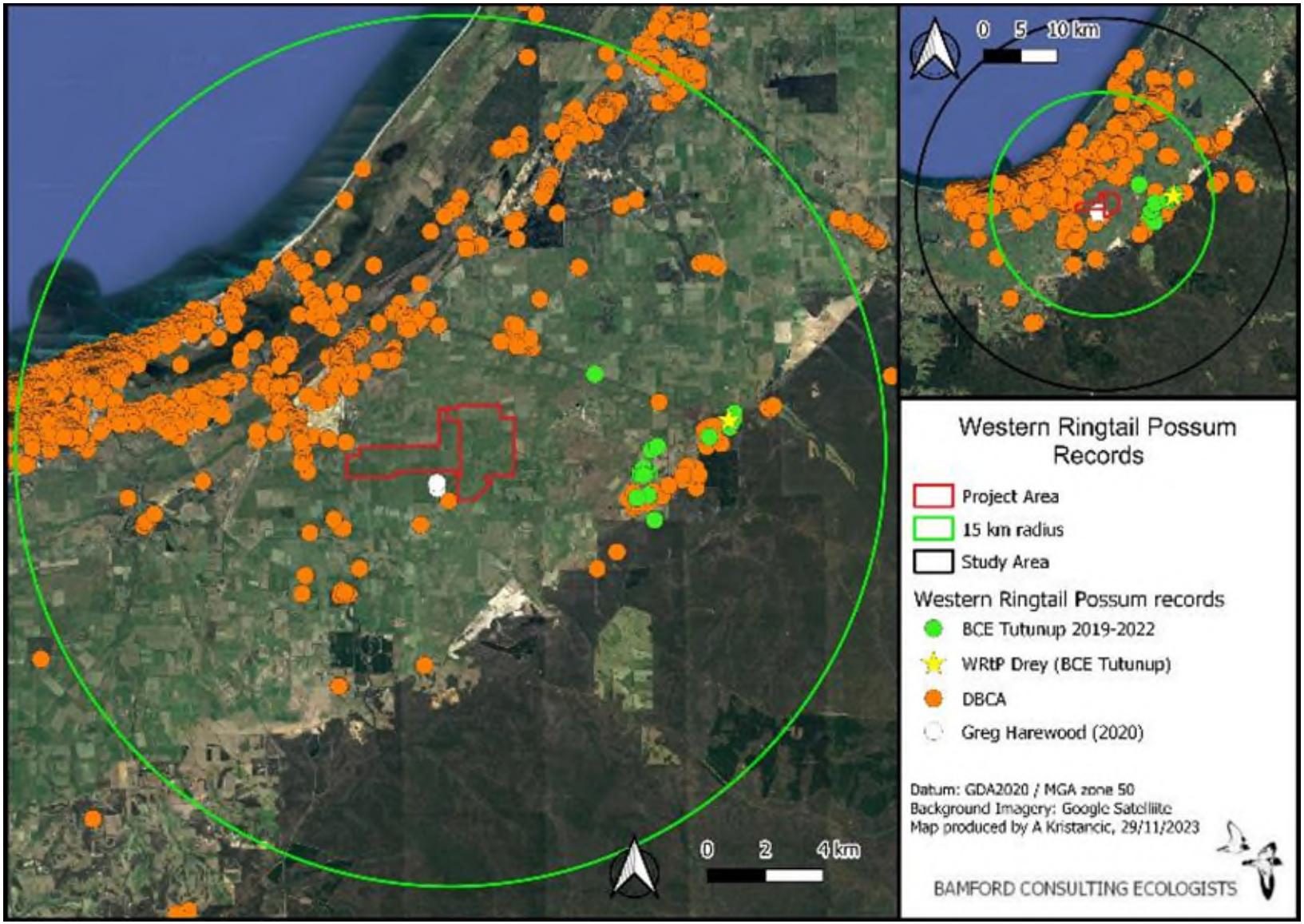

Figure 3-16 Locations of Western Ringtail Possum records from recent surveys and the DBCA threatened species database.

3.5 Patterns of Biodiversity

Investigating patterns of biodiversity can be complex and are often beyond the scope even of detailed investigations, but it is possible to draw some general conclusions based upon the size of the project area, the patterns of soils and vegetation across the landscape and the known fauna. A large proportion of the project area are paddocks; they have been previously cleared, are degraded and are used for cattle grazing. These areas likely support a lower fauna diversity than vegetated areas. Vegetated areas, even planted gardens and introduced trees planted as windbreaks, will provide habitat for fauna. Areas with highest diversity are expected to be along the strips of remnant native vegetation along road verges and along the Abba River; these may contain a diverse suite of reptiles, birds, some mammals, and frogs in the case of the stream. The project area is located on the Swan Coastal Plain and bushland of the Swan Coastal Plain is well-recognised as having high biodiversity values within south-western Western Australia (How & Cowan, 2006). Areas of melaleuca are expected to support dampland-associated species, and the many scattered mature trees (mostly native but also planted) would support birds such as nectarivores.

3.6 Ecological processes

The nature of the landscape and the fauna assemblage indicate some of the ecological processes that may be important for ecosystem function (see Appendix 1 for descriptions and other ecological processes), and it is those processes that maintain and mould the fauna assemblage. Ecological processes are also the mechanism by which development projects interact with a fauna assemblage, and therefore understanding the sustaining ecological processes helps to develop an understanding of how a development project may impact upon a fauna assemblage. Key ecological processes currently influencing the fauna assemblage of the survey area are:

Existing habitat loss

The project area is located in an area where native vegetation has largely been cleared for agriculture or grazing and very little remnant vegetation remains (see Figure 1-9). This has resulted in the loss and decline of many fauna species, while for any species persisting in the project area itself, any additional loss or even degradation of remnant vegetation or trees in the project area has the potential to lead to population decline. Revegetation of cleared areas within the project area and/or surrounding landscape has the potential to benefit fauna populations in the project area and in other populations nearby.

Landscape connectivity

The project area is mostly previously-cleared with isolated patches and strips of vegetation (along road verges, along the stream or as windbreaks) or isolated scattered mature trees. These strips of vegetation or scattered trees provide some connectivity in a landscape which is otherwise highly-fragmented. The main direct connectivity through the site is along the stream vegetation and along road verges. There is a diverse fauna assemblage within the Jarrah forests only three km southeast of the project area and this could provide a source of diverse range of species. However, the minimal connectivity across the project area likely restricts the fauna assemblage which can move through and which is therefore present in the project area.

Fire. Fire is an integral part of regional ecosystems and is recognised as a factor in the dynamics of fauna populations in Western Australia (Bamford and Roberts 2003). In terms of conservation management, it is not fire per se but the fire regime that is important, with the appropriate regime for biodiversity conservation differing between region and vegetation types. Note that fire regime can interact with feral species in providing greater access to habitats and native fauna hence impacting on native fauna populations. Small populations in small fragments of native vegetation can be particularly vulnerable to fire.

Feral species and interactions with over-abundant native species. The fauna assemblage of the project area includes a range of feral species and the mammal fauna in particular has suffered as a result. Predation by feral species (notably Fox and Cat) is a major factor in the decline of Australian mammals, including Quokka, Woylie and Tammar (Burbidge and McKenzie 1989), species considered locally extinct in the area. The Fox was recorded and the Cat is almost certainly present, and predation from these species may be limiting species such as the Western Ringtail Possum and Quenda.

Local hydrology. There is a minor stream which runs through the eastern part of the project area and areas of melaleuca dampland scattered throughout the project area which may become seasonally-inundated. Local hydrology is complex and the stream and damplands are expected to be locally important for some fauna. The local hydrology has almost certainly already been altered through land clearing.

3.7 Summary of fauna values

Vegetation and substrate associations

There were eight VSAs identified in the project area: Paddocks with scattered mature trees (VSA 8) was the dominant VSA. The key fauna values of this VSA were in the mature trees, most of which are large native remnant trees (e.g. Marri) with multiple hollows. Mixed Marri woodland and Stream with mixed Marri (VSAs 1 and 2) were represented along road verges, in patches, and along the stream in the east; this is native remnant vegetation and likely supports the highest biodiversity due to the floristic and structural diversity. There are patches of Melaleuca dampland (VSA 6) which will support a unique suite of species. The Flooded Gum stands (VSA 3), Planted Eucalypts (VSA 4) and Stream with planted Eucalypts (VSA 5) likely provides foraging, roosting and connectivity value, while the Planted garden (VSA 7) likely supports more common garden species.

Fauna assemblage

The desktop study identified 221 vertebrate fauna species as potentially occurring in the project area: 10 fishes, nine frogs, 28 reptiles, 150 birds (four introduced), 18 native mammals and six introduced mammals. A further 16 species (10 mammals, two birds, two reptiles and two fish) are considered locally extinct. The assemblage is typical of that expected in similar rural areas of the Swan Coastal Plain. Although a large number of species is expected in the project area, only one third of these are expected as residents; more species would be expected as residents in the project area if land clearing, habitat fragmentation and habitat degradation were less extensive. The assemblage is likely to be incomplete for all fauna groups, particularly so for mammals.

Species of conservation significance

The extant assemblage includes 56 species of conservation significance and 16 locally extinct species of conservation significance. Most notable for the project are the three black-cockatoo species, which are likely to use the project area for foraging and roosting, and possibly nesting, and the Western Ringtail Possum, which is expected to be a regular visitor or resident in the area.

Black-cockatoos

All three species of black-cockatoo present in the South-West are expected to be regular visitors to the project area. During the field investigations, a flock of three Carnaby's Black-Cockatoos was flushed from a stand of trees near the existing mining area (from what may be a day roost) and foraging evidence of the Baudin's Black-Cockatoo was recorded across the project area.

A large proportion of the project area is VSA 8 (paddocks with mature trees), and this VSA has a low foraging value of 3 out of 10 for all species. The presence of scattered mature trees is key to even this foraging value. The highest foraging values for all species are in VSAs 1 and 2 which contain Marri; these provide a moderate foraging value for the Carnaby's Black-Cockatoo (6 out of 10) and high foraging value for the Baudin's and Forest Red-tailed Black-Cockatoos (7 out of 10).

There were 721 trees that met the potential nest-tree criterion of a DBH of at least 500 mm. Of these, 27 were ranked 3, 53 were ranked 4 and 641 were ranked 5. This is a relatively large number of rank 3 trees (trees which contain hollows considered suitable for immediate black-cockatoo use) for the project area size and reflects the large number of mature remnant trees across the project area. There were no trees ranked 1 or 2 (i.e., showing current or recent use by black-cockatoos).

The project area contains suitable roosting habitat in the form of the many large trees present, and the presence of waterbodies nearby (an important feature of a black-cockatoo roost). BirdLife data returned seven confirmed roost sites within 25 km of the project area, with the closest being 1.3 km southwest of the project area. However, no roost sites were identified at the time of assessment.

Western Ringtail Possum

The Western Ringtail Possum (or evidence of the species) was not recorded in the project area. However, the species is known to be resident across the local area and has been recorded along McGibbon Track in the previous fauna survey for the existing Yalyalup mine (Harewood, 2020) and nearby, so is expected to be a regular visitor or resident. Suitable habitat for the species occurs in the project area, particularly along road verges and the stream.

Key ecological processes

The main ecological processes which may be influencing the fauna assemblage are:

- Existing habitat loss;
- landscape connectivity;
- the fire regime;
- the presence and abundance of feral species; and
- local hydrology.

Overall, the assemblage includes a large proportion of significant species, including a suite of locally significant species that have declined nearby due to clearing, primarily on the coastal plain. Nest trees for black-cockatoos are a very important habitat feature, and remnant native vegetation on farmland is important for maintaining local biodiversity.

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5 Appendices

Appendix 1. Explanation of fauna values.

Fauna values are the features of a site and its fauna that contribute to biodiversity, and it is these values that are potentially at threat from a development proposal. Fauna values can be examined under the five headings outlined below. It must be stressed that these values are interdependent and should not be considered equal, but contribute to an understanding of the biodiversity of a site. Understanding fauna values provides opportunities to predict and therefore mitigate impacts.

Assemblage characteristics

Uniqueness. This refers to the combination of species present at a site. For example, a site may support an unusual assemblage that has elements from adjacent biogeographic zones, it may have species present or absent that might be otherwise expected, or it may have an assemblage that is typical of a very large region. For the purposes of impact assessment, an unusual assemblage has greater value for biodiversity than a typical assemblage.

Completeness. An assemblage may be complete (i.e. has all the species that would have been present at the time of European settlement), or it may have lost species due to a variety of factors. Note that a complete assemblage, such as on an island, may have fewer species than an incomplete assemblage (such as in a species-rich but degraded site on the mainland).

Richness. This is a measure of the number of species at a site. At a simple level, a species rich site is more valuable than a species poor site, but value is also determined, for example, by the sorts of species present.

Vegetation and substrate associations (VSAs)

VSAs combine broad vegetation types, the soils or other substrate with which they are associated, and the landform. In the context of fauna assessment, VSAs are the environments that provide habitats for fauna. The term habitat is widely used in this context, but by definition an animal's habitat is the environment that it utilises (Calver et al., 2009), not the environment as a whole. Habitat is a function of the animal and its ecology, rather than being a function of the environment. For example, a species may occur in eucalypt canopy or in leaf-litter on sand, and that habitat may be found in only one or in several VSAs. VSAs are not the same as vegetation types since these may not incorporate soil and landform, and recognise floristics to a degree that VSAs do not. Vegetation types may also not recognise minor but often significant (for fauna) structural differences in the environment. VSAs also do not necessarily correspond with soil types, but may reflect some of these elements.

Because VSAs provide the habitat for fauna, they are important in determining assemblage characteristics. For the purposes of impact assessment, VSAs can also provide a surrogate for detailed information on the fauna assemblage. For example, rare, relictual or restricted VSAs should automatically be considered a significant fauna value. Impacts may be significant if the VSA is rare, a large proportion of the VSA is affected and/or the VSA supports significant fauna. The disturbance of even small amounts of habitat in a localised area can have significant impacts to fauna if rare or unusual habitats are disturbed.

VSA assessment was made with reference to the key attributes provided by (EPA, 2020):

- soil type and characteristics
- extent and type of ground surfaces and landforms
- height, cover and dominant flora within each vegetation stratum
- presence of specific flora or vegetation of known importance to fauna
- evidence of fire history including, where possible, estimates of time since fire
- evidence and degree of other disturbance or threats, e.g. feral species
- presence of microhabitats and significant habitat features, such as coarse woody debris, rocky
- outcrops, tree hollows, water sources and caves
- evidence of potential to support significant fauna
- function of the habitat as a fauna refuge or part of an ecological linkage.

Patterns of biodiversity across the landscape

This fauna value relates to how the assemblage is organised across the landscape. Generally, the fauna assemblage is not distributed evenly across the landscape or even within one VSA. There may be zones of high biodiversity such as particular environments or ecotones (transitions between VSAs). There may also be zones of low biodiversity. Impacts may be significant if a wide range of species is affected even if most of those species are not significant per se.

Species of conservation significance

Species of conservation significance are of special importance in impact assessment. The conservation status of fauna species in Australia is assessed under Commonwealth and State Acts such as the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Biodiversity Conservation Act 2016* (BC Act). In addition, the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) recognises priority levels, while local populations of some species may be significant even if the species as a whole has no formal recognition. Therefore, three broad levels of conservation significance can be recognised and are used for the purposes of this report, and are outlined below. A full description of the conservation significance categories, schedules and priority levels mentioned below is provided in Appendix 2.

<u>Conservation Significance (CS) 1: Species listed under State or Commonwealth Acts</u>.

Species listed under the EPBC Act are assigned to categories recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN, 2012), or are listed as migratory. Migratory species are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA), the Republic of South Korea Australia Migratory Bird Agreement (ROKAMBA), and/or the Convention on the Conservation of Migratory Species of Wild Animals (CMS; also referred to as the Bonn Convention). The *Biodiversity Conservation Act 2016* uses a series of divisions within three Schedules to classify conservation status that largely reflect the IUCN categories (IUCN, 2012).

Conservation Significance (CS) 2: Species listed as Priority by DBCA but not listed under State or Commonwealth Acts.

In Western Australia, DBCA has produced a supplementary list of Priority Fauna, being species that are not considered threatened under the *Biodiversity Conservation Act 2016* but for which DBCA feels there is cause for concern.

Conservation Significance (CS) 3: Species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution.

This level of significance has no legislative or published recognition and is based on interpretation of distribution information, but is used here as it may have links to preserving biodiversity at the genetic level (EPA, 2002). If a population is isolated but a subset of a widespread (common) species, then it may not be recognised as threatened, but may have unique genetic characteristics. Conservation significance is applied to allow for the preservation of genetic richness at a population level, and not just at a species level. Species on the edge of their range, or that are sensitive to impacts such as habitat fragmentation, may also be classed as CS3, as may colonies of waterbirds. The Western Australian Department of Environmental Protection, now DBCA, used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of the Perth Bushplan (Dell & Banyard, 2000).

Marine-listed species

Some conservation significant species may also be listed as 'Marine' under the EPBC Act. This listing protects these species in 'Commonwealth areas' which include "marine areas beyond the coastal waters of each State and the Northern Territory, and includes all of Australia's Exclusive Economic Zone (EEZ)" (DEH, 2006). The EEZ extends to 200 nautical miles (approximately 350 kilometres) from the coast (DEH, 2006). This may mean that the 'Marine' listing does not apply to the project/project area (depending on its location). Therefore, when a species is otherwise protected (under the EPBC Act or BC Act) or priority-listed (by the DBCA) then the Marine listing is also noted but it does not have site-specific relevance. In cases where a species is solely Marine-listed (for a list see DEH, 2000) and a project/project area is not within a Commonwealth area then it is treated like all other fauna.

Invertebrates

Invertebrate species considered to be short range endemics (SREs) also fall within the CS3 category, as they have no legislative or published recognition and their significance is based on interpretation of distribution information. Harvey (2002) notes that the majority of species that have been classified as short-range endemics have common life history characteristics such as poor powers of dispersal or confinement to discontinuous habitats. Several groups, therefore, have particularly high instances of short-range endemic species: Gastropoda (snails and slugs), Oligochaeta (earthworms), Onychophora (velvet worms), Araneae (mygalomorph spiders), Pseudoscorpionida (pseudoscorpions), Schizomida (schizomids), Diplopoda (millipedes), Phreatoicidea (phreatoicidean crustaceans), and Decapoda (freshwater crayfish). The poor understanding of the taxonomy of many of the short-range endemic species hinders their conservation (Harvey, 2002).

Introduced species

In addition to these conservation levels, species that have been introduced (INT) are indicated throughout the report. Introduced species may be important to the native fauna assemblage through effects by predation and/or competition.

Ecological processes upon which the fauna depend

These are the processes and conditions that apply to the existing environment and that affect and maintain fauna populations in an area. As such they are very complex; for example, populations are maintained through the dynamic of mortality, survival and recruitment being more or less in balance, and these are affected by a myriad of factors. The dynamics of fauna populations in a project area may be affected and effectively determined by processes such as:

- fire regime.
- landscape patterns (such as extent of existing habitat, fragmentation and/or linkage).
- the presence of feral species.
- hydrology.

Appendix 2. Categories used in the assessment of conservation status.

IUCN (International Union for the Conservation of Nature) categories, as outlined by IUCN (2012), and as used for the *Environment Protection and Biodiversity Conservation Act 1999* and the Western Australian *Biodiversity Conservation Act 2016*.

Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild (Ex)	Taxa known to survive only in captivity.
Critically Endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered €	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable (V)	Taxa facing a high risk of extinction in the wild in the medium-term future.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern.	Taxa that are not Threatened.

Schedules used in the WA *Biodiversity Conservation Act 2016, updated 2023*

Schedule 1	Specially protected fauna Division 1 – Species of special conservation interest (S1D1) Division 2 – Migratory species (S1D2) Division 3 – Species otherwise in need of special protection (S1D3)
Schedule 2	Threatened species Division 1 – Critically endangered species (S2D1) Division 2 – Endangered species (S2D2) Division 3 – Vulnerable species (S2D3)
Schedule 3	Extinct species (S3)

WA DBCA Priority species (species not listed under the *WA Biodiversity Conservation Act 2016*, but for which there is some concern).

Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4. (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5 (P5)	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

Appendix 3. Previous fauna surveys identified via IBSA, but for which reports/data were not available.

Citation	Details
Harewood (2018) Targeted Fauna Surv–y - Bussell Highway – Hutton to Sabina Section. Unpublished report for Main Roads Western Australia.	IBSA-2020-0553. Targeted Fauna Survey conducted for Main Roads Western Australia, for the Bussell Highway Duplication Stage 2 Hutton to Sabina 31-44 SLK project.
360 Environmental (2017) Bussell Highw–y - Hutton Road to Sabina section (30.91 – 44.18 SLK) Level 1 Fauna and Targeted Western Ringtail Possum Survey. Unpublished report for Main Roads Western Australia.	IBSA-2020-0552. Western Ringtail Possum habitat assessment survey conducted for Main Roads Western Australia, for theBussell Highway Duplication Stage 2 Hutton to Sabina 31-44 SLK project.
Main Roads Western Australia (2020) ussell Highway (H043) Duplication Hutton Road to Sabina River Project: Supplementary fauna habitat assessment results. Unpublished report for Main Roads Western Australia.	IBSA-2020-0550. Black Cockatoo and Western Ringtail Possum habitat assessment survey conducted for Main Roads, for the Bussell Highway Duplication Stage 2 Hutton to Sabina 31-44 SLK project.
Biota Environmental Sciences (2020) Bussell Highway (Hutton to Sabina) Western Ringtail Possum Assessment. Unpublished report for Main Roads Western Australia	IBSA-2020-0549. Terrestrial vertebrate faunasurvey conducted for Main Roads Western Australia, for the Bussell Highway Duplication Stage 2 Hutton to Sabina 31-44 SLK project.
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Appendix 4. Scoring system for black-cockatoo foraging value (developed by BCE).

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the DCCEEW (formerly DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed above. These three components are drawn from the DAWE offsets guide[2] but the scoring approach was developed by BCE and includes a fourth (moderation) component. Note that the scoring system can only be applied within the range of the species or at least where the species could reasonably be expected to occur based upon existing information.

Calculating the total score (out of 10) requires the following steps:

A. Site condition. Determining a score out of six for the vegetation composition, condition and structure; plus
B. Site context. Determining a score out of three for the context of the site; plus
C. Species stocking rate. Determining a score out of one for species density.
D. Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

The BCE scoring system places the greatest weight on site condition (scale of 0 to 6) because this has the highest influence on the foraging values of a site, which in turn is the fundamental driver in meeting ecological requirements for continued survival.

Site context has a lower weight (scale of 0 to 3) in recognition of the mobility of the species, which means they can access good foraging habitat even in fragmented landscapes, but allowing for recognition of the extent of available habitat in a region and context in relation to activity (such as breeding and roosting). The application of scoring site context is further discussed below.

Species stocking rate is given a low weight (0 to 1) as it is a means only of recognising that a species may or may not be abundant at a site, but that abundance is dependent upon site condition and context and is thus not an independent variable. The abundance of a species is also sensitive to sampling effort, and to seasonal and annual variation, and is therefore an unreliable indicator of actual

[2] https://www.agriculture.gov.au/sites/default/files/documents/offsets-how-use.pdf

importance of a site to a species. Calculation of scores and the moderation process are described in detail below.

A. Site condition. Vegetation composition, condition and structure scoring

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

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

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; • Eucalypt Woodland/Forest with Marri 20-60% projected foliage cover. Depending on understorey condition (and thus long-term viability) and Marri density, may downgrade to 3 or upgrade to 5.	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover. • Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 40-60% projected foliage cover.
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. • Sheoak Forest with > 60% projected foliage cover.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Vegetation structural class terminology follows Keighery (1994).

B. Site context

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Black-Cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with DEE, provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	**Percentage of the existing native vegetation within the 'local' area that the study site represents.**	
	'Local' breeding known/likely	**'Local' breeding unlikely**
3	> 5%	> 10%
2–1 - 5%–5 - 10%		
1	0–1 - 1%–1 - 5%	
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (eg 0.5% of such habitat within 15km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it. Adjustments to context score are further discussed below (moderation of scores).

C. Species density (stocking rate).

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black-cockatoos. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site context. For example, a site with a moderate condition score that is part of a network of such habitat where a black-cockatoo species is known

would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

D. Moderation of scores for the calculation of a value out of 10.

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a Condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat ($\geq$3). The approach to calculating a score out of 10 can be summarised as follows:

vegetation composition, condition and structure score (out of 6)	context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special circumstances; such as when very close to a major breeding area or if strategically located along a movement corridor. It could also get an elevated context score if it is the only foraging habitat in an area and birds are present, and also if it is immediately alongside at least moderately good foraging habitat, on the basis that birds are more likely to utilise it if they are nearby. Species density score might also be raised if there is a high likelihood of the birds actually being present. Context score can also be used to give a fine adjustment to the total score, such as if there are two vegetation types with the same vegetation composition score, but one may be slightly better foraging habitat and covers a larger area. Moderation is a means by which fairly subtle differences in overarching foraging value can be recognised.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.
- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott & Black, 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.
- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black-Cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and three times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental, such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.
- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this.
- Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black-Cockatoos are not regularly present.

Appendix 5. Expected fauna assemblage of the project area.

Status codes:

CS1, CS2, CS3 = (summary) levels of conservation significance. See Appendix 1 for full explanation.

EPBC Act listings: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory, Mar = Marine (see Appendix 2).

Biodiversity Conservation Act 2016 listings: S1 to S3 = Schedules 1 to 3, D1 to D3 = Divisions 1 to 3 (see Appendix 2).

DBCA Priority species: P1 to P4 = Priority 1 to 4 (see Appendix 2).

CS3 = considered to be of local significance by Bamford Consulting Ecologists (see Appendix 1).

Int = introduced species.

See Section 2.3.4.1 for explanation of expected occurrence categories.

Source: 1 = Atlas of Living Australia, 2 = Birdata, 3 = previous fauna surveys/reports, 4 = Naturemap (via request to DBCA), 5 = Protected Matters Search Tool, 6 = DBCA threatened and priority fauna search, 7 = general literature, 8 = BCE surveys at Tutunup (c. 5-10 km from Yalyalup project area).

X in Recorded column indicates the species was recorded during August 2023 field investigations; “e” indicates species for which evidence was recorded.

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Geotriidae (Lampreys)					
Geotria australis	Pouched Lamprey	CS2 (P3)	4 6	Regular visitor	
Plotosidae (Eeltail catfishes)					
Tandanus bostocki	Freshwater Cobbler		1	Regular visitor	
Galaxiidae (Galaxias)					
Galaxias occidentalis	Western Galaxias		1 3 4	Regular visitor	
Percichthyidae (Temperate perches)					
Bostockia porosa	Nightfish		1 4	Regular visitor	
Nannoperca vittata	Western Pygmy-perch		1 4	Regular visitor	
Sparidae (Sea Breams and Porgies)					
Acanthopagrus butcheri	Black Bream		1	Regular visitor	
Gobiidae (Gobies)					
Pseudogobius olorum	Bluespot Goby		1 4	Regular visitor	
Cyprinidae (Cyprinids)					
Carassius auratus	Goldfish	Int	1 4	Regular visitor	
Percidae (Freshwater perches)					
Perca fluviatilis	Redfin Perch	Int	1 4	Irregular visitor	
Poeciliidae (Livebearers)					

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Gambusia holbrooki	Mosquitofish	Int	1 4	Regular visitor	
Pelodryadidae (Tree frogs)					
Litoria adelaidensis	Slender Tree Frog		1 3 4	Resident	
Litoria moorei	Motorbike Frog		1 3 4	Resident	
Limnodynastidae (Burrowing frogs)					
Heleioporus eyrei	Moaning Frog		1 3 4 8	Resident	
Limnodynastes dorsalis	Western Banjo Frog		1 4	Resident	
Myobatrachidae (Ground frogs)					
Crinia georgiana	Tsch'di's Froglet		1 3 4 8	Resident	
Crinia glauerti	Glau'rt's Froglet		1 3 4	Resident	
Crinia insignifera	Squelching Froglet		1 3 4	Resident	X
Geocrinia leai	'ea's Frog		1 4	Resident	
Pseudophryne guentheri	Gunt'er's Toadlet		1 4 8	Resident	
Chelidae (Side-necked freshwater turtles)					
Chelodina oblonga	South-west Long-necked Tortoise	CS3	1 3 4	Resident	
Gekkonidae (Gekkonid geckos)					
Christinus marmoratus	Marbled Gecko		1 4 8	Resident	
Pygopodidae (Legless lizards)					
Aprasia repens	Southwestern Sandplain Worm Lizard		1 4	Resident	
Lialis burtonis	Bur'on's Snake-lizard		1 4 8	Resident	
Agamidae (Dragons)					
Pogona minor	Dwarf Bearded Dragon		1 4 8	Resident	
Scincidae (Skinks)					
Acritoscincus trilineatum	Western Three-lined Skink		4 8	Resident	
Cryptoblepharus buchananii	Bucha'an's Snake-eyed Skink		1 3 4 8	Resident	
Ctenotus impar	Odd-striped Ctenotus		1 4 8	Resident	
Egernia kingii	K'ng's Skink		1 3 4 8	Resident	
Egernia napoleonis	South-western Crevice-skink		1 4 8	Resident	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Hemiergis gracilipes	South-western Mulch-skink		1 4	Resident	
Hemiergis peronii	Lowlands Earless Skink		1 4 8	Resident	
Hemiergis quadrilineata	Two-toed Earless Skink		1 4	Resident	
Lerista elegans	Elegant Slider		1 4 8	Resident	
Lissolepis luctuosa	Western Mourning Skink		1 4	Resident	
Lissolepsis luctuosa	Mourning Skink	CS3	3	Resident	
Menetia greyii	Common Dwarf Skink		1 3 4 8	Resident	
Morethia lineoocellata	West Coast Morethia Skink		1 4 8	Resident	
Morethia obscura	Shrubland Morethia Skink		1 4	Resident	
Tiliqua rugosa	Bobtail		1 3 4 8	Resident	
Varanidae (Monitor lizards)					
Varanus rosenbergi	Heath Monitor		1 4 8	Resident	
Typhlopidae (Blind snakes)					
Anilios australis	Southern Blind Snake		1 4	Resident	
Pythonidae (Pythons)					
Morelia spilota subsp. imbricata	South-west Carpet Python	CS3	4	Irregular visitor	
Elapidae (Venomous land snakes)					
Echiopsis curta	Bardick		1 3 4	Resident	
Elapognathus coronatus	Western Crowned Snake		1 3 4	Resident	
Notechis scutatus	Tiger Snake		1 3 4 8	Resident	
Pseudonaja affinis	Dugite		1 3 4 8	Resident	
Suta nigriceps	Mitch'll's Short-tailed Snake		1 4	Resident	
Casuariidae (Emus and Cassowaries)					
Dromaius novaehollandiae	Emu	CS3	1 2 4 8	Irregular visitor	
Phasianidae (Pheasants)					
Coturnix pectoralis	Stubble Quail		1 2 4	Regular visitor	
Synoicus ypsilophora	Brown Quail		1 2	Regular visitor	
Anatidae (Ducks, Geese and Swans)					
Anas acuta	Northern Pintail		1	Vagrant	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Anas castanea	Chestnut Teal		1 2 4	Irregular visitor	
Anas gracilis	Grey Teal		1 2 3 4	Regular visitor	
Anas superciliosa	Pacific Black Duck		1 2 3 4	Regular visitor	X
Aythya australis	Hardhead		1 2 4	Regular visitor	
Biziura lobata	Musk Duck		1 2 4	Regular visitor	
Chenonetta jubata	Australian Wood Duck		1 2 3 4	Regular visitor	X
Cygnus atratus	Black Swan		1 2 4	Regular visitor	
Malacorhynchus membranaceus	Pink-eared Duck		1 2 4	Irregular visitor	
Oxyura australis	Blue-billed Duck	CS2 (P4)	1 2 4 6	Irregular visitor	
Spatula rhynchotis	Australasian Shoveler		1 2 4	Regular visitor	
Stictonetta naevosa	Freckled Duck	CS3	1 2 4	Irregular visitor	
Tadorna tadornoides	Australian Shelduck		1 2 3 4	Regular visitor	X
Podicipedidae (Grebes)					
Podiceps cristatus	Great Crested Grebe		1 2 4	Irregular visitor	
Poliocephalus poliocephalus	Hoary-headed Grebe		1 2 4	Irregular visitor	
Tachybaptus novaehollandiae	Australasian Grebe		1 2 4	Regular visitor	
Columbidae (Pigeons and Doves)					
Columba livia	Rock Dove		1 2 3 4	Regular visitor	
Ocyphaps lophotes	Crested Pigeon		1 2 3 4 8	Regular visitor	X
Phaps chalcoptera	Common Bronzewing		1 2 3 4 8	Regular visitor	X
Phaps elegans	Brush Bronzewing	CS3	1 2 4	Irregular visitor	
Spilopelia chinensis	Spotted Dove		1	Regular visitor	
Spilopelia senegalensis	Laughing Dove		1 2 4	Regular visitor	
Podargidae (Frogmouths)					
Podargus strigoides	Tawny Frogmouth		1 2 4 8	Regular visitor	
Eurostopodidae (Eared Nightjars)					
Eurostopodus argus	Spotted Nightjar		1 4	Regular visitor	
Aegothelidae (Owlet-nightjars)					
Aegotheles cristatus	Australian Owlet-nightjar		1 2 4	Regular visitor	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Cuculidae (Cuckoos)					
Cacomantis flabelliformis	Fan-tailed Cuckoo	CS3	1 2 4	Regular visitor	
Chalcites basalis	Horsfi'ld's Bronze-Cuckoo	CS3	1 2 4 8	Regular visitor	
Chalcites lucidus	Shining Bronze-Cuckoo	CS3	1 2 4 8	Regular visitor	
Heteroscenes pallidus	Pallid Cuckoo	CS3	1 2 3 4	Regular visitor	
Rallidae (Crakes, Rails and Swamphens)					
Fulica atra	Eurasian Coot		1 2 3 4	Regular visitor	
Gallinula tenebrosa	Dusky Moorhen		1 2 3 4	Regular visitor	
Hypotaenidia philippensis	Buff-banded Rail		1 2 4	Regular visitor	
Porphyrio porphyrio	Purple Swamphen		1 2 4	Regular visitor	
Porzana fluminea	Australian Spotted Crake		1 2 4	Regular visitor	
Tribonyx ventralis	Black-tailed Native-hen		1 2 4	Irregular visitor	
Zapornia pusilla	Bail'on's Crake		1 2 4	Regular visitor	
Zapornia tabuensis	Spotless Crake		1 2 4	Regular visitor	
Threskiornithidae (Ibis and Spoonbills)					
Platalea flavipes	Yellow-billed Spoonbill		1 2 4	Regular visitor	
Platalea regia	Royal Spoonbill		1 2 4	Vagrant	
Plegadis falcinellus	Glossy Ibis	CS1 (MI, S1D2)	1 2 4 6	Irregular visitor	
Threskiornis moluccus	Australian White Ibis		1 2 3 4	Regular visitor	
Threskiornis spinicollis	Straw-necked Ibis		1 2 3 4 8	Regular visitor	
Ardeidae (Herons, Egrets and Bitterns)					
Ardea alba	Great Egret		1 2 4	Regular visitor	
Ardea intermedia	Intermediate Egret		1 3 4	Vagrant	
Ardea pacifica	White-necked Heron		1 2 4	Irregular visitor	
Bubulcus ibis	Cattle Egret		1 2 4	Vagrant	
Egretta garzetta	Little Egret		1 2 4	Irregular visitor	
Egretta novaehollandiae	White-faced Heron		1 2 3 4 8	Regular visitor	
Ixobrychus flavicollis australis (southwest subpop.)	Black Bittern (southwest subpop.)	CS2 (P2)	1 4 6	Vagrant	
Nycticorax caledonicus	Nankeen Night-Heron		1 2 4	Regular visitor	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Charadriidae (Plovers, Dotterel and Lapwings)					
Charadrius ruficapillus	Red-capped Plover		1 2 3 4	Irregular visitor	
Elseyornis melanops	Black-fronted Dotterel		1 2 3 4	Irregular visitor	
Erythrogonys cinctus	Red-kneed Dotterel		1 2 4	Irregular visitor	
Vanellus miles	Masked Lapwing		1 2 4	Vagrant	
Vanellus tricolor	Banded Lapwing		1 2 4	Regular visitor	
Turnicidae (Button-quail)					
Turnix varius	Painted Button-quail	CS3	1 2 4 8	Irregular visitor	
Glareolidae (Pratincoles)					
Glareola maldivarum	Oriental Pratincole	CS1 (MI, S1D2)	1	Vagrant	
Tytonidae (Masked Owls)					
Tyto alba	Barn Owl		1 2 4	Regular visitor	
Tyto novaehollandiae novaehollandiae	Masked Owl (southwest)	CS2 (P3)	1 4 6	Irregular visitor	
Strigidae (Hawk-Owls)					
Ninox boobook	Southern Boobook		1 2 3 4 8	Resident	
Accipitridae (Eagles, Kites, Goshawks)					
Accipiter cirrocephalus	Collared Sparrowhawk		1 2 3 4	Resident	
Accipiter fasciatus	Brown Goshawk		1 2 3 4 8	Resident	
Aquila audax	Wedge-tailed Eagle		1 2 4 8	Regular visitor	
Circus approximans	Swamp Harrier		1 2 4	Regular visitor	
Circus assimilis	Spotted Harrier		1 2 4	Irregular visitor	
Elanus axillaris	Black-shouldered Kite		1 2 4	Irregular visitor	
Haliaeetus leucogaster	White-bellied Sea-Eagle		1 2 4	Vagrant	
Haliastur sphenurus	Whistling Kite		1 2 3 4 8	Regular visitor	
Hieraaetus morphnoides	Little Eagle		1 2 4 8	Regular visitor	
Lophoictinia isura	Square-tailed Kite	CS3	1 2 4	Irregular visitor	
Meropidae (Bee-eaters)					
Merops ornatus	Rainbow Bee-eater	CS3	1 2 3 4 8	Regular visitor	
Alcedinidae (Kingfishers)					

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Dacelo novaeguineae	Laughing Kookaburra	Int	1 2 3 4 8	Resident	
Todiramphus sanctus	Sacred Kingfisher		1 2 4 8	Regular visitor	
Falconidae (Falcons)					
Falco berigora	Brown Falcon	CS3	1 2 4	Irregular visitor	
Falco cenchroides	Nankeen Kestrel		1 2 3 4 8	Resident	X
Falco longipennis	Australian Hobby		1 2 4	Regular visitor	
Falco peregrinus	Peregrine Falcon	CS1 (S1D3)	1 2 4 6	Regular visitor	
Cacatuidae (Cockatoos and Corellas)					
Cacatua sanguinea	Little Corella		1 2 3 4	Regular visitor	
Cacatua tenuirostris	Long-billed Corella	Int	1	Regular visitor	
Calyptorhynch banksii naso	Forest Red-tailed Black-Cockatoo	CS1 (VU, S2D3)	1 3 4 5 6 8	Regular visitor	
Eolophus roseicapilla	Galah		1 2 3 4 8	Resident	
Zanda baudinii	Baudin's Black-Cockatoo	CS1 (EN, S2D2)	1 2 3 4 5 6 8	Regular visitor	e
Zanda latirostris	Carnaby's Black-Cockatoo	CS1 (EN, S2D2)	1 2 3 4 5 6 8	Regular visitor	X
Psittaculidae (Parrots, Lorikeets and Rosellas)					
Barnardius zonarius	Australian Ringneck		1 2 3 4 8	Resident	X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		1 2 3 4 8	Irregular visitor	
Neophema elegans	Elegant Parrot		1 2 3 4 8	Regular visitor	X
Platycercus icterotis	Western Rosella	CS3	1 2 4	Irregular visitor	
Polytelis anthopeplus	Regent Parrot	CS3	1 2 4 8	Regular visitor	
Purpureicephalus spurius	Red-capped Parrot		1 2 3 4 8	Resident	
Climacteridae (Treecreepers)					
Climacteris rufus	Rufous Treecreeper	CS3	1 2 4	Vagrant	
Maluridae (Fairy-wrens, Emu-wrens and Grasswrens)					
Malurus elegans	Red-winged Fairy-wren	CS3	1 2 4 8	Irregular visitor	
Malurus splendens	Splendid Fairy-wren	CS3	1 2 3 4 8	Resident	X
Stipiturus malachurus	Southern Emu-wren	CS3	1 2 4	Irregular visitor	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Meliphagidae (Honeyeaters and Chats)					
Acanthorhynchus superciliosus	Western Spinebill		1 2 4 8	Regular visitor	
Anthochaera carunculata	Red Wattlebird		1 2 3 4 8	Regular visitor	X
Anthochaera lunulata	Western Wattlebird		1 2 3 4	Regular visitor	
Epthianura albifrons	White-fronted Chat		1 2 4	Irregular visitor	
Gavicalis virescens	Singing Honeyeater		1 2 3 4	Irregular visitor	
Gliciphila melanops	Tawny-crowned Honeyeater		1 2	Irregular visitor	
Lichmera indistincta	Brown Honeyeater		1 2 3 4 8	Regular visitor	
Melithreptus brevirostris	Brown-headed Honeyeater		1 2 4	Irregular visitor	
Melithreptus chloropsis	Gilb'rt's Honeyeater	CS3	1 4	Irregular visitor	
Phylidonyris niger	White-cheeked Honeyeater		1 2 4	Regular visitor	
Phylidonyris novaehollandiae	New Holland Honeyeater		1 2 3 4 8	Regular visitor	
Pardalotidae (Pardalotes)					
Pardalotus punctatus	Spotted Pardalote		1 2 4 8	Regular visitor	
Pardalotus striatus	Striated Pardalote		1 2 3 4 8	Resident	
Acanthizidae (Thornbills and Gerygones)					
Acanthiza apicalis	Inland Thornbill	CS3	1 2 3 4 8	Resident	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		1 2 3 4 8	Resident	X
Acanthiza inornata	Western Thornbill	CS3	1 2 3 4 8	Regular visitor	
Gerygone fusca	Western Gerygone		1 2 3 4 8	Resident	X
Sericornis maculatus	Spotted Scrubwren	CS3	3 8	Resident	
Smicrornis brevirostris	Weebill		1 2 3 4 8	Resident	
Neosittidae (Sittellas)					
Daphoenositta chrysoptera	Varied Sittella	CS3	1 2 4 8	Regular visitor	
Falcunculidae (Shriketits)					
Falcunculus frontatus	Crested Shrike-tit	CS3	1	Vagrant	
Pachycephalidae (Whistlers, Shrike-thrushes and allies)					
Colluricincla harmonica	Grey Shrike-thrush	CS3	1 2 4 8	Regular visitor	
Pachycephala pectoralis occidentalis	Western Whistler	CS3	1 2 3 4 8	Regular visitor	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Pachycephala rufiventris	Rufous Whistler	CS3	1 2 3 4 8	Resident	X
Campephagidae (Cuckoo-shrikes and Trillers)					
Coracina novaehollandiae	Black-faced Cuckoo-shrike		1 2 3 4 8	Regular visitor	X
Lalage tricolor	White-winged Triller		1 2 3 4 8	Regular visitor	
Artamidae (Woodswallows, Currawongs, Butcherbirds and Magpie)					
Artamus cinereus	Black-faced Woodswallow		1 2 3 4 8	Resident	X
Artamus cyanopterus	Dusky Woodswallow	CS3	1 2 4 8	Regular visitor	
Cracticus torquatus	Grey Butcherbird		1 2 3 4 8	Resident	X
Gymnorhina tibicen	Australian Magpie		1 2 3 4 8	Resident	X
Strepera versicolor	Grey Currawong		1 2 4	Regular visitor	
Rhipiduridae (Fantails)					
Rhipidura albiscapa	Grey Fantail		1 2 3 4 8	Resident	X
Rhipidura leucophrys	Willie Wagtail		1 2 3 4 8	Resident	X
Monarchidae (Monarch and Flycatchers)					
Grallina cyanoleuca	Magpie-lark		1 2 3 4 8	Resident	X
Myiagra inquieta	Restless Flycatcher	CS3	1 2 4 8	Irregular visitor	
Corvidae (Crows and Ravens)					
Corvus coronoides	Australian Raven		1 2 3 4 8	Resident	X
Petroicidae (Australian Robins)					
Eopsaltria griseogularis	Western Yellow Robin	CS3	1 2 4 8	Irregular visitor	
Melanodryas cucullata	Hooded Robin	CS3	1 2	Irregular visitor	
Microeca fascinans	Jacky Winter	CS3	1 2	Irregular visitor	
Petroica boodang	Scarlet Robin	CS3	1 2 4 8	Regular visitor	
Quoyornis georgianus	White-breasted Robin	CS3	1 2 4 8	Irregular visitor	
Acrocephalidae (Reed-Warblers)					
Acrocephalus australis	Australian Reed-Warbler		1 2 4	Regular visitor	
Locustellidae (Grassbirds)					
Cincloramphus cruralis	Brown Songlark		1 2 4	Regular visitor	
Cincloramphus mathewsi	Rufous Songlark		1 2 3	Regular visitor	

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Poodytes gramineus	Little Grassbird		1 2 4	Regular visitor	
Hirundinidae (Swallows and Martins)					
Cheramoeca leucosterna	White-backed Swallow		1 4	Regular visitor	
Hirundo neoxena	Welcome Swallow		1 2 3 4 8	Regular visitor	X
Petrochelidon ariel	Fairy Martin		1 2 3 4	Irregular visitor	
Petrochelidon nigricans	Tree Martin		1 2 3 4 8	Regular visitor	
Zosteropidae (True Babblers)					
Zosterops lateralis	Silvereye		1 2 3 4 8	Regular visitor	
Dicaeidae (Flowerpeckers)					
Dicaeum hirundinaceum	Mistletoebird		1 2 4 8	Regular visitor	
Estrildidae (Weaver Finches)					
Stagonopleura oculata	Red-eared Firetail	CS3	1 2 4 8	Irregular visitor	
Motacillidae (Pipits and Wagtails)					
Anthus novaeseelandiae	Australasian Pipit		1 2 3 4 8	Resident	X
Motacilla tschutschensis	Eastern Yellow Wagtail		1	Vagrant	
Tachyglossidae (Echidnas)					
Tachyglossus aculeatus	Echidna	CS3	8	Irregular visitor	
Dasyuridae (Dasyurids)					
Dasyurus geoffroii	Chuditch	CS1 (VU, S2D3)	1 4 5 6	Vagrant	
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	CS1 (S1D1)	1 4 6 8	Vagrant	
Peramelidae (Bandicoots)					
Isoodon fusciventer	Quenda	CS2 (P4)	1 3 4 6 8	Regular visitor	Observed by farm manager
Pseudocheiridae (Ringtail possums and greater gliders)					
Pseudocheirus occidentalis	Western Ringtail Possum	CS1 (CR, S2D1)	1 3 4 5 6 8	Resident	
Phalangeridae (Brushtail possums)					
Trichosurus vulpecula	Common Brushtail Possum		1 3 4 8	Resident	X
Macropodidae (Kangaroos)					

Latin Name	Common Name	Status	Source	Expected Occurrence	Recorded
Macropus fuliginosus	Western Grey Kangaroo		1 3 4 8	Resident	
Notamacropus irma	Brush Wallaby	CS2 (P4)	1 4 6 8	Irregular visitor	
Muridae (Rats and mice)					
Hydromys chrysogaster	Rakali	CS2 (P4)	1 4 6	Regular visitor	
Mus musculus	House Mouse	Int	1 4	Resident	
Rattus fuscipes	Bush Rat	CS3	1 4 8	Resident	
Rattus rattus	Black Rat	Int	1 4 8	Resident	
Leporidae (Rabbits and hares)					
Oryctolagus cuniculus	European Rabbit	Int	1 3 4 8	Resident	X
Molossidae (Freetail bats)					
Austronomus australis	White-striped Free-tailed Bat		4 8	Regular visitor	
Ozimops kitcheneri	South-western Free-tailed Bat		7 8	Regular visitor	
Vespertilionidae (Vespertillionid bats)					
Chalinolobus gouldii	Go'ld's Wattled Bat		1 4 8	Resident	
Chalinolobus morio	Chocolate Wattled Bat		4 8	Regular visitor	
Falsistrellus mackenziei	Western False Pipistrelle	CS2 (P4)	1 4 6 8	Regular visitor	
Nyctophilus geoffroyi	Lesser Long-eared Bat		4	Resident	
Nyctophilus major	Western Long-eared Bat		1 4	Regular visitor	
Vespadelus regulus	Southern Forest Bat		1 4 8	Resident	
Canidae (Dogs)					
Vulpes vulpes	Red Fox	Int	1 3 4 8	Resident	X
Felidae (Cats)					
Felis catus	Feral Cat	Int	1 3 4	Resident	
Suidae (Pigs)					
Sus scrofa	Pig	Int	8	Irregular visitor	

Appendix 6. Species recorded in the 2023 field investigation.

Latin Name	Common Name	Comments
FROGS		
Crinia insignifera	Squelching Froglet	Recorded calling along main stream
BIRDS		
Chenonetta jubata	Australian Wood Duck	Along stream and throughout
Barnardius zonarius	Australian Ringneck	Abundantly throughout
Corvus coronoides	Australian Raven	Throughout
Falco cenchroides	Nankeen Kestrel	Along Princefield Road
Phaps chalcoptera	Common Bronzewing	
Rhipidura albiscapa	Grey Fantail	On vegetation throughout
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Throughout
Rhipidura leucophrys	Willie Wagtail	Throughout
Artamus cinereus	Black-faced Woodswallow	Coopers
Gymnorhina tibicen	Australian Magpie	Throughout
Gerygone fusca	Western Gerygone	Throughout tall trees
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Throughout
Neophema elegans	Elegant Parrot	
Anthochaera carunculata	Red Wattlebird	
Pachycephala rufiventris	Rufous Whistler	
Hirundo neoxena	Welcome Swallow	At least 8 nests recorded at farmhouse with adults in them
Ocyphaps lophotes	Crested Pigeon	In paddocks
Grallina cyanoleuca	Magpie-lark	Throughout
Anthus novaeseelandiae	Australasian Pipit	
Zanda latirostris	Carnaby's Black-Cockatoo	Three individuals flushed from day roost within site, opposite mine
Tadorna tadornoides	Australian Shelduck	
Anas superciliosa	Pacific Black Duck	
Cracticus torquatus	Grey Butcherbird	
Malurus splendens	Splendid Fairy-wren	
MAMMALS		
Trichosurus vulpecula	Common Brushtail Possum	Scats recorded at abandoned house by Coopers
Isoodon fusciventer	Quenda	Isla has seen one crossing Ludlow-Hithergreen Rd by site
Vulpes vulpes	Fox	Scats recorded throughout. Four individuals seen during night survey, one with a pup
Oryctolagus cuniculus	Rabbit	Scats, warrens and individuals recorded throughout

Appendix 7. Species returned from the literature review that have been omitted from the expected species list because of habitat or range limitations, or because they are domesticated species.

Note that some birds could still occur as extremely rare vagrants.
Source: 1 = Atlas of Living Australia, 2 = Birdata, 3 = previous fauna surveys/reports, 4 = Naturemap (via request to DBCA), 5 = Protected Matters Search Tool, 6 = DBCA threatened and priority fauna search, 7 = general literature, 8 = BCE surveys at Tutunup (c. 5-10 km from Yalyalup project area).

Latin Name	Common Name	Status	Source	Reason
Pristidae				
Pristis pristis	Freshwater Sawfish	CS1 (VU & MI, S1D2 & P3)	5	Out of range
Lepidogalaxiidae				
Lepidogalaxias salamandroides	Salamanderfish	CS1 (S2D2)	4 6	Out of range
Percichthyidae				
Nannatherina balstoni	Bals'on's Pygmy-perch	CS1 (VU, S2D3)	5	Out of range
Hylidae				
Litoria cyclorhyncha	Spotted-thighed Frog		1	Out of range
Limnodynastidae				
Heleioporus psammophilus	Sand Frog		1 4	No habitat
Neobatrachus kunapalari	Kunapalari Frog		1 4	Out of range
Myobatrachidae				
Crinia pseudinsignifera	Bleating Froglet		1 4 8	Out of range
Metacrinia nichollsi	Nich'll's Toadlet		1 4	Out of range
Diplodactylidae				
Diplodactylus lateroides	Speckled Stone Gecko		8	No habitat
Diplodactylus polyophthalmus	Spotted Sandplain Gecko		4	Out of range
Pygopodidae				
Aprasia pulchella	Western Granite Worm-lizard		1 4 8	Out of range
Delma australis	Marble-faced Delma		4	Out of range
Delma hebesa	Heath Delma		1	Out of range
Pygopus lepidopodus	Common Scaly-foot		1 4	Out of range
Scincidae				
Cryptoblepharus plagiocephalus	Pé'on's Snake-eyed Skink		4	Out of range

Latin Name	Common Name	Status	Source	Reason
Ctenotus labillardieri	Common South-west Ctenotus		1 4	Out of range
Cyclodomorphus melanops	Slender Bluetongue		4	Out of range
Lerista distinguenda	Dwarf Four-toed Slider		1 3 4 8	Out of range
Lerista lineata	Lined Skink	CS2 (P3)	1 4 6	Out of range
Varanidae				
Varanus gouldii	Go'ld's Goanna		1 4	Out of range
Typhlopidae				
Anilios pinguis	Fat Blind Snake		1 4	Out of range
Elapidae				
Elapognathus minor	Short-nosed Snake	CS2 (P2)	1 4 6	Out of range
Neelaps calonotus	Black-striped Burrowing Snake		1	Out of range
Pseudonaja mengdeni	Gwardar		1	Out of range
Rhinoplocephalus bicolor	Mül'er's Snake		1 4	Out of range
Numididae				
Numida meleagris	Helmeted Guineafowl	Int	1 2	Domestic
Anatidae				
Anas platyrhynchos	Mallard		1 2 4	Domestic
Cairina moschata	Muscovy Duck		2	Domestic
Cereopsis novaehollandiae	Cape Barren Goose		1	Out of range
Cygnus olor	Mute Swan		1	Out of range
Dendrocygna arcuata	Wandering Whistling-Duck		1	Out of range
Phaethontidae				
Phaethon rubricauda	Red-tailed Tropicbird	CS1 (MI, S1D2 & P4)	1 2 4 6	No habitat
Columbidae				
Geopelia humeralis	Bar-shouldered Dove		1	Out of range
Ardeidae				
Botaurus poiciloptilus	Australasian Bittern	CS1 (EN, S2D2)	1 4 5 6	No habitat
Egretta sacra	Eastern Reef Egret		1 2 4	No habitat
Pelecanidae				
Pelecanus conspicillatus	Australian Pelican		1 2 4	No habitat

Latin Name	Common Name	Status	Source	Reason
Sulidae				
Morus serrator	Australasian Gannet		1 2 4	No habitat
Phalacrocoracidae				
Microcarbo melanoleucos	Little Pied Cormorant		1 2 3 4	No habitat
Phalacrocorax carbo	Great Cormorant		1 2 3 4	No habitat
Phalacrocorax sulcirostris	Little Black Cormorant		1 2 4	No habitat
Phalacrocorax varius	Pied Cormorant		1 2 4	No habitat
Anhingidae				
Anhinga novaehollandiae	Australasian Darter		1 2 4	No habitat
Burhinidae				
Burhinus grallarius	Bush Stone-curlew		1	No habitat
Haematopodidae				
Haematopus fuliginosus	Sooty Oystercatcher		1 2	No habitat
Haematopus longirostris	Australian Pied Oystercatcher		1 2 4	No habitat
Recurvirostridae				
Cladorhynchus leucocephalus	Banded Stilt		1 2 4	No habitat
Himantopus leucocephalus	Pied Stilt		1 2 4	No habitat
Recurvirostra novaehollandiae	Red-necked Avocet		1 2 4	No habitat
Charadriidae				
Charadrius bicinctus	Double-banded Plover		1	No habitat
Charadrius leschenaultii	Greater Sand Plover	CS1 (VU & MI, S2D3)	1 2 4 5 6	No habitat
Charadrius mongolus	Lesser Sand Plover	CS1 (EN & MI, S2D2)	2 5	No habitat
Pluvialis fulva	Pacific Golden Plover	CS1 (MI, S1D2)	1 2 4 6	No habitat
Pluvialis squatarola	Grey Plover	CS1 (MI, S1D2)	1 2 4 6	No habitat
Thinornis cucullatus	Hooded Plover	CS2 (P4)	2 4 6	No habitat
Rostratulidae				
Rostratula australis	Australian Painted-snipe		2	No habitat
Scolopacidae				
Actitis hypoleucos	Common Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Arenaria interpres	Ruddy Turnstone		1 2	No habitat

Latin Name	Common Name	Status	Source	Reason
Calidris acuminata	Sharp-tailed Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Calidris alba	Sanderling	CS1 (MI, S1D2)	1 2 4 6	No habitat
Calidris canutus	Red Knot	CS1 (EN & MI, S2D2)	1 2 4 5 6	No habitat
Calidris falcinellus	Broad-billed Sandpiper		1	No habitat
Calidris ferruginea	Curlew Sandpiper	CS1 (CR & MI, S2D1)	1 2 4 5 6	No habitat
Calidris melanotos	Pectoral Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Calidris ruficollis	Red-necked Stint	CS1 (MI, S1D2)	1 2 4 6	No habitat
Calidris subminuta	Long-toed Stint	CS1 (MI, S1D2)	1 2 4 6	No habitat
Calidris tenuirostris	Great Knot	CS1 (CR & MI, S2D1)	1 2 4 6	No habitat
Limnodromus semipalmatus	Asian Dowitcher	CS1 (MI, S1D2)	1	No habitat
Limosa lapponica	Bar-tailed Godwit	CS1 (MI, S1D2)	1 2 4 6	No habitat
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CS1 (CR, S2D1)	5	No habitat
Limosa limosa	Black-tailed Godwit	CS1 (MI, S1D2)	1 2 4 6	No habitat
Numenius madagascariensis	Eastern Curlew	CS1 (CR & MI, S2D1)	1 2 4 5 6	No habitat
Numenius phaeopus	Whimbrel	CS1 (MI, S1D2)	1	No habitat
Phalaropus lobatus	Red-necked Phalarope	CS1 (MI, S1D2)	1	No habitat
Tringa brevipes	Grey-tailed Tattler	CS1 (MI, S1D2 & P4)	1 2 4 6	No habitat
Tringa glareola	Wood Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Tringa nebularia	Common Greenshank	CS1 (MI, S1D2)	1 2 4 6	No habitat
Tringa stagnatilis	Marsh Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Xenus cinereus	Terek Sandpiper	CS1 (MI, S1D2)	1 2 4 6	No habitat
Laridae				
Anous stolidus	Common Noddy	CS1 (MI, S1D2)	1 4 6	No habitat
Anous tenuirostris melanops	Australian Lesser Noddy	CS1 (VU, S2D2)	1 4 5 6	No habitat
Chlidonias hybrida	Whiskered Tern		1 2	No habitat
Chlidonias leucopterus	White-winged Tern	CS1 (MI, S1D2)	1	No habitat
Chroicocephalus novaehollandiae	Silver Gull		1 2 3 4	No habitat
Gelochelidon nilotica	Gull-billed Tern	CS1 (MI, S1D2)	1	No habitat
Hydroprogne caspia	Caspian Tern	CS1 (MI, S1D2)	1 2 4 6	No habitat

Latin Name	Common Name	Status	Source	Reason
Larus pacificus	Pacific Gull		1 2 4	No habitat
Onychoprion anaethetus	Bridled Tern	CS1 (MI, S1D2)	1 2 4 6	No habitat
Sterna dougallii	Roseate Tern		1	No habitat
Sterna paradisaea	Arctic Tern		1 2	No habitat
Sternula nereis nereis	Fairy Tern	CS1 (VU, S2D3)	1 2 4 5	No habitat
Thalasseus bergii	Crested Tern	CS1 (MI, S1D2)	1 2 4 6	No habitat
Pandionidae				
Pandion haliaetus	Osprey	CS1 (MI, S1D2)	1 2 3 4 6	No habitat
Accipitridae				
Milvus migrans	Black Kite		1 4	Out of range
Falconidae				
Falco hypoleucos	Grey Falcon	CS1 (VU, S2D3)	5	Out of range
Cacatuidae				
Cacatua galerita	Sulphur-crested Cockatoo		1	Out of range
Cacatua pastinator	Western Corella		1 2 4	Out of range
Cacatua pastinator pastinator	M’ir's Corella	CS1 (S1D1)	4 6	Out of range
Lophochroa leadbeateri	Major Mitch’ll's Cockatoo		1	Out of range
Nymphicus hollandicus	Cockatiel		1	Out of range
Psittaculidae				
Neophema petrophila	Rock Parrot		1 2 4	No habitat
Pezoporus occidentalis	Night Parrot		5	Out of range
Psephotus haematonotus	Red-rumped Parrot		1	Out of range
Dasyornithidae				
Dasyornis broadbenti	Rufous Bristlebird		1	Out of range
Meliphagidae				
Anthochaera chrysoptera	Little Wattlebird		1	Out of range
Anthochaera paradoxa	Yellow Wattlebird		1	Out of range
Lichenostomus ornatus	Yellow-plumed Honeyeater		3	Out of range
Manorina flavigula	Yellow-throated Miner		1	Out of range
Melithreptus lunatus	White-naped Honeyeater		1 2 4	Out of range

Latin Name	Common Name	Status	Source	Reason
Nesoptilotis leucotis	White-eared Honeyeater		1	Out of range
Ptilotula ornata	Yellow-plumed Honeyeater		1	Out of range
Acanthizidae				
Hylacola cauta	Shy Heathwren		1	Out of range
Pomatostomidae				
Pomatostomus superciliosus	White-browed Babbler		1	Out of range
Pachycephalidae				
Pachycephala rufogularis	Red-lored Whistler		1	Out of range
Campephagidae				
Coracina maxima	Ground Cuckoo-shrike		1	Out of range
Artamidae				
Cracticus nigrogularis	Pied Butcherbird		1 2 4	Out of range
Corvidae				
Corvus bennetti	Little Crow		1	Out of range
Petroicidae				
Petroica goodenovii	Red-capped Robin		1	Out of range
Petroica multicolor	Norfolk Island Robin		1 4	Out of range
Hirundinidae				
Hirundo rustica	Barn Swallow		1	Out of range
Oceanitidae				
Oceanites oceanicus	Wil'on's Storm Petrel		1	No habitat
Passeridae				
Passer domesticus	House Sparrow	Int	1	Out of range
Muridae				
Pseudomys occidentalis	Western Mouse	CS2 (P4)	4 6	Out of range
Molossidae				
Ozimops planiceps	South-eastern Free-tailed Bat		4	Out of range
Canidae				
Canis lupus familiaris	Dog	Int	3 4	Domestic
Equidae				

Latin Name	Common Name	Status	Source	Reason
Equus caballus	Horse	Int	3	Domestic
Bovidae				
Bos taurus	Cow	Int	3 4	Domestic

Species omitted because they are marine:

Latin Name	Common Name
Reptiles	
Caretta caretta	Loggerhead Turtle
Chelonia mydas	Green Turtle
Natator depressus	Flatback Turtle
Dermochelys coriacea	Leatherback Turtle
Hydrophis elegans	Elegant Seasnake
Hydrophis ornatus	Reef Seasnake
Hydrophis platurus	Yellow-bellied Seasnake
Birds	
Aptenodytes patagonicus	King Penguin
Eudyptes moseleyi	Northern Rockhopper Penguin
Eudyptula minor	Little Penguin
Diomedea amsterdamensis	Amsterdam Albatross
Diomedea dabbenena	Tristan Albatross
Diomedea epomophora	Southern Royal Albatross
Diomedea exulans	Wandering Albatross
Diomedea sanfordi	Northern Royal Albatross
Phoebetria fusca	Sooty Albatross
Phoebetria palpebrata	Light-mantled Sooty Albatross
Thalassarche carteri	Indian Yellow-nosed Albatross
Thalassarche cauta	Shy Albatross
Thalassarche chlororhynchos	Atlantic Yellow-nosed Albatross
Thalassarche chrysostoma	Grey-headed Albatross

Latin Name	Common Name
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross
Thalassarche melanophris	Black-browed Albatross
Thalassarche steadi	White-capped Albatross
Ardenna carneipes	Flesh-footed Shearwater
Ardenna pacifica	Wedge-tailed Petrel
Daption capense	Cape Petrel
Fulmarus glacialoides	Antarctic Fulmar
Halobaena caerulea	Blue Petrel
Macronectes giganteus	Southern Giant-Petrel
Macronectes halli	Northern Giant Petrel
Pachyptila belcheri	Slender-billed Prion
Pachyptila desolata	Antarctic Prion
Pachyptila salvini	Sal'in's Prion
Pachyptila turtur	Short-billed Prion
Pachyptila turtur subantarctica	Fairy Prion (southern)
Pachyptila vittata	Broad-billed Prion
Procellaria cinerea	Grey Petrel
Pterodroma gouldi	Grey-faced Petrel
Pterodroma lessonii	White-headed Petrel
Pterodroma macroptera	Mutton-bird
Pterodroma mollis	Soft-plumaged Petrel
Puffinus assimilis	Little Shearwater
Puffinus huttoni	Hut'on's Shearwater
Stercorarius antarcticus lonnbergi	Subantarctic Skua
Mammals	
Arctocephalus forsteri	New Zealand Fur Seal
Arctocephalus tropicalis	Subantarctic Fur Seal
Neophoca cinerea	Australian Sea Lion
Eubalaena australis	Southern Right Whale
Balaenoptera borealis	Sei Whale

Latin Name	Common Name
Balaenoptera musculus	Antarctic Blue Whale
Megaptera novaeangliae	Humpback Whale
Caperea marginata	Pygmy Right Whale
Mesoplodon bowdoini	Andr'ws' Beaked Whale
Mesoplodon grayi	G'ay's Beaked Whale (scamperdown Whale)
Delphinus delphis	Common Dolphin
Globicephala melas	Long-finned Pilot Whale
Grampus griseus	Ri'so's Dolphin
Pseudorca crassidens	False Killer Whale
Stenella coeruleoalba	Striped Dolphin
Tursiops aduncus	Indo-Pacific Bottlenose Dolphin
Tursiops truncatus	Common Bottlenose Dolphin
Fish	
Carcharhinus brevipinna	spinner shark
Bathytoshia brevicaudata	Smooth Stingray
Elops hawaiensis	Giant Herring
Sardinella lemuru	Scaly Mackerel
Cnidoglanis macrocephalus	South Australian Catfish
Aldrichetta forsteri	Yelloweye Mullet
Liza argentea	Gold-gill Mullet
Mugil cephalus	Hard-gut Mullet
Atherinomorus vaigiensis	Common Hardyhead
Leptatherina presbyteroides	Tamar Hardyhead
Hyporhamphus melanochir	Gardie
Psammoperca waigiensis	Dwarf Palmer
Ostorhinchus rueppellii	Western Gobbleguts
Ostorhinchus victoriae	Red-striped Cardinalfish
Siphamia cephalotes	W'od's Siphonfish
Vincentia punctata	Orange Cardinalfish
Parequula melbournensis	Melbourne Silverbelly

Latin Name	Common Name
Chrysophrys auratus	Snapper
Pagrus aurat128ustralasianian Snapper	
Rhabdosargus sarba	Tarwhine
Pelates octolineatus	Sea Trumpeter
Eviota bimaculata	Twospot Fringedfin Goby
Favonigobius lentiginosus	Long-finned Goby
Nesogobius pulchellus	Sailfin Goby
Priolepis nuchifasciata	Threadfin Reefgoby
Aseraggodes haackeanus	Southern Sole
Phyllichthys punctatus	Spotted Sole
Zebrias cancellatus	Harrowed Sole
Contusus brevicaudus	Hardys Toadfish
Lagocephalus sceleratus	Giant Toadfish
Omegophora armilla	Ringed Toado
Omegophora cyanopunctata	Blue-spotted Toadfish
Polyspina piosae	Orangebarred Puffer
Torquigener pleurogramma	Weeping Toadfish
Torquigener vicinus	(blank)
Allenichthys glauerti	Glau’rt's Anglerfish
Antennarius commerson	Black Angler
Histiophryne cryptacanthus	Cryptic Anglerfish
Phyllophryne scortea	Whitespotted Anglerfish
Rhycherus gloveri	Glo’er's Anglerfish
Aploactisoma milesii	Velvetfish
Aplodactylus westralis	Western Australian Seacarp
Anoplocapros amygdaloides	Robust Boxfish
Anoplocapros lenticularis	Whitebarred Boxfish
Anoplocapros robustus	(blank)
Aracana aurita	Striped Cowfish
Caprichthys gymnura	Ornate Pigmy Boxfish

Latin Name	Common Name
Arripis georgianus	Australian Herring
Latropiscis purpurissatus	Sergeant Baker
Parablennius postoculomaculatus	False Tasmanian Blenny
Parablennius tasmanianus	Southern Blenny
Brama brama	’ay's Bream
Eocallionymus papilio	Painted Dragonet
Pseudocalliurichthys goodladi	Longspine Dragonet
Repomucenus calcaratus	Spotted Sand-dragonet
Caranx heberi	Blacktip Trevally
Caranx sexfasciatus	Turrum
Gnathanodon speciosus	Golden Trevally
Pseudocaranx georgianus	Silver Trevally
Pseudocaranx wrighti	Sand Trevally
Seriola hippos	Kingfish
Trachurus declivis	Cowanyoung
Trachurus novaezelandiae	Yellowtail Scad
Cetorhinus maximus	Basking Shark
Chaetodon assarius	Western Butterflyfish
Chelmonops curiosus	Western Talma
Cheilodactylus gibbosus	Crested Morwong
Dactylophora nigricans	Dusky Morwong
Nemadactylus valenciennesi	Sea Carp
Cristiceps aurantiacus	Crested Weed-fish
Cristiceps australis	Southern Crested Weedfish
Heteroclinus adelaidae	Adelaide Weedfish
Conger wilsoni	Eastern Conger
Gnathophis longicaudatus	Adelaide Weedfish
	Little Conger
Coryphaena hippurus	Mahi Mahi
Paraplagusia bilineata	Spotted Tongue-sole

Latin Name	Common Name
Dinolestes lewini	Longfin Pike
Chilomycterus reticulatus	Spotfin Porcupinefish
Diodon nicthemerus	Globefish
Echeneis naucrates	Sharksucker
Enoplosus armatus	Angelfish
Platax teira	Spotbelly Batfish
Girella zebra	Zebrafish
Glaucosoma hebraicum	Westralian Jewfish
Cochleoceps bicolor	Western Cleaner Clingfish
Cochleoceps spatula	Spadenose Clingfish
Cochleoceps viridis	Green Clingfish
Posidonichthys hutchinsi	Posidonia Clingfish
Gonorynchus greyi	Beaked Salmon
Plectorhinchus flavomaculatus	Goldspotted Sweetlips
Heterodontus portusjacksoni	Port Jackson Shark
Hypnos monopterygium	Coffin Ray
Hypnos monopterygius	Coffin Ray
Xiphias gladius	Swordfish
Istiompax indic’	D'ombr’in's Marlin
Kajikia audax	Stripey
Tetrapturus audax	Striped Marlin
Kyphosus cornelii	Western Drummer
Kyphosus gladius	Gladius Sea Chub
Kyphosus sydneyanus	Drummer Bream
Achoerodus gouldii	Western Blue Groper
Austrolabrus maculatus	Black-spotted Wrasse
Bodianus frenchii	Foxfish
Bodianus vulpinus	(blank)
Choerodon rubescens	Westralian Baldchin Groper
Coris auricularis	King Wrasse

Latin Name	Common Name
Dotalabrus alleni	Little Rainbow Wrasse
Dotalabrus aurantiacus	Ornate Wrasse
Eupetrichthys angustipes	Snake-skin Wrasse
Haletta semifasciata	Blue Weed-whiting
Halichoeres brownfieldi	Brownfi'ld's Wrasse
Heteroscarus acroptilus	Rainbow Fish
Notolabrus parilus	Brown Spotted Wrasse
Olisthops cyanomelas	Herring Cale
Ophthalmolepis lineolata	Southern Maori Wrasse
Pictilabrus laticlavius	Senatorwrasse
Pictilabrus viridis	Green Senator Wrasse
Pseudolabrus biserialis	Redband Wrasse
Siphonognathus argyrophanes	Tubemouth
Siphonognathus attenuatus	Short-nose Weed Whiting
Siphonognathus beddomei	Pencil Weed Whiting
Siphonognathus caninis	Sharpnose Weed Whiting
Siphonognathus radiatus	Longray Weed Whiting
Carcharodon carcharias	White Shark, Great White Shark
Microcanthus strigatus	Stripey
Neatypus obliquus	Footballer Sweep
Tilodon sexfasciatus	Moonlighter
Ranzania laevis	Slender Sunfish
Acanthaluteres brownii	Spinytail Leatherjacket
Acanthaluteres spilomelanurus	Golden-eyed Leatherjacket
Acanthaluteres vittiger	Toothbrush Leatherjacket
Brachaluteres jacksonianus	Pigmy Leatherjacket
Cantheschenia longipinnis	Smoothspine Leatherjacket
Chaetodermis penicilligerus	Leafy Leatherjacket
Eubalichthys cyanoura	Bluetail Leatherjacket
Eubalichthys mosaicus	Oval Leatherjacket

Latin Name	Common Name
Meuschenia flavolineata	Yellowstriped Leatherjacket
Meuschenia freycineti	Orange-spotted Leatherjacket
Meuschenia galii	Bluelined Leatherjacket
Meuschenia hippocrepis	Horse-shoe Leatherjacket
Monacanthus chinensis	Fanbelly Leatherjacket
Nelusetta ayraud	Chinaman Leather-jacket
Scobinichthys granulatus	Rough Leatherjacket
Cleidopus gloriamaris	Mailfish
Schuettea woodwardi	Western Pomfred
Lotella rhacina	Kelp Rock Cod
Parupeneus spilurus	Black-spot Goatfish
Upeneichthys vlamingii	Western Red Mullet
Gymnothorax prasinus	Green Moray
Myliobatis tenuicaudatus	Southern Eagle Ray
Pentapodus vitta	Striped Whiptail
Maxillicosta scabriceps	Little Gurnard Perch
Neosebastes pandus	Bighead Gurnard Perch
Carcharias taurus	Greynurse Shark
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)
Cirrhimuraena calamus	Fringelip Snake Eel
Ophichthus altipennis	Blackfin Snake Eel
Ophichthus melanochir	(blank)
Ophisurus serpens	Serpent Eel
Scolecenchelys breviceps	Shorthead Worm Eel
Genypterus blacodes	Kingclip
Genypterus tigerinus	Rockling
Sutorectus tentaculatus	Cobbler Wobbegong
Lactoria cornuta	Cowfish
Pseudorhombus jenynsii	Smalltooth Flounder
Parascyllium variolatum	Southern Collared Cat Shark

Latin Name	Common Name
Aetapcus maculatus	Warty Prowfish
Parapriacanthus elongatus	Elongate Bullseye
Pempheris klunzingeri	Rough Bullseye
Pempheris multiradiata	Bigscale Bullseye
Pempheris ornata	Orangelined Bullseye
Pentaceropsis recurvirostris	Longsnout Boarfish
Parapercis haackei	Wavy Weever
Leviprora inops	Weed Flathead
Platycephalus speculator	King Flathead
Paraplesiops meleagris	Southern Blue Devil
Paraplesiops sinclairi	Western Blue Devil
Trachinops brauni	Blue-lined Prettyfin
Trachinops noarlungae	Noarlunga Hulafish
Ammotretis elongatus	Elongate Flounder
Chromis klunzingeri	Blackhead Puller
Parma mccullochi	Mccull’ch's Scalyfin
Parma occidentalis	Western Scalyfin
Parma victoriae	Victorian Scalyfin
Pristiophorus cirratus	Longnose Sawshark
Pristiophorus nudipinnis	(blank)
Rachycentron canadum	Cobia
Regalecus glesne	Streamer Fish
Rhincodon typus	Whale Shark
Aptychotrema vincentiana	Southern Shovelnose-ray
Trygonorrhina dumerilii	Southern Fiddler Ray
Rhynchobatus australiae	White-spotted Shovelnose Ray
Sarda orientalis	Oriental Bonito
Scomberomorus commerson	Spanish Mackerel
Thunnus alalunga	Albacore
Thunnus maccoyii	Southern Bluefin Tuna

Latin Name	Common Name
Pterois volitans	Common Lionfish
Scorpaena sumptuosa	Western Red Scorpionfish
Scorpis aequipinnis	Snapjack
Scorpis georgiana	Banded Sweep
Atelomycterus macleayi	Marbled Cat-shark
Aulohalaelurus labiosus	Blackspotted Catshark
Acanthistius pardalotus	Leopard Wirrah
Acanthistius serratus	Western Wirrah
Caesioscorpis theagenes	Blowhole Perch
Epinephelides armatus	Breaksea Cod
Epinephelus multinotatus	White-blotched Rockcod
Epinephelus rivulatus	Chinaman Rockcod
Hypoplectrodes annulata	Blackbanded Seaperch
Hypoplectrodes annulatus	Blackbanded Seaperch
Hypoplectrodes nigroruber	Banded Seaperch
Hypoplectrodes wilsoni	Spotty Seaperch
Othos dentex	Harlequin Rock Cod
Siganus fuscescens	Black Rabbitfish
Sillaginodes punctata	King George Whiting
Sillaginodes punctatus	King George Whiting
Sillago bassensis	Southern School Whiting
Sphyraena novaehollandiae	Snook
Sphyrna lewini	Scalloped Hammerhead
Squatina australis	Angelshark
Filicampus tigris	Tiger Pipefish
Histiogamphelus cristatus	Rhino Pipefish
Phyllopteryx taeniolatus	Weedy Seadragon
Pugnaso curtirostris	Pugnose Pipefish
Stigmatopora argus	Gulf Pipefish
Stigmatopora nigra	Wide-body Pipefish

Latin Name	Common Name
Vanacampus phillipi	Port Phillip Pipefish
Vanacampus poecilolaemus	Australian Long-nosed Pipefish
Gymnapistes marmoratus	Soldier
Trachichthys australis	Southern Roughy
Galeorhinus galeus	School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark
Chelidonichthys kumu	Red Gurnard
Lepidotrigla papilio	Spiny Gurnard
Pterygotrigla polyommata	Flying Gurnard
Enneapterygius larsonae	Blackhead Threefin
Helcogramma decurrens	Blackthroat Threefin
Ichthyscopus barbatus	Fringed Stargazer
Trygonoptera mucosa	Western Shovelnose Stingaree
Trygonoptera ovalis	Bight Stingaree
Trygonoptera personata	Masked Stingaree
Urolophus circularis	Circular Stingaree
Urolophus paucimaculatus	Di'on's Stingaree

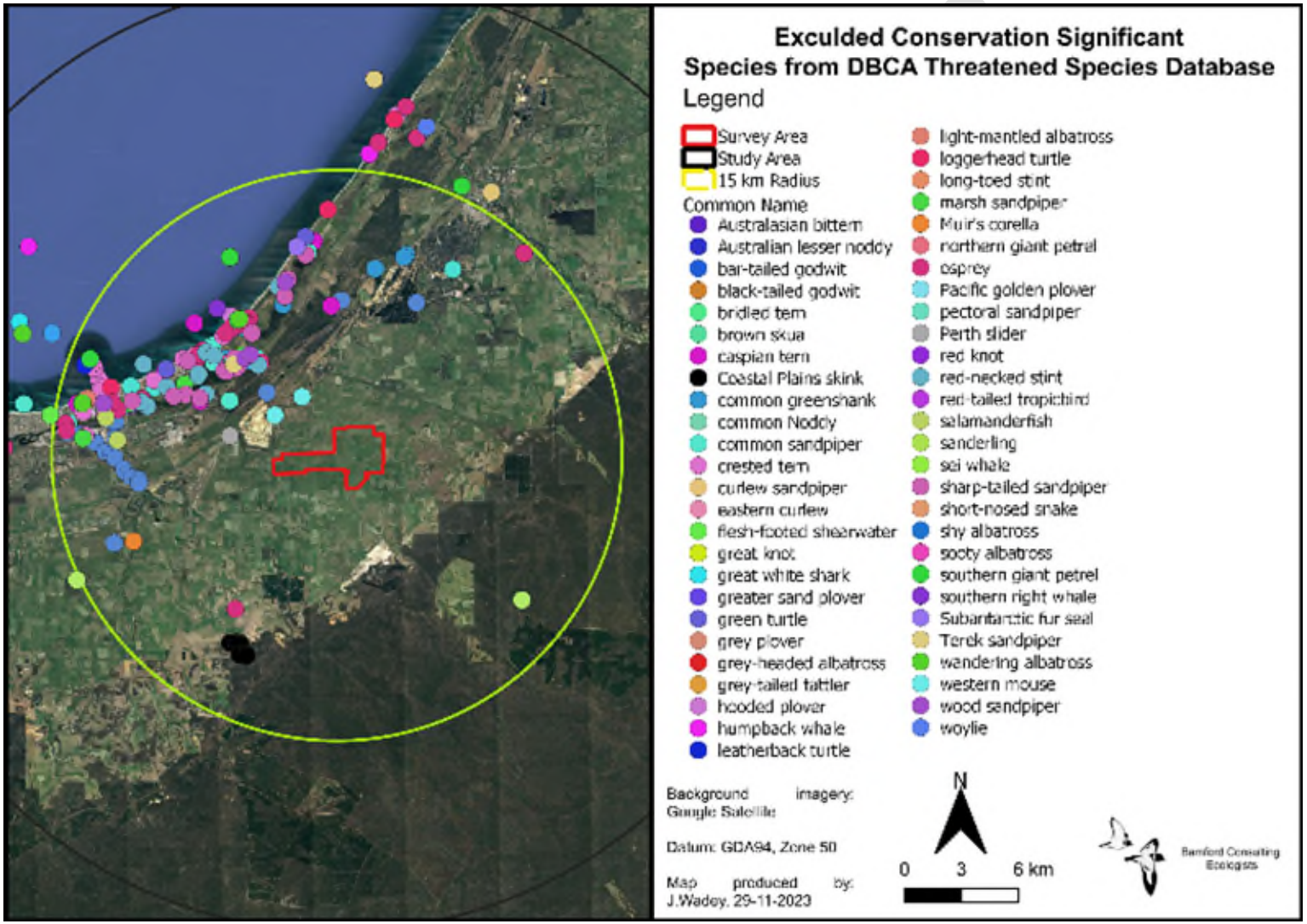
Appendix 8. Vertebrate species returned from the literature review and database search that have been omitted from the expected species list because they are extinct or considered locally extinct.

Status codes: CS1, CS2, CS3 = (summary) levels of conservation significance. See Appendix 1 for full explanation.
EPBC Act listings: CR = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, Mar = Marine (see Appendix 2).
Biodiversity Conservation Act 2016 listings: S1 to S3 = Schedules 1 to 3, D1 to D3 = Divisions 1 to 3 (see Appendix 2).
DBCA Priority species: P1 to P4 = Priority 1 to 4 (see Appendix 2).
See Section 2.3.4.1 for explanation of expected occurrence categories..
Source: 1 = Atlas of Living Australia, 2 = Birdata, 3 = previous fauna surveys/reports, 4 = Naturemap (via request to DBCA), 5 = Protected Matters Search Tool, 6 = DBCA threatened and priority fauna search, 7 = general literature, 8 = BCE surveys at Tutunup (c. 5-10 km from Yalyalup project area).

Latin Name	Common Name	Status	Source	Expected Occurrence
Galaxiidae				
Galaxiella munda	Mud Minnow, Western Dwarf Galaxias	CS1 (S2D3)	1 4	Locally extinct
Galaxiella nigrostriata	Black-striped Dwarf Galaxias	CS1 (EN, S2D2)	1	Locally extinct
Scincidae				
Ctenotus catenifer	Chain-striped South-west Ctenotus		1 4	Locally extinct
Ctenotus ora	Coastal Plains Skink	CS2 (P3)	4 6 8	Locally extinct
Megapodiidae				
Leipoa ocellata	Malleefowl	CS1 (VU, S2D3)	1 4 6	Locally extinct
Psophodidae				
Psophodes nigrogularis	Western Whipbird		1	Locally extinct
Dasyuridae				
Antechinus flavipes	Mardo (Yellow-footed Antechinus)		4 8	Locally extinct
Sminthopsis fuliginosus	Dusky Dunnart		1 4 8	Locally extinct
Sminthopsis gilberti	Gilbert's Dunnart		1 4	Locally extinct
Myrmecobiidae				
Myrmecobius fasciatus	Numbat	CS1 (EN, S2D2)	5	Locally extinct
Thylacomyidae				
Macrotis lagotis	Greater Bilby	CS1 (VU, S2D3)	4 6	Locally extinct
Burramyidae				
Cercartetus concinnus	Western Pygmy-possum		1 4 8	Locally extinct

Latin Name	Common Name	Status	Source	Expected Occurrence
Tarsipedidae				
Tarsipes rostratus	Honey Possum		1 4	Locally extinct
Potoroidae				
Bettongia penicillata ogilbyi	Woylie	CS1 (EN, S2D1)	1 4 5 6	Locally extinct
Macropodidae				
Setonix brachyurus	Quokka	CS1 (VU, S2D3)	1 4 5 6	Locally extinct
Canidae				
Canis lupus dingo	Dingo		7	Locally extinct

Appendix 9. Locations of records of conservation significant species returned from the DBCA threatened species database which were excluded from the expected fauna assemblage in this study.



Appendix 10. Tree data from black-cockatoo potential nesting tree assessment. Trees which were revisited and inspected with a pole camera are indicated with an asterisk against their rank.

See Section 2.4.4 for definitions of ranks. Datum GDA2020, Zone 50H.

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
18/08/2023	360295.2	6271905	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360306	6271898	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360289.7	6271888	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360291	6271885	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360292.8	6271883	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360290.5	6271880	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360291.4	6271872	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360293.6	6271870	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	4
18/08/2023	360297.3	6271685	*Corymbia calophylla*	Marri	Alive	500	5
18/08/2023	360309.6	6271695	*Corymbia calophylla*	Marri	Alive	700	5
18/08/2023	360307.6	6271714	*Corymbia calophylla*	Marri	Alive	500	5
18/08/2023	360302.8	6271857	*Corymbia calophylla*	Marri	Alive	600	5
18/08/2023	360304.1	6271946	*Corymbia calophylla*	Marri	Alive	700	5
18/08/2023	360296.3	6271967	*Corymbia calophylla*	Marri	Dead	600	5
18/08/2023	360289.5	6271949	*Corymbia calophylla*	Marri	Alive	500	5
18/08/2023	360707.7	6271774	*Corymbia calophylla*	Marri	Alive	700	5
18/08/2023	360719.7	6271714	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360717.5	6271728	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360592.9	6271909	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360588	6271914	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360585.4	6271919	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360589.5	6271926	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360595.3	6271930	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360594.3	6271934	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
18/08/2023	360589.6	6271938	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360591.3	6271946	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360591.4	6271948	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360596.7	6271945	*Eucalyptus sp.*	Introduced Eucalypt	Alive	550	5
18/08/2023	360599.2	6271953	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360596.5	6271962	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360602.5	6271966	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360596.8	6271971	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360597.6	6271972	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360599.7	6271975	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360603.3	6271973	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360604.9	6271976	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360609.2	6271996	*Eucalyptus sp.*	Introduced Eucalypt	Dead	700	5
18/08/2023	360622.7	6272032	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360622.1	6272041	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360623.5	6272042	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360623.7	6272044	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360621.1	6272045	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360616.9	6272051	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360622	6272053	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360624.4	6272054	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360625.5	6272058	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360626.8	6272059	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360627.8	6272060	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360629.4	6272065	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360619.1	6272061	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360618.9	6272066	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360631.4	6272069	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
18/08/2023	360626.2	6272079	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360623.6	6272084	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
18/08/2023	360624	6272086	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360624.1	6272090	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360631.4	6272091	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360632.9	6272095	*Eucalyptus sp.*	Introduced Eucalypt	Dead	800	5
18/08/2023	360632.2	6272098	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360626.9	6272099	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360625.6	6272105	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360624.3	6272109	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360630.4	6272107	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360630.7	6272108	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360630.4	6272109	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360630.3	6272111	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360632.2	6272112	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360631.2	6272116	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360630.5	6272120	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360624.5	6272120	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360628.9	6272124	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360628.9	6272127	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360622.2	6272130	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360620.8	6272133	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360620	6272137	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360620.1	6272139	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360625.4	6272138	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360626.7	6272139	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
18/08/2023	360625.9	6272143	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360620.2	6272146	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
18/08/2023	360619.4	6272149	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360619.5	6272152	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360619.3	6272156	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360625.6	6272155	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360625.2	6272159	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360620	6272163	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360625.4	6272165	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360624.6	6272172	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360618.8	6272174	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360617.4	6272176	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360622.6	6272178	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360623.4	6272180	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360622.7	6272183	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360622.8	6272185	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360622.3	6272188	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360616.6	6272186	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360614.3	6272192	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360620.5	6272194	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360621.2	6272197	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360621.3	6272202	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360615.7	6272200	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360615.2	6272207	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360614.7	6272210	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360612.3	6272218	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360618.7	6272219	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360619	6272222	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360613.1	6272223	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360612.1	6272227	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
18/08/2023	360617.5	6272230	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360618.4	6272232	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360618.2	6272237	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360618.1	6272241	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360617.4	6272245	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360617	6272249	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360612	6272249	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360612.6	6272242	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360612.3	6272240	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360302.6	6271630	*Corymbia calophylla*	Marri	Alive	700	5
18/08/2023	360306.9	6271624	*Corymbia calophylla*	Marri	Alive	800	5
18/08/2023	360304.2	6271618	*Corymbia calophylla*	Marri	Alive	900	5
18/08/2023	360292.9	6271620	*Corymbia calophylla*	Marri	Alive	700	5
18/08/2023	360297.2	6271598	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360294.6	6271598	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360292.9	6271563	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360343.6	6271557	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360351.3	6271554	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360352.1	6271552	*Corymbia calophylla*	Marri	Alive	900	5
18/08/2023	360360	6271558	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360363	6271552	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360365.9	6271555	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360367.9	6271557	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360368	6271557	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
18/08/2023	360373.1	6271546	*Corymbia calophylla*	Marri	Alive	600	5
18/08/2023	360452.2	6271556	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360459.7	6271559	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360462	6271557	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5

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18/08/2023	360462.4	6271558	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360474.5	6271555	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360483.4	6271554	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
18/08/2023	360501.8	6271562	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
18/08/2023	360514.3	6271556	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
18/08/2023	360516.3	6271559	*Eucalyptus sp.*	Introduced Eucalypt	Dead	700	5
18/08/2023	360511.1	6271557	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
18/08/2023	360707.1	6271705	*Corymbia calophylla*	Marri	Alive	800	5
18/08/2023	360701	6271724	*Corymbia calophylla*	Marri	Alive	900	5
18/08/2023	360685.3	6271756	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360624.8	6272255	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
21/08/2023	360642.2	6272254	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	360643.9	6272256	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	360675.9	6272259	*Corymbia calophylla*	Marri	Alive	900	5
21/08/2023	360723	6272258	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360727.2	6272257	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360728.7	6272255	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360738.5	6272257	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360757.3	6272257	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360759.6	6272253	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360761.8	6272255	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	360767.8	6272254	*Eucalyptus marginata*	Jarrah	Alive	500	5
21/08/2023	360785.9	6272258	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360793.4	6272256	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360804.1	6272258	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360911.3	6272264	*Corymbia calophylla*	Marri	Alive	900	5
21/08/2023	361067.5	6272262	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361082.2	6272264	*Corymbia calophylla*	Marri	Alive	700	5

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21/08/2023	361091	6272263	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361151.6	6272264	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361154.9	6272262	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361159.8	6272266	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	361170.4	6272266	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361177.7	6272265	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361197.2	6272267	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361200	6272267	*Corymbia calophylla*	Marri	Dead	500	3
21/08/2023	361209.4	6272267	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361215.7	6272266	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361227.4	6272268	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361235.4	6272267	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361254.5	6272263	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361261.1	6272249	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	361264	6272241	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361259.9	6272229	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	361261.4	6272219	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361267.5	6272212	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361262.2	6272204	*Eucalyptus marginata*	Jarrah	Dead	600	4
21/08/2023	361263.7	6272201	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361255.9	6272200	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361253.9	6272192	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361251.7	6272181	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361262.3	6272181	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361256.6	6272162	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361258.1	6272148	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361254.4	6272126	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361256.3	6272120	*Corymbia calophylla*	Marri	Alive	900	3

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21/08/2023	361260.1	6272110	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361181	6272281	*Eucalyptus marginata*	Jarrah	Dead	600	5
21/08/2023	361157.8	6272277	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360891	6272269	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360790.1	6272267	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360772.4	6272267	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360745.2	6272267	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360652.3	6272265	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360476.5	6272255	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360473.8	6272255	*Corymbia calophylla*	Marri	Alive	500	4
21/08/2023	360470.8	6272254	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360446.8	6272254	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360407.7	6272252	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360390.7	6272253	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	360375.7	6272251	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360355.3	6272252	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	360343	6272250	*Corymbia calophylla*	Marri	Alive	700	4
21/08/2023	360327.7	6272252	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360308.1	6272251	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360296.5	6272247	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360306.6	6272262	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360333.4	6272262	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360338.5	6272262	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360360.7	6272262	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360378.6	6272261	*Corymbia calophylla*	Marri	Alive	1000	4
21/08/2023	360399.1	6272264	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	361242.6	6273082	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	361239.7	6273084	*Corymbia calophylla*	Marri	Alive	1000	5

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21/08/2023	361225.7	6273085	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
21/08/2023	361221.7	6273085	*Corymbia calophylla*	Marri	Alive	900	5
21/08/2023	361215.7	6273084	*Corymbia calophylla*	Marri	Alive	900	5
21/08/2023	361211.5	6273084	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
21/08/2023	361201.3	6273087	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
21/08/2023	361195.3	6273087	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
21/08/2023	361191	6273086	*Pinus sp.*	Pine	Alive	900	5
21/08/2023	361149.8	6273086	*Corymbia calophylla*	Marri	Alive	900	4*
21/08/2023	361126.4	6273086	*Corymbia calophylla*	Marri	Alive	800	3*
21/08/2023	361213.1	6273690	*Corymbia calophylla*	Marri	Alive	1000	3*
21/08/2023	361248.5	6273740	*Corymbia calophylla*	Marri	Alive	800	4
21/08/2023	361241.2	6273749	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	361225.3	6273752	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	361221.2	6273744	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361215.8	6273749	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361195.2	6273753	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	361182.6	6273748	*Corymbia calophylla*	Marri	Dead	600	5
21/08/2023	361178	6273748	*Corymbia calophylla*	Marri	Alive	1000	5
21/08/2023	361144	6273749	*Corymbia calophylla*	Marri	Alive	1000	3
21/08/2023	361092.6	6273741	*Corymbia calophylla*	Marri	Alive	600	5
21/08/2023	361041.8	6273748	*Corymbia calophylla*	Marri	Alive	800	5
21/08/2023	360979.9	6273736	*Corymbia calophylla*	Marri	Alive	800	3
21/08/2023	360964.1	6273737	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360944.6	6273739	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360923	6273741	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360906.2	6273748	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	360711.8	6273736	*Corymbia calophylla*	Marri	Alive	500	4
21/08/2023	359504.4	6272364	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
21/08/2023	359498	6272556	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	359500.1	6272555	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	359501.5	6272554	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	359508.6	6272553	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	359510.5	6272553	*Corymbia calophylla*	Marri	Alive	700	5
21/08/2023	359511.8	6272554	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359512.6	6272558	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359514.9	6272565	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359516.1	6272568	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359516.2	6272577	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359515.6	6272579	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359514.8	6272584	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359515.9	6272588	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
21/08/2023	359516.6	6272591	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359516.9	6272594	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359517.5	6272598	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359517.9	6272606	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359517.1	6272609	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359515.1	6272612	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359511.8	6272614	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
21/08/2023	359503.8	6272619	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359498.3	6272620	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359493	6272430	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359496.4	6272422	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359498.4	6272399	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359500.6	6272364	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359500.1	6272071	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	359913.9	6271811	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
21/08/2023	359901.9	6271809	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359899.2	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359897.3	6271807	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359893.6	6271807	*Corymbia calophylla*	Marri	Alive	500	5
21/08/2023	359892.5	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359891.4	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359888.7	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359880.2	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
21/08/2023	359869.5	6271810	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359862.3	6271807	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
21/08/2023	359861.3	6271807	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359857.1	6271806	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359855	6271805	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359848.5	6271801	*Corymbia calophylla*	Marri	Dead	900	5*
21/08/2023	359796.3	6271809	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359794.8	6271808	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
21/08/2023	359758.2	6271805	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359741.1	6271807	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359679.4	6272338	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359707	6272457	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1200	5
22/08/2023	359745.5	6272458	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1500	5
22/08/2023	359732.9	6272461	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
22/08/2023	359843.2	6272460	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359849.5	6272458	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359847.7	6272459	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359862.9	6272454	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359889.4	6272440	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359889.6	6272397	*Corymbia calophylla*	Marri	Alive	1600	4

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
22/08/2023	359935.1	6272393	*Corymbia calophylla*	Marri	Alive	1100	5
22/08/2023	359954.2	6272408	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359964.4	6272355	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	360084.1	6272297	*Eucalyptus robusta*	Swamp Mahogany	Alive	500	5
22/08/2023	360069.6	6272306	*Eucalyptus robusta*	Swamp Mahogany	Alive	500	5
22/08/2023	360062.5	6272317	*Eucalyptus robusta*	Swamp Mahogany	Alive	500	5
22/08/2023	360044.7	6272345	*Eucalyptus robusta*	Swamp Mahogany	Alive	500	5
22/08/2023	360042.3	6272353	*Corymbia calophylla*	Marri	Alive	1000	5
22/08/2023	360038.6	6272360	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	360029.8	6272378	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	360024.3	6272381	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	360017.3	6272384	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	360009.7	6272388	*Corymbia calophylla*	Marri	Dead	600	5
22/08/2023	360005.2	6272390	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359993.6	6272396	*Corymbia calophylla*	Marri	Alive	850	5
22/08/2023	359983.8	6272398	*Corymbia calophylla*	Marri	Dead	750	3
22/08/2023	359982.1	6272400	*Corymbia calophylla*	Marri	Dead	700	5
22/08/2023	359973.7	6272405	*Corymbia calophylla*	Marri	Alive	7500	5
22/08/2023	359955.7	6272412	*Corymbia calophylla*	Marri	Dead	500	5
22/08/2023	359952.2	6272414	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359949.1	6272416	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359928.4	6272426	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359781.1	6272573	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1200	5
22/08/2023	359756.6	6272576	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1200	5
22/08/2023	359738.2	6272575	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1200	5
22/08/2023	359668.3	6272502	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359830.1	6272554	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359838	6272533	*Corymbia calophylla*	Marri	Alive	700	5

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22/08/2023	359848.3	6272510	*Corymbia calophylla*	Marri	Alive	800	4
22/08/2023	359849.9	6272506	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359850	6272502	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359850.9	6272499	*Corymbia calophylla*	Marri	Alive	800	3
22/08/2023	359921.1	6272460	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359929.6	6272455	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	359936.2	6272453	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359942.7	6272450	*Corymbia calophylla*	Marri	Dead	700	5
22/08/2023	359945.4	6272449	*Corymbia calophylla*	Marri	Alive	900	4
22/08/2023	359988.9	6272433	*Corymbia calophylla*	Marri	Alive	1100	5
22/08/2023	360016.9	6272421	*Corymbia calophylla*	Marri	Dead	500	5
22/08/2023	360027.9	6272417	*Corymbia calophylla*	Marri	Dead	500	5
22/08/2023	360028.1	6272418	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	360039.6	6272413	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	360048	6272409	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	360057.2	6272407	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359827.4	6272591	*Corymbia calophylla*	Marri	Dead	900	5
22/08/2023	359845.8	6272587	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	4
22/08/2023	359880.5	6272592	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
22/08/2023	360023.8	6272628	*Eucalyptus sp.*	Introduced Eucalypt	Dead	500	5
22/08/2023	360003.7	6272608	*Eucalyptus sp.*	Introduced Eucalypt	Dead	500	5
22/08/2023	360007	6272607	*Eucalyptus sp.*	Introduced Eucalypt	Dead	500	5
22/08/2023	359960.1	6272597	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359962	6272591	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359950.7	6272590	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	4
22/08/2023	359944.6	6272594	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359940.3	6272594	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359938.3	6272591	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5

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22/08/2023	359736.4	6272259	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359711.8	6272256	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359498.1	6273693	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359487.6	6273722	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359491.6	6273723	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359478.6	6273749	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
22/08/2023	359250.1	6273907	*Melaleuca sp.*	Paperbark	Alive	700	4
22/08/2023	359382.4	6273985	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
22/08/2023	359410.1	6273936	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1100	5
22/08/2023	359417.1	6273929	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359422	6273904	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359429.7	6273895	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359435.5	6273887	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359469.5	6273688	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359552.4	6273669	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359606.7	6273669	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359621.3	6273672	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359625.3	6273669	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359637.8	6273670	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359640.5	6273669	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
22/08/2023	359645.5	6273671	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359661.9	6273670	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1100	5
22/08/2023	359661.1	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359692.5	6273679	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359702.4	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
22/08/2023	359738.4	6273673	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359742.9	6273674	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359743.6	6273677	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
22/08/2023	359742.8	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359741.4	6273681	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359748	6273674	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359750.5	6273672	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359760.3	6273671	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359758.5	6273677	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359756.5	6273679	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359768.7	6273673	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359772.7	6273677	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359775.3	6273678	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359778	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359780.4	6273674	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359782.8	6273674	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359807	6273673	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359833.1	6273672	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
22/08/2023	359860.4	6273684	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359866.1	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359873.4	6273676	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359880.6	6273674	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359882.5	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359898.4	6273683	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359903.5	6273683	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359906.2	6273676	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359909.2	6273675	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359911	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359917.8	6273680	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359918.3	6273683	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359931.7	6273679	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
22/08/2023	359928.5	6273678	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359591.9	6273679	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359557.4	6273675	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
22/08/2023	359542.5	6273648	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
22/08/2023	359551.8	6273627	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
22/08/2023	359553.9	6273622	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
22/08/2023	359558	6273611	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
22/08/2023	359560.2	6273607	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
22/08/2023	359562.2	6273603	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
22/08/2023	359563	6273601	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
22/08/2023	359522.7	6273623	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
22/08/2023	359541.6	6273589	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
22/08/2023	359542.4	6273586	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
22/08/2023	359549	6273578	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
22/08/2023	359550.9	6273575	*Eucalyptus rudis*	Flooded Gum	Alive	800	5
22/08/2023	359570	6273549	*Eucalyptus rudis*	Flooded Gum	Alive	800	5
22/08/2023	359644.6	6273447	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359652.8	6273437	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359662.1	6273423	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359692.2	6273383	*Corymbia calophylla*	Marri	Alive	1000	5
22/08/2023	359806.9	6273208	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359813.7	6273197	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359816.2	6273193	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359817.6	6273191	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359840.1	6273100	*Eucalyptus sp.*	Introduced Eucalypt	Alive	1000	5
22/08/2023	359859.2	6273045	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359860.4	6273040	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359859.6	6273033	*Corymbia calophylla*	Marri	Alive	800	5

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22/08/2023	359860.5	6273029	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359863	6273014	*Eucalyptus robusta*	Swamp Mahogany	Alive	1000	5
22/08/2023	359863.7	6273008	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359866	6272972	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359866.2	6272979	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359865.9	6272982	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359863.4	6272925	*Eucalyptus robusta*	Swamp Mahogany	Alive	1000	5
22/08/2023	359865.6	6272925	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359864	6272916	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359864.7	6272908	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359864.2	6272905	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359862.9	6272898	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359862	6272893	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359862.6	6272891	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359862.7	6272891	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
22/08/2023	359862.8	6272887	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359859.6	6272885	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
22/08/2023	359861.5	6272876	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359860.5	6272871	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359860.5	6272870	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359860.1	6272866	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359859.8	6272863	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359851.2	6272835	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359849.5	6272827	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359846.7	6272821	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	359845.1	6272814	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359844.2	6272810	*Corymbia calophylla*	Marri	Alive	700	5
22/08/2023	359837.1	6272789	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5

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22/08/2023	359834.9	6272784	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359833.3	6272780	*Corymbia calophylla*	Marri	Alive	500	5
22/08/2023	359829.6	6272776	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	359827.2	6272767	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
22/08/2023	359822.8	6272753	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
22/08/2023	359817.3	6272740	*Corymbia calophylla*	Marri	Alive	800	5
22/08/2023	359815.6	6272736	*Corymbia calophylla*	Marri	Alive	900	5
22/08/2023	359811.6	6272727	*Corymbia calophylla*	Marri	Alive	600	5
22/08/2023	359813.9	6272732	*Eucalyptus sp.*	Introduced Eucalypt	Dead	500	5
23/08/2023	359787.4	6272649	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
23/08/2023	359794.3	6272677	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359795.5	6272684	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359796.8	6272690	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	359797.2	6272698	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	359799.2	6272701	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	359799.2	6272704	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359799.4	6272716	*Corymbia calophylla*	Marri	Dead	800	5
23/08/2023	359803.4	6272713	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359803.7	6272707	*Corymbia calophylla*	Marri	Alive	1000	5
23/08/2023	359803.5	6272707	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359661.3	6273469	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359665.5	6273463	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359677	6273449	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	359683.9	6273447	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359701	6273440	*Corymbia calophylla*	Marri	Dead	800	5
23/08/2023	359703.8	6273412	*Corymbia calophylla*	Marri	Alive	800	4
23/08/2023	359775.3	6273311	*Corymbia calophylla*	Marri	Alive	800	3
23/08/2023	359802.1	6273273	*Corymbia calophylla*	Marri	Alive	1300	5

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23/08/2023	359808.9	6273261	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359835.8	6273217	*Corymbia calophylla*	Marri	Dead	900	4
23/08/2023	359847.8	6273197	*Corymbia calophylla*	Marri	Alive	800	3
23/08/2023	359852.8	6273187	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359853.9	6273184	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359861.4	6273167	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
23/08/2023	359871	6273114	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	4
23/08/2023	359871.5	6273120	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	4
23/08/2023	359883.3	6273135	*Eucalyptus sp.*	Introduced Eucalypt	Alive	900	5
23/08/2023	359877.9	6273081	*Corymbia calophylla*	Marri	Alive	1000	4
23/08/2023	359880.4	6273072	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	359888	6273080	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359890.6	6273081	*Corymbia calophylla*	Marri	Alive	1000	5
23/08/2023	359902.2	6273077	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	359906	6273084	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	359982.8	6273082	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
23/08/2023	359979.5	6273131	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359981.3	6273139	*Corymbia calophylla*	Marri	Alive	800	5
23/08/2023	359981	6273153	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	358505.9	6271933	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
23/08/2023	358493.6	6271942	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358490.5	6271932	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358695.4	6272310	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358688.8	6272312	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358261.4	6271986	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	357238	6271902	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
23/08/2023	357222.3	6271889	*Eucalyptus rudis*	Flooded Gum	Alive	700	4
23/08/2023	357216.4	6271898	*Eucalyptus rudis*	Flooded Gum	Alive	600	4*

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23/08/2023	357207.1	6271919	*Eucalyptus rudis*	Flooded Gum	Alive	700	3*
23/08/2023	357242.4	6272153	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
23/08/2023	357230.2	6272144	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
23/08/2023	357219.7	6272137	*Eucalyptus rudis*	Flooded Gum	Alive	800	3*
23/08/2023	357217	6272135	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357216.7	6272131	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357216.8	6272128	*Eucalyptus rudis*	Flooded Gum	Alive	900	5
23/08/2023	357209.3	6272122	*Eucalyptus rudis*	Flooded Gum	Alive	700	5
23/08/2023	357203	6272123	*Eucalyptus rudis*	Flooded Gum	Alive	700	4*
23/08/2023	356983.2	6272741	*Eucalyptus sp.*	Eucalypt	Alive	700	5
23/08/2023	356992.8	6272742	*Eucalyptus sp.*	Eucalypt	Alive	700	5
24/08/2023	355482.5	6272212	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355488.2	6272160	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	355487.9	6272159	*Corymbia calophylla*	Marri	Alive	900	5
24/08/2023	355488.7	6272134	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355488.6	6272096	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355492.9	6272054	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355490.4	6271983	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355489.7	6271969	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355493.2	6271948	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355491.8	6271943	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355491.9	6271920	*Corymbia calophylla*	Marri	Alive	800	3
24/08/2023	355494.1	6271898	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	355492.5	6271865	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355493.4	6271859	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355494.1	6271799	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355496.6	6271747	*Corymbia calophylla*	Marri	Alive	500	4
24/08/2023	355496.4	6271731	*Corymbia calophylla*	Marri	Alive	600	5

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24/08/2023	355498.7	6271725	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355499	6271703	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355485.9	6271734	*Corymbia calophylla*	Marri	Alive	800	5
24/08/2023	355481.4	6271984	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355477.9	6272038	*Corymbia calophylla*	Marri	Alive	900	3
24/08/2023	355477.8	6272083	*Corymbia calophylla*	Marri	Alive	800	3
24/08/2023	355472.8	6272273	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355472.8	6272272	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355476.3	6272304	*Corymbia calophylla*	Marri	Alive	800	5
24/08/2023	355473.9	6272307	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355473.6	6272358	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	355473.5	6272376	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	355471.4	6272403	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355482.5	6272416	*Corymbia calophylla*	Marri	Alive	900	4
24/08/2023	355481.8	6272401	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355481.9	6272398	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355481	6272386	*Corymbia calophylla*	Marri	Dead	500	5
24/08/2023	355482.1	6272377	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	355482	6272368	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355482.3	6272366	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355482.7	6272358	*Corymbia calophylla*	Marri	Alive	800	3
24/08/2023	355482	6272348	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355483	6272343	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	355485.8	6272302	*Corymbia calophylla*	Marri	Alive	600	5
24/08/2023	355485.6	6272253	*Corymbia calophylla*	Marri	Alive	800	5
24/08/2023	355626.4	6272087	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	355628.1	6272085	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	355630	6272085	*Eucalyptus rudis*	Flooded Gum	Alive	500	5

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24/08/2023	355632	6272085	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	355621.5	6272054	*Eucalyptus rudis*	Flooded Gum	Alive	900	5
24/08/2023	355613.5	6272047	*Eucalyptus rudis*	Flooded Gum	Alive	800	4
24/08/2023	355626.2	6272037	*Eucalyptus rudis*	Flooded Gum	Alive	600	4
24/08/2023	355627.3	6272035	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	355629.3	6272035	*Eucalyptus rudis*	Flooded Gum	Dead	400	3
24/08/2023	355634	6272031	*Eucalyptus rudis*	Flooded Gum	Alive	800	4
24/08/2023	359296.1	6271798	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359287.9	6271799	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	359247.7	6271798	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359232.5	6271798	*Corymbia calophylla*	Marri	Alive	700	5
24/08/2023	359212.4	6271801	*Corymbia calophylla*	Marri	Alive	700	4
24/08/2023	359207.2	6271800	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359199.1	6271790	*Corymbia calophylla*	Marri	Dead	600	3
24/08/2023	359200.4	6271790	*Corymbia calophylla*	Marri	Alive	400	3
24/08/2023	359217.1	6271791	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359258.9	6271791	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359222.4	6270927	*Corymbia calophylla*	Marri	Alive	500	5
24/08/2023	359235.2	6270907	*Corymbia calophylla*	Marri	Alive	900	4
24/08/2023	359245.2	6270940	*Corymbia calophylla*	Marri	Dead	800	3
24/08/2023	359274.3	6270997	*Corymbia calophylla*	Marri	Alive	900	4
24/08/2023	359350.3	6270916	*Corymbia calophylla*	Marri	Alive	900	4*
24/08/2023	359422.2	6270990	*Corymbia calophylla*	Marri	Dead	1000	4*
24/08/2023	359490.9	6271005	*Corymbia calophylla*	Marri	Dead	900	4
24/08/2023	359590.6	6271004	*Corymbia calophylla*	Marri	Dead	900	4*
24/08/2023	359585	6271158	*Corymbia calophylla*	Marri	Alive	1000	4
24/08/2023	359556.7	6271100	*Corymbia calophylla*	Marri	Alive	900	4
24/08/2023	359543.4	6271101	*Corymbia calophylla*	Marri	Alive	900	4

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24/08/2023	359384.9	6271054	*Corymbia calophylla*	Marri	Dead	700	5
24/08/2023	359385.2	6271009	*Corymbia calophylla*	Marri	Alive	800	4*
24/08/2023	359421.6	6270989	*Corymbia calophylla*	Marri	Dead	800	4
24/08/2023	360273.2	6273854	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	360283.8	6273869	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	360288.9	6273887	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
24/08/2023	360281.1	6273910	*Eucalyptus rudis*	Flooded Gum	Alive	500	4
24/08/2023	360268.2	6273915	*Eucalyptus rudis*	Flooded Gum	Alive	800	5
24/08/2023	360262.2	6273915	*Eucalyptus rudis*	Flooded Gum	Alive	800	4
18/08/2023	359884.1	6271682	*Corymbia calophylla*	Marri	Dead	700	4
18/08/2023	359869.8	6271687	*Corymbia calophylla*	Marri	Dead	1000	3*
23/08/2023	359814.9	6272624	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359817.1	6272639	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359834.8	6272703	*Corymbia calophylla*	Marri	Alive	700	4
23/08/2023	359844.2	6272725	*Eucalyptus marginata*	Jarrah	Alive	700	4
23/08/2023	359854.2	6272761	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	359855	6272764	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	359855.5	6272766	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	359872.7	6272826	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359884.7	6272883	*Eucalyptus marginata*	Jarrah	Alive	600	5
23/08/2023	359884.7	6272892	*Corymbia calophylla*	Marri	Alive	900	5
23/08/2023	359884	6272916	*Corymbia calophylla*	Marri	Alive	700	4
23/08/2023	359897	6272996	*Corymbia calophylla*	Marri	Dead	600	4
23/08/2023	359914.4	6273007	*Corymbia calophylla*	Marri	Dead	900	4
23/08/2023	359884.3	6273024	*Eucalyptus robusta*	Swamp Mahogany	Alive	500	5
23/08/2023	359884.2	6273057	*Eucalyptus robusta*	Swamp Mahogany	Alive	700	5
23/08/2023	359938.9	6273057	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	359941.6	6273057	*Corymbia calophylla*	Marri	Alive	700	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
23/08/2023	359963.8	6273058	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	359966.9	6273058	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360181.4	6273059	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360215.9	6273060	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360235	6273062	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360239.5	6273062	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360253.7	6273056	*Corymbia calophylla*	Marri	Alive	1000	3
23/08/2023	360259.9	6273058	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360263.8	6273059	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360349.6	6273061	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360352.6	6273060	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360382.1	6273063	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360478.7	6273061	*Corymbia calophylla*	Marri	Alive	700	4
23/08/2023	360479.4	6273064	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360510.2	6273066	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360533.7	6273064	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360543.7	6273064	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360562.6	6273065	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360731.4	6273067	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360745	6273067	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360757.3	6273067	*Corymbia calophylla*	Marri	Alive	600	5
23/08/2023	360844.2	6273071	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	360896.6	6273070	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360910.3	6273072	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360951.8	6273074	*Corymbia calophylla*	Marri	Alive	500	5
23/08/2023	360961.1	6273074	*Corymbia calophylla*	Marri	Alive	800	4
23/08/2023	361010.6	6273075	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	358722.6	6271803	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5

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23/08/2023	358754	6271879	*Corymbia calophylla*	Marri	Dead	700	5
23/08/2023	358731.8	6271928	*Corymbia calophylla*	Marri	Alive	700	5
23/08/2023	358731.2	6271933	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358732.6	6272023	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358729.2	6272131	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358729.6	6272136	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358176.9	6271941	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358176.8	6271941	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358190.1	6272033	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	358409.5	6271914	*Eucalyptus sp.*	Introduced Eucalypt	Alive	500	5
23/08/2023	356939.7	6271724	*Eucalyptus rudis*	Flooded Gum	Alive	800	3*
23/08/2023	357216.3	6272005	*Eucalyptus rudis*	Flooded Gum	Alive	800	4
23/08/2023	357207.2	6272019	*Eucalyptus rudis*	Flooded Gum	Alive	500	4
23/08/2023	357209.6	6272020	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357205.7	6272022	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357200.3	6272036	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357193.4	6272042	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357177.6	6272050	*Eucalyptus rudis*	Flooded Gum	Dead	500	5
23/08/2023	357172.7	6272065	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357145.1	6272094	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357176.3	6272091	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357185.9	6272109	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357186.5	6272109	*Eucalyptus rudis*	Flooded Gum	Alive	600	4*
23/08/2023	357233.6	6272248	*Eucalyptus rudis*	Flooded Gum	Alive	600	4
23/08/2023	357137.8	6272269	*Eucalyptus rudis*	Flooded Gum	Alive	800	5
23/08/2023	357097.9	6272268	*Eucalyptus rudis*	Flooded Gum	Alive	800	4*
23/08/2023	356983	6272241	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357031.9	6272119	*Eucalyptus rudis*	Flooded Gum	Alive	500	5

Date	Easting	Northing	Tree Species	Common Name	Life Status	DBH (mm)	Rank
23/08/2023	357039	6272115	*Eucalyptus rudis*	Flooded Gum	Alive	800	3*
23/08/2023	357044.8	6272087	*Eucalyptus rudis*	Flooded Gum	Dead	600	5
23/08/2023	357120.2	6272524	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357094.8	6272581	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357094.1	6272594	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357070.5	6272741	*Eucalyptus rudis*	Flooded Gum	Alive	500	5
23/08/2023	357043.9	6272742	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
23/08/2023	356543.9	6272683	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356542.1	6272678	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356542.1	6272666	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356541.5	6272654	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356544.5	6272561	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356544.8	6272558	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
23/08/2023	356673.3	6272245	*Eucalyptus rudis*	Flooded Gum	Alive	800	4
23/08/2023	356561.8	6272124	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356560.8	6272110	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356562.6	6272083	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356562.9	6272061	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356563.9	6272010	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356571.5	6271920	*Eucalyptus sp.*	Introduced Eucalypt	Alive	700	5
23/08/2023	356570.8	6271915	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356569.7	6271861	*Eucalyptus sp.*	Introduced Eucalypt	Alive	800	5
23/08/2023	356572.6	6271731	*Eucalyptus sp.*	Introduced Eucalypt	Alive	600	5
23/08/2023	356802.5	6271795	*Eucalyptus rudis*	Flooded Gum	Alive	600	5
16/01/2023	359840.3	6271728	*Corymbia calophylla*	Marri	Dead	900	4

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