Yathroo Wind Farm

Targeted Fauna Habitat Assessment

Final

December 2025

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Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Australia Pty Ltd

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Executive Summary

Neoen Australia Pty Ltd (Neoen) is proposing to develop a wind farm in the locality of Yathroo, in the Shire of Dandaragan, in the south-west region of Western Australia. To support environmental approvals, Umwelt conducted targeted fauna habitat assessments in mid-2025 for three groups of conservation significant species: Black-Cockatoos, migratory shorebirds/waterbirds, and the Blue-billed Duck (*Oxyura australis*).

Surveys were undertaken across three events between June and October 2025, focusing on two areas:

- the broader Development Corridor (3,442.9 ha) and, within this,
- the Disturbance Footprint (729.1 ha).

Carnaby's Black-Cockatoo (*Zanda latirostris*) has been previously recorded in the Project Area and was again observed in the course of the targeted field assessments here. Interestingly, Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) was not expected to occur in the vicinity (its core, contemporary distribution is further south) but it was recorded (sightings and through foraging evidence) in the south of the Project Area; these observations are discussed in detail.

Black-Cockatoo breeding habitat was assessed in a tiered approach, with potential Black-Cockatoo nest-trees comprehensively surveyed (i.e. all trees that met the nest-tree criteria of DCCEEW (2022, 2025b, 2025c, 2025d) within 75.4% of the Development Corridor (including 95.7% of the Disturbance Footprint) and partially surveyed (all of the highest value trees and with opportunistic sampling of lower-value trees) within 22.1% of the Development Corridor (including 3.6% of the Disturbance Footprint). A small proportion of the Development Corridor (2.5%) and Development Footprint (0.7%) remains unassessed. Trees were ranked according to the Bamford ranking system.

Black-Cockatoo breeding habitat was present within the Development Corridor (and the Disturbance Footprint within this) and is mainly attributed to the presence of large, hollow-bearing Marri trees. A total of 560 potential Black-Cockatoo nest-trees were recorded within the Development Corridor, including 112 within the Disturbance Footprint. A further 50 trees were assessed outside of the Development Corridor (where they were likely to be helpful to inform infrastructure micro-siting). No confirmed Black-Cockatoo nests (Rank 1) were located during the survey. Five trees within the Disturbance Footprint were found to presently have hollow-entrances that were of suitable size, height and orientation to support Black-Cockatoo breeding (Rank 3), but none had indications that they may have been used by Black-Cockatoos (chew marks around the entrance; Rank 2). Breeding is considered possible within the Project Area and further inspection of the higher value trees is recommended to provide additional information in order to minimise impacts.

Foraging value was assessed for both Forest Red-tailed Black-Cockatoo and Carnaby's Black-Cockatoo across the entire Development Corridor by re-evaluating the existing fauna habitat mapping and using this to define patches within which field-truthing was undertaken. site condition, context and density score (following the methodology developed by Bamford) was assigned to each patch and this enabled the calculation of the overall foraging habitat quality score.

Foraging habitat for Forest Red-tailed Black-Cockatoo was present in the Development Corridor and largely restricted to one key species: Marri. Carnaby's Black-Cockatoo foraging habitat was also present across the Development Corridor, with key forage species including *Banksia* spp., Marri and planted pines. Habitat quality scores varied between patches within the Development Corridor, however, overall, the Development Corridor was generally of very low value for foraging by Forest Red-tailed Black-Cockatoo and low value for foraging by Carnaby's Black-Cockatoo. Disturbance to isolated areas of higher quality foraging habitat should be minimised, wherever practicable, to reduce potential impacts to these taxa.

A survey for Black-Cockatoo night-roosting was also undertaken in June 2025. Up to 200 Carnaby's Black-Cockatoos were recorded using a previously discovered night-roost site. Two night-roost locations have been detected in surveys for the Project but neither of these is within the Development Corridor.

A desktop assessment of wetlands within the Project Area was undertaken in order to assess, in conjunction with field observations, their potential to support migratory shorebirds/waterbirds and also the Blue-billed Duck. Those most likely to provide habitat for migratory shorebirds/waterbirds and/or the Blue-billed Duck are categorised as lakes or sumplands. There are 77 recognised geomorphic wetlands within the Project Area. Migratory shorebirds/waterbirds and/or the Blue-billed Duck are known or likely to occur at six of these, with two wetlands in common and two additional wetlands for each. Several wetlands may possibly be suitable for each, should seasonal conditions be favourable. At least 68 of the wetlands are considered unsuitable habitat and are not expected to support these taxa.

Waterbird counts have been regularly undertaken at least four wetlands (two lakes and two sumplands) within the Project Area. No migrant shorebirds were recorded during the June 2025 survey and this suggests that the site does not support a substantial population of these birds in the breeding season (when birds are generally not expected in Australia). Further understanding of the use of these wetlands by shorebirds in the non-breeding season (Austral summer) will help to manage any potential risk to these species and sites accordingly. Blue-billed Duck was also not recorded in the June 2025 survey.

Data collected in the targeted assessments here can be used to highlight areas of greatest concern with respect to impacts to Black-Cockatoos (high-quality potential Black-Cockatoo nest-trees, higher quality patches of foraging habitat and roost site locations), and migratory shorebirds/waterbirds and the Blue-billed Duck, and these can inform Project design and/or operation accordingly.

Abbreviations

Term	Definition
BBUS	Bird and bat utilisation survey
BESS	Battery energy storage system
BC Act	*Biodiversity Conservation Act 2016* (State of Western Australia)
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at breast-height
DC	Development Corridor
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DF	Disturbance Footprint
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
EP Act	*Environmental Protection Act 1986* (State of Western Australia)
EPBC Act	*Environment Protection Biodiversity Conservation Act 1999* (Commonwealth)
FHQS	Foraging habitat quality score - Bamford Consulting Ecologists (2020)
FHT	Fauna habitat type
MNES	Matters of National Environmental Significance
PA	Project Area
RFHT	Re-evaluated fauna habitat type
WTG	Wind turbine generators

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1.0 Introduction

Neoen Australia Pty Ltd (Neoen) is proposing to develop a wind farm in the locality of Yathroo, in the Shire of Dandaragan, in the south-west region of Western Australia. The Yathroo Wind Farm (the Project) will be located approximately 120 kilometres (km) north of Perth, 11 km south of the town of Dandaragan, 12 km south-east of Cataby and 7 km north of Regans Ford, as shown in **Figure 1.1**. The Project is expected to comprise of up to 65 Wind Turbine Generators (WTG), a Battery Energy Storage System (BESS) and associated ancillary infrastructure, including cabling and internal access roads.

Previous ecological surveys have been undertaken within the Project Area to support impact assessments and environmental approvals for the Project under the commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Environmental Protection Act 1986* (EP Act) and these include:

- Basic and Targeted fauna assessment (Umwelt, 2025a).
- Detailed and Targeted flora and vegetation assessment (Umwelt, 2025b).
- Bird and bat utilisation survey (BBUS; Umwelt, 2025c).

Umwelt was engaged in 2025 by Neoen to undertake targeted fauna habitat assessments for conservation significant species (i.e. those listed under the EPBC or the Western Australian *Biodiversity Conservation Act 2016*, the BC Act; or those ranked as priority species by the Western Australian Department of Biodiversity, Conservation and Attractions, DBCA) identified as most likely to be at risk of impact by the Project, these being:

- Carnaby's Black-Cockatoo (*Zanda latirostris*) – listed as Endangered under both the EPBC Act and BC Act.
- Migratory shorebirds. Ten of the thirty-six species of migratory shorebirds that are listed under the EPBC Act and migrate annually between breeding grounds in the northern hemisphere (e.g., Siberia, Mongolia, Alaska) and non-breeding grounds in Australia, using the East Asian–Australasian Flyway (EAAF) are either known to occur or are considered to have a moderate or higher likelihood to occur within the Project Area. In addition, the Glossy Ibis has been assessed along with the migratory shorebirds as it has a similar ecology and habitat requirements.
- Blue-billed Duck (*Oxyura australis*) – ranked as Priority 4 by DBCA.

In the course of field surveys for the Project an additional conservation significant taxon was also recorded:

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under both the EPBC Act and BC Act. Discussion of this taxon and its occurrence on site will follow.

This report summarises the methods and findings of the targeted fauna habitat assessments.

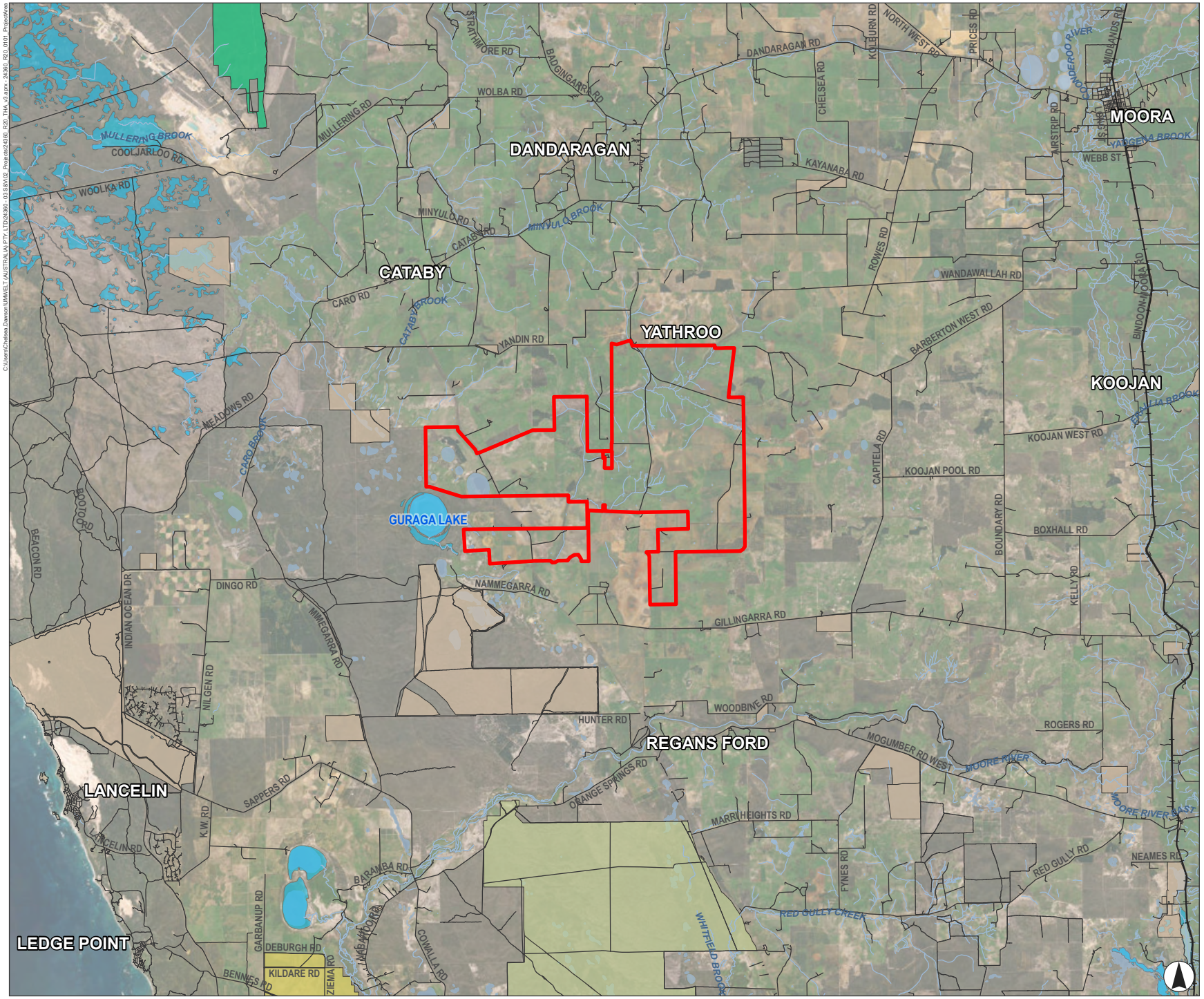


FIGURE 1.1

The Yathroo Wind Farm Project Area

Legend

- Project Area
- Railway
- Road
- Watercourse
- Waterbody

DBCA - Legislated Lands and Waters

- National Park
- Nature Reserve
- Conservation Park
- Section 5(1)(g) Reserve
- Section 5(1)(h) Reserve
- State Forest
- Directory of Nationally Important Wetlands

0 2 4

Kilometres

Scale 1:320,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

2.0 Methods

2.1 Assessment Boundaries

The proposed Yathroo Wind Farm Project Area is shown in **Figure 2.1**. Three boundaries within the Project Area (15,617.6 ha) were the focus of this assessment and were provided by Neoen prior to the commencement of the field investigations:

- The Project Area (PA) – the outer boundary in which the Project will be developed (15,617.6 ha).
- The Development Corridor (DC) – a broader area (3,442.9 ha) inside which the proposed infrastructure will be constructed that allows for some realignment or repositioning of the Project components.
- The Disturbance Footprint (DF)– a narrower and more-specific boundary comprising the areas that are considered likely to be directly disturbed from the construction and/or operation of the wind farm (based on an indicative layout of infrastructure), totalling 729.1 ha.

The PA, DC and DF boundaries are shown in **Figure 2.1**.

While assessments were focussed within the DC and DF, some survey work was also conducted in adjacent parts of the PA where it was considered applicable (e.g. patches of adjacent trees, wetlands). This assessment area was not strictly delineated with a boundary but is referred to as the 'Survey Area' in order to differentiate this effort (and the results) from the DC and DF boundaries *sensu stricto*, where applicable.

2.2 Dates and Personnel

Field investigations were undertaken across three survey events from June to October 2025. The survey dates and personnel are presented in **Table 2.1**.

Table 2.1 Field Survey Dates and Personnel

Survey Dates	Personnel
23–27 June 2025	Dr Wes Bancroft – Principal Ecologist Ms Grace Ball – Ecologist Ms Monika Hrubanova – Ecologist
21 July 2025	Dr Wes Bancroft – Principal Ecologist
13–17 October 2025	Dr Wes Bancroft – Principal Ecologist Mr Deon Leoo – Ecologist

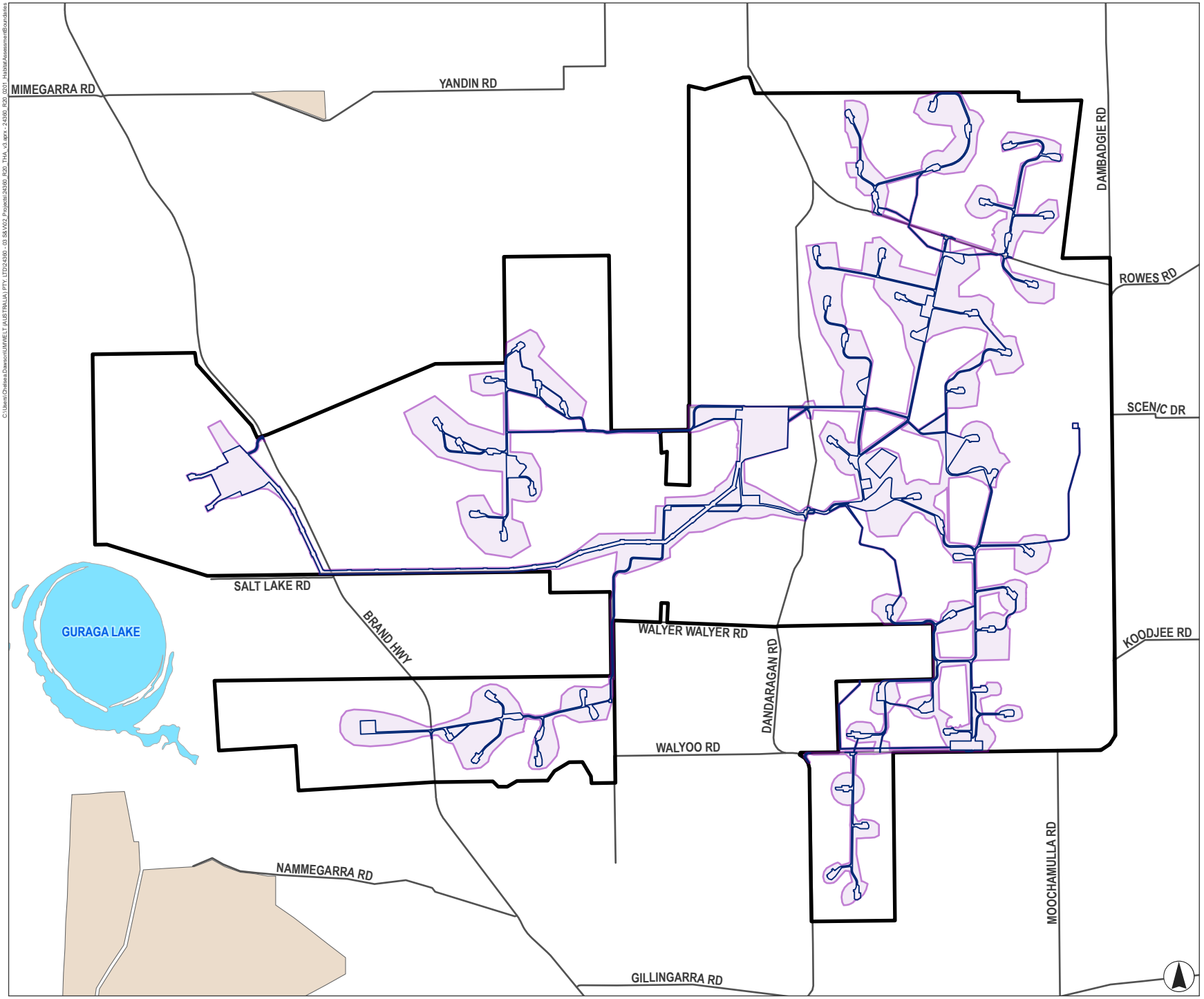


FIGURE 2.1

Habitat Assessment Boundaries

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

DBCA - Legislated Lands and Waters

- Nature Reserve
- Directory of Nationally Important Wetlands

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

2.3 Field Investigations

2.3.1 Overview

Field investigations comprised a Black-Cockatoo habitat assessment (for breeding, foraging and roosting habitat), surveys for the presence of migratory shorebirds and Blue-billed Duck, and the assessment of wetlands for their suitability for these waterbird taxa.

Field survey methods are detailed below.

2.3.2 Black-Cockatoo Habitat Assessment

2.3.2.1 Guidelines

Guidelines for the referral of actions that may result in impact to Black-Cockatoos (for assessment under the EPBC Act) are provided by the Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2022). The survey and analysis reported here have been conducted with strong reference to both the existing guidelines as well as the previous guidelines (DoEE, 2017). Survey methodology also followed the recommendations listed on the DCCEEW's Species Profile and Threats Database (DCCEEW, 2025b, 2025c, 2025d). Ecological values for Black-Cockatoos within the Survey Area were based on the definitions of breeding, foraging and roosting habitat as per the EPBC Act referral guidelines for Black-Cockatoos (DCCEEW, 2022).

The Department of Biodiversity, Conservation and Attractions (DBCA) has indicated that the methodology developed and applied previously by Bamford (e.g. Bamford Consulting Ecologists (BCE), 2020) is an acceptable approach to score breeding value and foraging habitat and, therefore, these methods have been adopted in this assessment, as detailed in the following sections.

2.3.2.2 Breeding Habitat

Nest Tree Ranking

While the *Referral Guideline for 3 WA Threatened Black-Cockatoo Species* (Department of Agriculture, Water and the Environment, 2022) has attempted to provide some prescriptive direction as to the methods that should be employed in Black-Cockatoo assessment, this can, in practice and at times, be challenging to apply. With respect to Black-Cockatoo breeding, the following guidance is provided (in Table A2 of DCCEEW, 2022):

"*Types of additional information that might be considered during the assessment and approval stage:*

- *The number and location (e.g., in or adjacent to breeding habitat; in normal breeding range; away from breeding habitat; or outside of known breeding range) of* ***known nesting trees****, i.e. trees of each species currently or recently used for breeding;*
- *The number and location of* ***suitable nesting trees****, i.e. trees of each species with suitable hollows;*
- *An estimated number and location of* ***potential nesting trees****. Potential nesting trees have a suitable diameter at breast height (DBH) to develop a nest hollow, but do not have hollows. For most species of trees, suitable nest hollows are only found in live trees with a DBH of at least 500 mm. Trees suitable to develop a nest hollow in the future are 300–500 mm DBH. Note that many species of eucalypt may develop suitable hollows for breeding*."

In an attempt for clarity and an applied method, the consulting industry has developed a number of systems for the ranking of tree suitability for Black-Cockatoo breeding. One such method was employed by Bamford Consulting (for example, as applied by (Bancroft & Bamford, 2023)) and is now widely used across the sector to assess tree hollow entrances from the ground. The Bamford (2020) rankings have been developed in conjunction with published information on the qualities/parameters of trees known to be used by Black-Cockatoos for nesting (e.g. Johnstone et al., 2013) and are summarised in **Table 2.2** along with their corresponding DCCEEW (2022) categories.

Table 2.2 Bamford (2020) Black-Cockatoo Nest Tree Ranks

DCCEEW (2022) Category	Bamford (2020) Rank	Description of Tree and Hollows/Activity
Known nesting tree	**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.
Suitable nesting tree	**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 >8 m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5 m so in a Wheatbelt breeding site a lower criterion may be more appropriate.
Potential nesting tree	**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.

It is noted that some trees that are assessed as Rank 3 are unlikely to support breeding (for example, because the internal dimensions – not assessed from ground level – are unsuited to Black-Cockatoo nesting; and this may be strongly related to tree species and the propensity to form hollows). Therefore, consideration of a sub-ranking of these trees (to identify those which are considered to be of 'greatest' potential) is sometimes made, where applicable, when undertaking field investigations. This may be of practical importance if further assessment of hollows (e.g. by pole camera or drone) is required.

The following biological considerations were made for each of the Black-Cockatoo species when assessing the value and ranking of nest trees:

- **Height of nest entrance**. For Carnaby's Black-Cockatoo, a study by Saunders (1979) found that the minimum height of a known nest entrance was approximately 3 m (Saunders, 1979) and while nests as low as 2 m (in Wandoo or Salmon Gum) were recorded, 95% of nests were above 3 m. For Forest Red-tailed Black-Cockatoo, a study by Johnstone et al. (2013) found the minimum height of a known nest entrance to be 6.5 m but, in general, the nest-hollows are high in the Marri forest (an average of about 14.5 m). Published data on Baudin's Black-Cockatoo nest heights are scant. Therefore, 3–4 m absolute minimum threshold seems a pragmatic "general" approach to use for the purpose of field work where multiple species are likely to occur (and breed), and multiple tree species are under consideration. It should be noted, however, that this can vary considerably depending on site (and species) context.
- **Tree species**. In the Jarrah forest, Marris are strongly favoured as breeding trees, with more than 90% of Black-Cockatoo nests recorded in Marri in a study by Johnstone et al. (2013). While nests in Jarrah are known, these are relatively rare because the heartwood is resistant to termites and, thus, it is uncommon for this species to form the internal hollows of suitable dimensions for Black-Cockatoo nesting. Smooth, white-barked eucalypts (such as Wandoo and Powderbark Wandoo) have a much greater propensity to form large internal hollows, even in trees that have relatively narrow DBH. Nests in other species such as Flooded Gum, Karri, Tuart and Yarri are known and it is generally considered that a tree of any species may be a breeding site if hollow height, dimensions, and orientation are adequate.
- **Hollow entrance dimensions**. Johnstone et al. (2013) recorded the minimum nest entrance dimensions as 100 mm x 120 mm but noted that this was an extreme case. On 'average', hollow entrance dimensions were 300 mm x 340 mm and, in many cases the nest entrance was very much greater.
- **Hollow entrance orientation**. Johnstone et al. (2013) defined a number of hollow entrance types (based on their orientation and location within the tree's structure). These can be condensed to the following categories:
    - Chimney;
    - Elbow;
    - Spout;
    - Side entrance (to main trunk).

Black-Cockatoos mainly nest in chimneys, elbows and side entrances. Therefore, in most cases the hollow entrance needs to be oriented vertically (chimneys, elbows), near-vertically (some spouts) or outwards (side entrances). Horizontal or downward-facing hollow entrances (even of suitable height and diameter) are undesirable to Black-Cockatoos.

Terminology Used

The terms adopted in the *Referral Guideline for 3 WA Threatened Black-Cockatoo Species* (DCCEEW, 2022) to categorise Black-Cockatoo breeding habitat (especially 'suitable' and 'potential') can be confusing to use in practice. Therefore, Umwelt uses the term 'potential nest-tree' to define any tree that meets the nest-tree criteria of DCCEEW (2022, 2025b, 2025c, 2025d), unless explicitly stated otherwise.

Breeding Habitat Assessment

A tiered approach to the Black-Cockatoo breeding habitat assessment was undertaken in order to prioritise the detection of the highest-value potential Black-Cockatoo nest-trees (those that presently bear a hollow entrance suited to Black-Cockatoo breeding; Rank 1, 2 and 3 trees, see **Table 2.2**) across the entire Development Corridor. This was followed by the assessment of other trees that met the potential Black-Cockatoo nest-tree criteria of DCCEEW (2022, 2025b, 2025c, 2025d); Rank 4 and 5 trees, see **Table 2.2**. Completion of this second-tier assessment focused initially on the Disturbance Footprint but was followed by areas outside of the Disturbance Footprint within the Development Corridor (see **Figure 2.1**). Lowest priority was given to trees in areas outside of the Development Corridor. These areas were not within the provisional development boundaries supplied prior to survey but were considered (in the field, by field personnel) likely to be helpful to inform infrastructure micro-siting. All of the above was balanced with logistic and access constraints.

'Comprehensive' potential Black-Cockatoo nest-trees surveys were conducted across approximately 2,596.6 ha (75.4%) of the Development Corridor, with a 'partial' survey (comprehensively for the highest ranking trees, Rank 1 to 3 but only opportunistically surveyed for Rank 4 and 5 trees) undertaken over 762.3 ha (22.1%) and the remaining 84.0 ha (2.5%) unassessed, as illustrated in **Figure 2.2**. Almost the entire Disturbance Footprint was comprehensively surveyed for potential Black-Cockatoo nest-trees (697.9 ha; 95.7%) with the exception of 26.0 ha (3.6%) that was partially surveyed and 5.1 ha (0.7%) that remains unassessed (as shown in **Figure 2.2**).

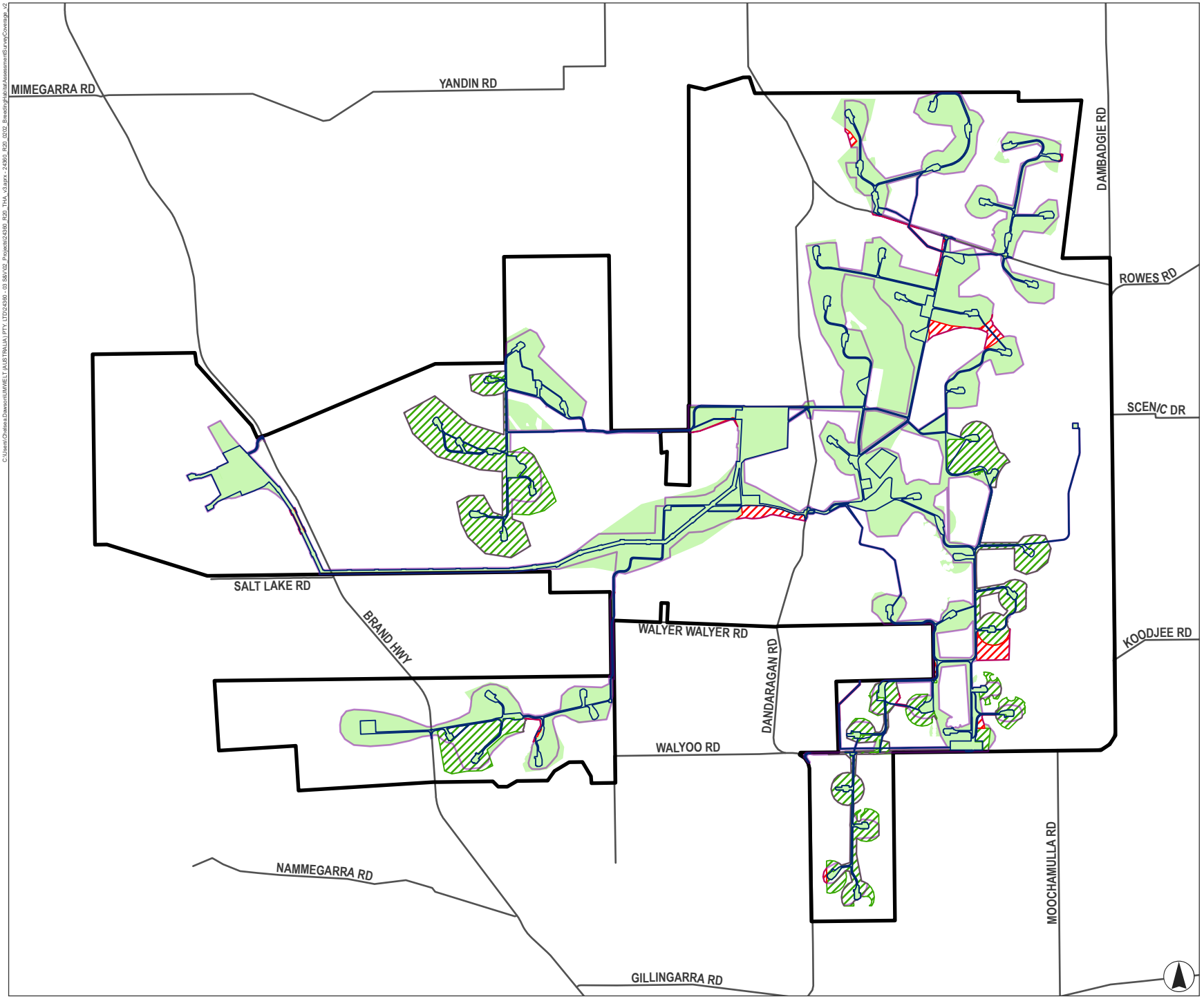


FIGURE 2.2

Breeding Habitat Assessment Survey Coverage

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Potential Black Cockatoo Nest Tree Coverage

- Complete survey (Rank 1 to 5 trees)
- Partial survey (Rank 1 to 3 trees only)
- Unassessed

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

2.3.2.3 Foraging Habitat

Foraging Habitat Quality Scoring

Bamford Consulting Ecologists (2020) has also developed a foraging value assessment, and foraging value within the Survey Area was assessed using this rationale for each vegetation patch within the Development Corridor (based on the fauna habitat mapping of Umwelt (2025a)). 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 Bamford foraging habitat quality score (FHQS) system has three components as detailed by Bamford Consulting Ecologists (2020). These three components are drawn from the DCCEEW (2023) offset calculator but with the scoring approach developed by Bamford Consulting Ecologists (2020) which comprises:

- A score out of six for the vegetation composition, condition and structure ('site condition');
- 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 if context and species density are also considered. A higher score represents better foraging value. The approach to assigning scores for vegetation, context and species density incorporates a range of considerations and circumstances, and these are outlined and discussed by Bamford (2020). For the purposes of the current assessment, the following categories of site condition score are recognised:

- No foraging value (corresponding to a site condition score of 0);
- Negligible to Low foraging value (1);
- Low foraging value (2);
- Low to Moderate foraging value (3);
- Moderate foraging value (4);
- Moderate to High foraging value (5);
- High foraging value (6).

It should be noted that FHQSs are calculated differently for each of the three conservation significant Black-Cockatoo taxa that occur in WA; thus a separate score is generally given for each taxon when multiple taxa are potentially present in an area.

The fauna habitat types (FHT) presented by Umwelt (2025a) were necessarily assessed at a broad ('landscape') scale due to the large size of the Project Area. Given the much finer patch-scale nature of this assessment in the Development Corridor, the FHT of Umwelt (2025a) were briefly re-evaluated when undertaking the field surveys to provide specific context to Black-Cockatoo habitat quality assessment. In most cases the re-evaluated fauna habitat types (RFHTs) were equivalent to the FHT of Umwelt (2025a) but in some cases, or specific locations, the RFHT combined several small areas of adjacent FHTs. Eighteen RFHTs were recognised:

- Cleared;
- *Corymbia calophylla* woodland;
- Dams;

- Dampland;
- Drainage with *Eucalyptus rudis*;
- *Eucalyptus loxophleba* woodland;
- Grasses;
- Grasses with scattered shrubs and trees;
- Paddocks;
- Paddocks with scattered *Corymbia calophylla;*
- Paddocks with scattered *Eucalyptus rudis;*
- Paddocks with scattered *Eucalyptus todtiana;*
- Paddocks with *Corymbia calophylla;*
- Paddocks with *Corymbia calophylla* and *Eucalyptus rudis;*
- Paddocks with scattered *Corymbia calophylla* and *Eucalyptus todtiana;*
- Pine plantations;
- Planted;
- Shrubland.

Foraging Evidence

Black-Cockatoo foraging signs were also recorded opportunistically as part of the field survey. When observed, the following was recorded:

- Location;
- Black-Cockatoo species;
- Forage plant species;
- Approximate age of the foraging evidence.

Evidence of Black-Cockatoo foraging may persist for several months or years after the foraging event. There is currently no published documentation of the deterioration process of forage. 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 were recognised, based on the time since foraging as outlined in **Table 2.3**.

Table 2.3 Age Categories for Black-Cockatoo Foraging Evidence

Age Category	Description
Active	Where birds were observed in the act of foraging.
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.
Intermediate	Foraging signs are dried out and usually brown in colour. Foraging was likely to have occurred within weeks to months previously. Approximately one to six months old.
Old	Foraging signs are dried out, weathered and usually grey in colour. In some cases they may show advanced signs of decomposition. Foraging was likely to have occurred months to years previously. Approximately more than six months old.

2.3.2.4 Night-roosting Habitat

A survey for Black-Cockatoo night-roost locations was undertaken by attempting to locate flocks of Black-Cockatoos in the late afternoon and, where practicable, following them to their roost site(s). This survey was conducted on the afternoon and evening of the 23 June 2025.

Night-roosting habitat was also assessed in conjunction with the breeding and foraging habitat assessments (see **Section 2.3.2.2** and **Section 2.3.2.3**). As per the guidance of DCCEEW (2022), areas likely to be used as night-roosting sites were noted based on the topographical, physical and vegetation characteristics present (such as sites adjacent to watercourses with large trees) and/or indirect evidence of roosting (e.g. guano deposits, discarded feathers, tree clippings).

2.3.3 Migratory Shorebird and Blue-billed Duck Habitat Assessment and Surveys

2.3.3.1 Habitat Assessment

The Project Area contains (or is adjacent to) a number of wetlands that may provide suitable habitat for migratory shorebirds listed under the EPBC Act and BC Act. Semeniuk and Semeniuk (1995) provided a wetland classification system based on landform (e.g. basin, flat or slope) and water permanence and the thirteen resultant geomorphic wetland categories are shown in **Table 2.4**. Following this system, the geomorphic wetlands of the Swan Coastal Plain have been delineated by DBCA (2025) and this information has been used here, in conjunction with in-field assessments (of wetland features and bird presence) and existing data (i.e. database searches), to determine the locations that were most likely to support migratory shorebirds or Blue-billed Duck within the Project Area. Each wetland within the Project Area was assigned a likelihood rating as follows:

- Known – the group/taxon has been previously recorded from the wetland.
- Likely – the wetland has suitable and sufficient features that make it likely to support the group/taxon.
- Possible – the wetland may occasionally have conditions suited to the group/taxon (e.g. seasonal inundation, or years of favourable rainfall that result in standing water or mudflats).
- Unlikely – the wetland is not expected to provide suitable habitat for the group/taxon.

Table 2.4 Geomorphic Wetland Categories (from Semeniuk & Semeniuk, 1995)

Wetland Category	Description
Lake	Permanently inundated basin. A large, often deep depression that holds permanent or semi-permanent water, typically supporting aquatic vegetation and open water habitats.
Sumpland	Seasonally inundated basin. A low-lying depression that fills with water seasonally, often forming shallow wetlands that dry out in summer.
Playa	Intermittently inundated basin. A shallow, ephemeral basin that periodically fills with water, typically found in arid or semi-arid regions.
Dampland	Seasonally waterlogged basin. A seasonally waterlogged area that rarely floods, typically supporting sedgelands or woodlands adapted to moist but not inundated conditions.
River	Permanently inundated channel. A large, flowing body of water that moves continuously along a defined channel from higher to lower elevations.
Creek	Seasonally inundated channel. A small stream or minor tributary that often flows intermittently and feeds into larger water bodies.
Wadi	Intermittently inundated channel. A dry riverbed or valley that temporarily carries water during periods of heavy rain, common in desert landscapes.
Trough	Seasonally waterlogged channel. A linear depression or elongated basin that can collect water or sediment, often formed by tectonic or erosional processes.
Floodplain	Seasonally inundated flat. A flat area adjacent to rivers or creeks that is periodically inundated during high flows, supporting riparian and flood-tolerant vegetation.
Barlkarra	Intermittently inundated flat. An intermittently inundated flat typically surrounding playa landforms and subject to episodic flooding following significant rainfall events but will remain dry for extended periods.
Palusplain	Seasonally waterlogged flat. A broad, flat landscape that becomes seasonally waterlogged, often supporting dampland or sumpland vegetation communities.
Paluslope	Seasonally waterlogged slope. A gently sloping area on the margins of palusplains that experiences seasonal waterlogging and supports transitional wetland vegetation.
Palusmont	Seasonally waterlogged highlands. A wetland type found on sloping terrain, where water accumulates due to impeded drainage, often forming peat-rich soils.

2.3.3.2 Waterbird Surveys

While migrant shorebirds may potentially make use of any of the geomorphic wetland categories noted above, the two that are most likely to regularly support shorebirds in the vicinity of the Project Area are sumplands and lakes. Four such wetlands within the Project Area appear to provide the best migratory shorebird habitat, as indicated in **Figure 2.3**, and have been the focus of field assessments to date:

i. a large unnamed lake in the west of the Project Area (east of Guraga Lake which sits just outside the Project Area).

ii. Lake Yangy in the mid-east of the Project Area.

iii. a smaller sumpland to the north-west of (i).

iv. a sumpland on Yandin Road in the north of Project Area.

Further surveys of these wetlands (total counts of each waterbird species) were undertaken in the June 2025 survey (in conjunction with the habitat assessments) to provide information on how migratory species may be using the site in the *breeding* season. This is a time when the majority of individuals of these taxa are expected to be at breeding grounds in the northern hemisphere (noting that a very small proportion of birds may 'over-winter' in Australia; and when this is the case is it usually in northern Australia).

A brief, descriptive assessment of the suitability for migrant waders was also undertaken for the four wetlands at which waterbird surveys were conducted.

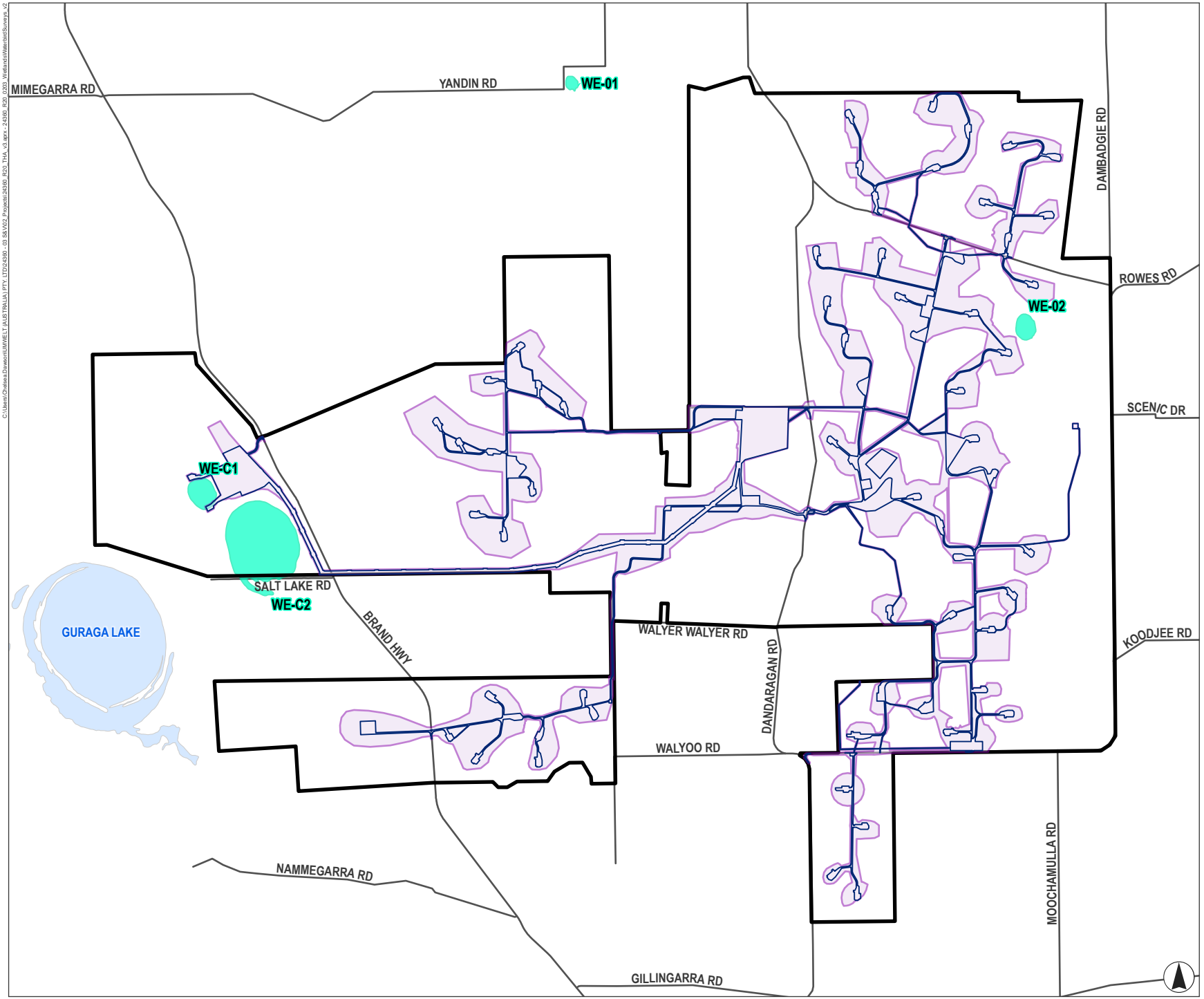


FIGURE 2.3

Wetlands at Which Waterbird Surveys Were Undertaken

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Directory of Nationally Important Wetlands
- Survey Wetlands

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

3.0 Results and Discussion

3.1 Black-Cockatoo Presence

3.1.1 Carnaby's Black-Cockatoo

Carnaby's Black-Cockatoo has previously been recorded within the Project Area (Umwelt, 2025a) and was, again, observed in the current field investigations. In the late afternoon of the 23 June 2025 a loose aggregation of up to 150 birds was noted adjacent to the Brand Highway (in association with Banksia woodlands and heaths, mine workings, paddocks and pine plantations in this area) at the western edge of the Project Area. These birds were followed to their roost (also located in the Project Area), as described in **Section 3.2.3**.

No Carnaby's Black-Cockatoos were observed on the Dandaragan plateau to the east of this location throughout the habitat assessment survey (despite most of the survey time and effort being focussed in this area).

3.1.2 Red-tailed Black-Cockatoos

In addition, one sighting of a red-tailed Black-Cockatoo taxon was made within the Project Area during the survey; two birds were recorded in flight along Rowes Road on 25 June 2025. This is an interesting observation, and at the time it was not clear as to which taxon of Black-Cockatoo it may be. Two options were possible:

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*). Generally expected to occur to the south of the Project Area, where it ranges north to about Cullalla (north of Gingin), some 40 km to the south of the Project Area. Interestingly, Johnstone and Storr (1998) noted that the range of this species *formerly* extended north to Dandaragan (but presently is expected to occur to the Gingin area; south of the Project Area). BirdLife Australia (2023) concurs with this distribution, as does the expected distribution mapping of DCCEEW (2025a). The latter is shown in **Figure 3.1** and suggests that the modelled limits of habitat for where Forest Red-tailed Black-Cockatoos are *likely* to occur, and where they *may* occur, both fall south of the Project Area. This taxon is listed as Vulnerable under both the EPBC Act and BC Act.
- Western Red-tailed Black-Cockatoo (*C. b. escondidus*). Generally expected to occur to the east and north of the Project Area, where it ranges west as far as Moora (approximately 30 km north-east of the Project Area) and south to the Badgingarra area (approximately 45 km north of the Project Area). Johnstone and Storr (1998) noted that, close to the Swan Coastal Plain, the range of this species extends south to Eneabba (well north of the aforementioned Badgingarra). In their genetic assessment of red-tailed Black-Cockatoos (*Calyptorhynchus banksii* subspecies), Ewart et al. (2020) provided a distribution map which appears to show that the Project Area falls between the expected occurrence of both Western Red-tailed Black-Cockatoo and Forest Red-tailed Black-Cockatoo. Only the geographical range for the Western Red-tailed Black-Cockatoo, however, is described in the text:

  "The arid and semi-arid zones of Western Australia south of the Kimberley, here tentatively … including the presumed isolated population inhabiting the north-eastern Pilbara in the upper drainages of the Oakover and de Grey Rivers … and definitely including the Wheatbelt."

  This taxon is not listed under federal or state legislation.

Therefore, it appeared that the Project Area fell in the interzone between the general distributions of these two taxa. Habitat within the Project Area may plausibly be suited to both. Forest Red-tailed Black-Cockatoos forage extensively on the seeds of Marri (*Corymbia calophylla*) trees and, within the agricultural matrix, Western Red-tailed Black-Cockatoos have a prefer ground-foraging on the naturalised weed Doublegee (*Emex australis*). While the Project Area provides opportunity for both of these food sources, there is a noted prevalence of Marri in the Yathroo-Dandaragan area, and it is perhaps more likely that the birds observed were Forest Red-tailed Black-Cockatoos.

Further sightings of this red-tailed Black-Cockatoo taxon were made in the winter 2025 BBUS surveys and evidence of their foraging (Marri nut debris) was recorded, and collected, in subsequent visits to the site. The Marri debris was assessed against reference samples collected in the Perth hills (known to be from the *C. b. naso* subspecies) and there was no significant difference in the size of chew-marks on the nuts (indicative of bill width which can be used to discriminate subspecies). Expert opinion was also elicited (T. Kirkby, pers. comm) and the conclusion was made that the birds recorded from the Project Area were Forest Red-tailed Black-Cockatoos (*C. b. naso*). Other consultants have also recorded this subspecies in the Cataby/Dandaragan area (M. Bamford, N. Riches, pers. comm.) and anecdotal evidence suggests that birds 'arrived' (re-colonised) in the early 2020s (M. Bamford, pers. comm.).

Despite considerable survey effort in the spring (October) 2025 BBUS, no red-tailed Black-Cockatoos were located in the Project Area and no recent foraging evidence was recorded. Given the observations to date, it currently thought that there is a small number of Forest Red-tailed Black-Cockatoos that use the Project Area on an intermittent basis and that they likely spend the majority of their time outside of the Project Area itself.

Black-Cockatoo habitat assessment (see **Section 3.2)** was initially targeted to Carnaby's Black-Cockatoo but that has been extended to Forest Red-tailed Black-Cockatoo subsequent to their detection on site.

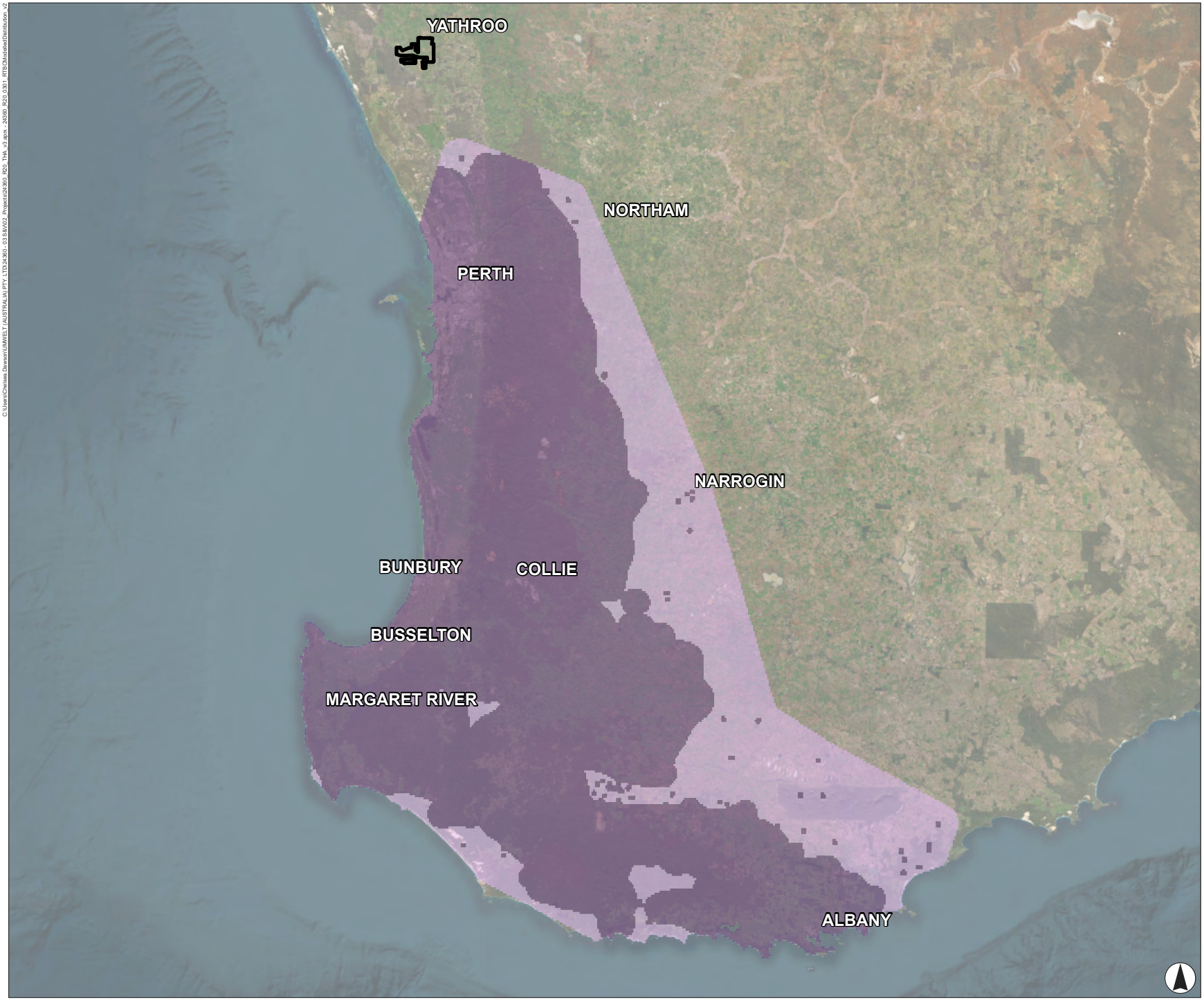


FIGURE 3.1

Modelled Distribution (DCCEEW) of Forest Red-tailed Black-Cockatoo in Relation to the Project Area

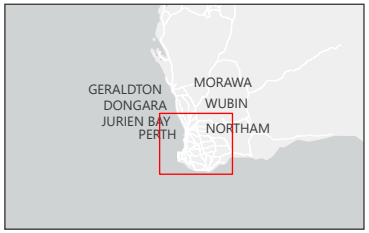
Legend

Project Area

***Calyptorhynchus banksii naso* Distribution**

Species or species habitat likely to occur

Species or species habitat may occur



0 50 100

Kilometres

Scale 1:2,750,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

3.2 Black-Cockatoo Habitat Assessment

3.2.1 Breeding Habitat

A total of 610 trees that met the potential Black-Cockatoo nest-tree criteria of DCCEEW (2022, 2025b, 2025c, 2025d) were recorded within the Survey Area (i.e. this is all trees recorded during the survey). Of these:

- 50 potential Black-Cockatoo nest-trees were outside of the Development Corridor (see **Section 2.1** and **Figure 2.2**) but within adjacent parts of the Project Area (these trees were opportunistically recorded to provide additional information or context, if required).
- 560 potential Black-Cockatoo nest-trees were within the Development Corridor, comprising 520 trees in the 2,596.6 ha (75.4% of the Development Corridor) that were comprehensively assessed (for all tree ranks, as described in **Section 2.3.2.2**) and 40 trees in the 762.3 ha (22.1%) that were only partially surveyed (comprehensively for Ranks 1, 2 and 3, and opportunistically for Rank 4 and 5 trees). Note that 84.0 ha (2.5%) of the Development Corridor has not been assessed.
- 112 potential Black-Cockatoo nest-trees were within the entire Disturbance Footprint (729.1 ha) that was 95.7% comprehensively surveyed (697.9 ha; with 26.0 ha (3.6%) partially surveyed and 5.1 ha (0.7%) unassessed as outlined in **Section 2.3.2.2** and **Figure 2.2**). It should be noted that the unassessed area is primarily cleared.

A series of maps showing the locations of all trees recorded, to date, within the Survey Area is presented in **Figure 3.2**.

Appendix B presents a summary of the potential Black-Cockatoo nest-trees recorded during the survey by Bamford rank, species and life.

A similar summary of the potential Black-Cockatoo nest-trees *within* the Disturbance Footprint (the focus the assessment) is presented in **Table 3.1**. There are several noteworthy points from these data:

- One native tree species represented almost 80% of the potential Black-Cockatoo nest-trees recorded in the Disturbance Footprint: Marri. This species is known to be one of the best hollow-bearing species of tree for Black-Cockatoo breeding in the south-west of Western Australia.
- More than 99% of potential Black-Cockatoo nest-trees were alive; a very high proportion for the agricultural landscape.
- No confirmed Black-Cockatoo nests were located (Rank 1).
- No trees within the Disturbance Footprint were found to have hollow-entrances of suitable size, height and orientation to support Black-Cockatoo breeding and also with evidence of Black-Cockatoo activity (chew marks around the entrance; Rank 2).
- Five trees within the Disturbance Footprint (4.5% of trees assessed; four Marri and one Flooded Gum) were found to have hollow-entrances that were of suitable size, height and orientation to support Black-Cockatoo breeding (Rank 3). These hollow-entrances had no external signs of Black-Cockatoo activity (e.g. chew marks). Internal hollows have not been assessed on these trees.
- The remaining 95.5% of trees within the Disturbance Footprint did not bear hollow-entrances that were suited to Black-Cockatoo breeding (but did still meet the DBH criteria of DCCEEW (2022, 2025a, 2025b, 2025c; Rank 4 or 5 trees).

- There were no Rank 1, 2 or 3 trees within the area of the Disturbance Footprint that was partially assessed, as shown in **Figure 2.2**. A revision of the Disturbance Footprint was made following the initial (June 2025) surveys to avoid high-value trees, where possible, and, as a result, some small areas (totalling 5.1 ha; 0.7% of the Disturbance Footprint) have not been assessed for potential Black-Cockatoo nest-trees. These areas are unlikely to contribute further Rank 1, 2 or 3 trees so the total numbers of ranked trees are considered all but complete for the whole of the Disturbance Footprint.
- While no tree hollows (in the Rank 3 potential nest-trees) were inspected internally (e.g. with a pole camera, drone or by a tree climber) it is likely that some will not have a suitable internal chamber to support Black-Cockatoo breeding (this is unable to be ascertained by the initial on-ground inspection). Observation of very high potential nest-trees or hollow inspections (where practicable) during the breeding season are the best ways to determine whether a tree is used for nesting by Black-Cockatoos.
- Other cockatoos (e.g. Galah, corella spp.) that were, at times, observed in considerable abundance within the Project Area may compete with Black-Cockatoos for nest-sites.

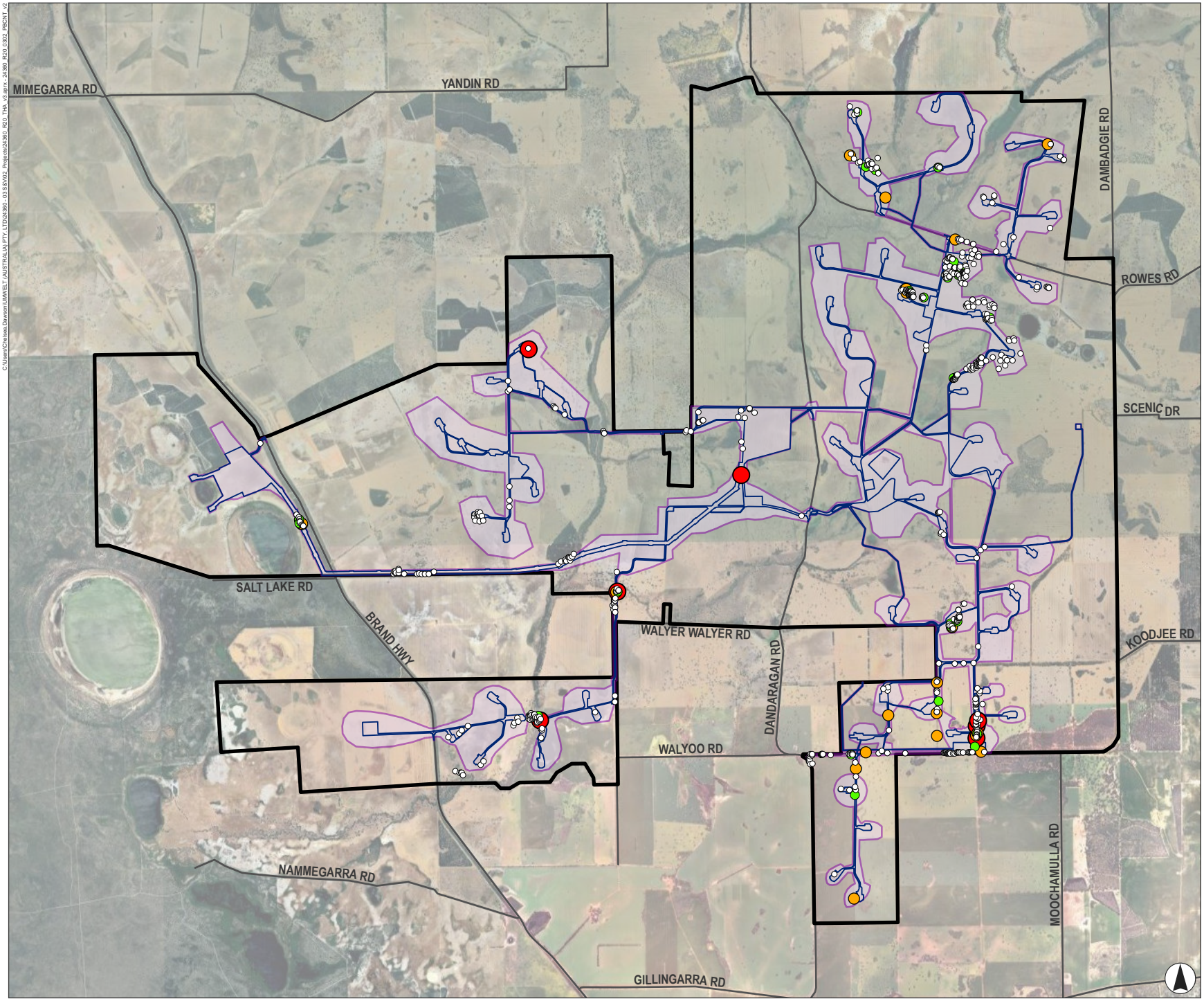


FIGURE 3.2.1

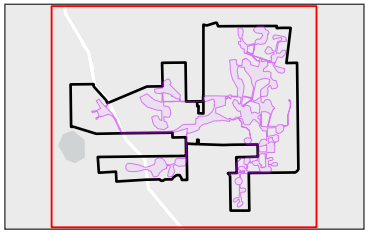
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 1
- 2
- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

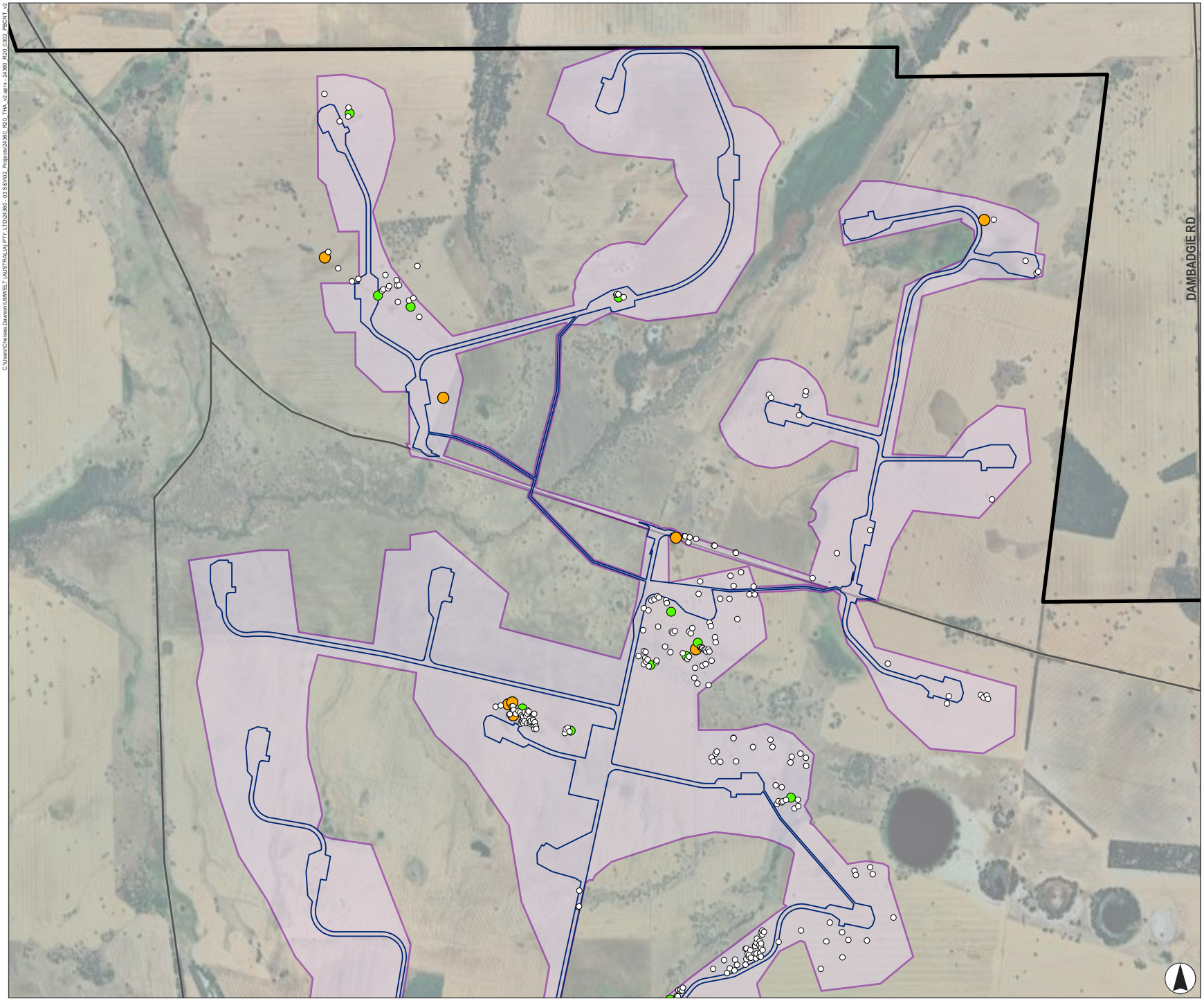


FIGURE 3.2.2

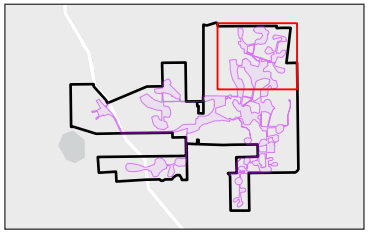
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

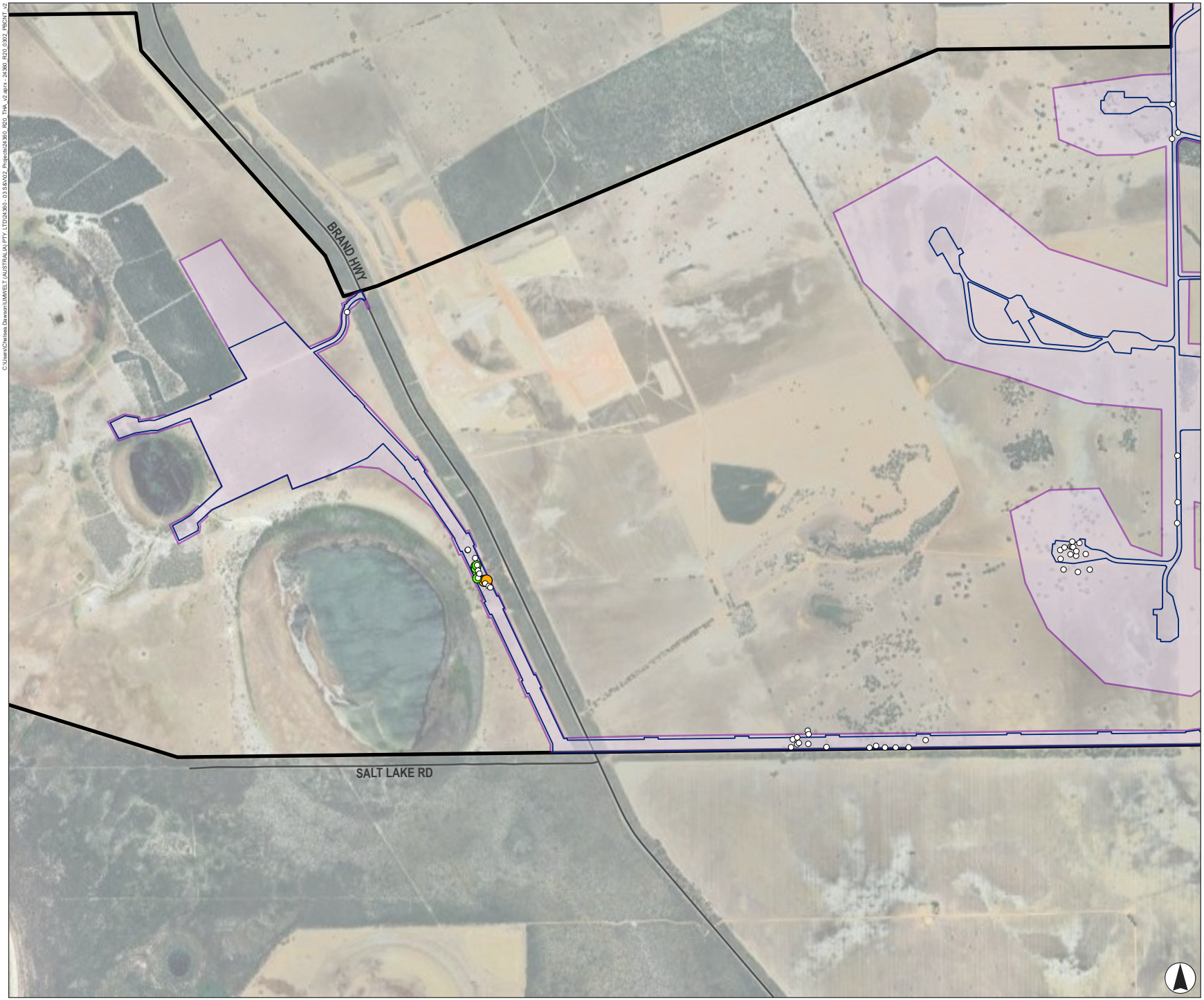


FIGURE 3.2.3

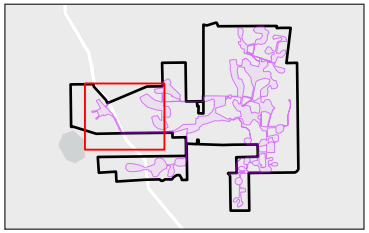
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

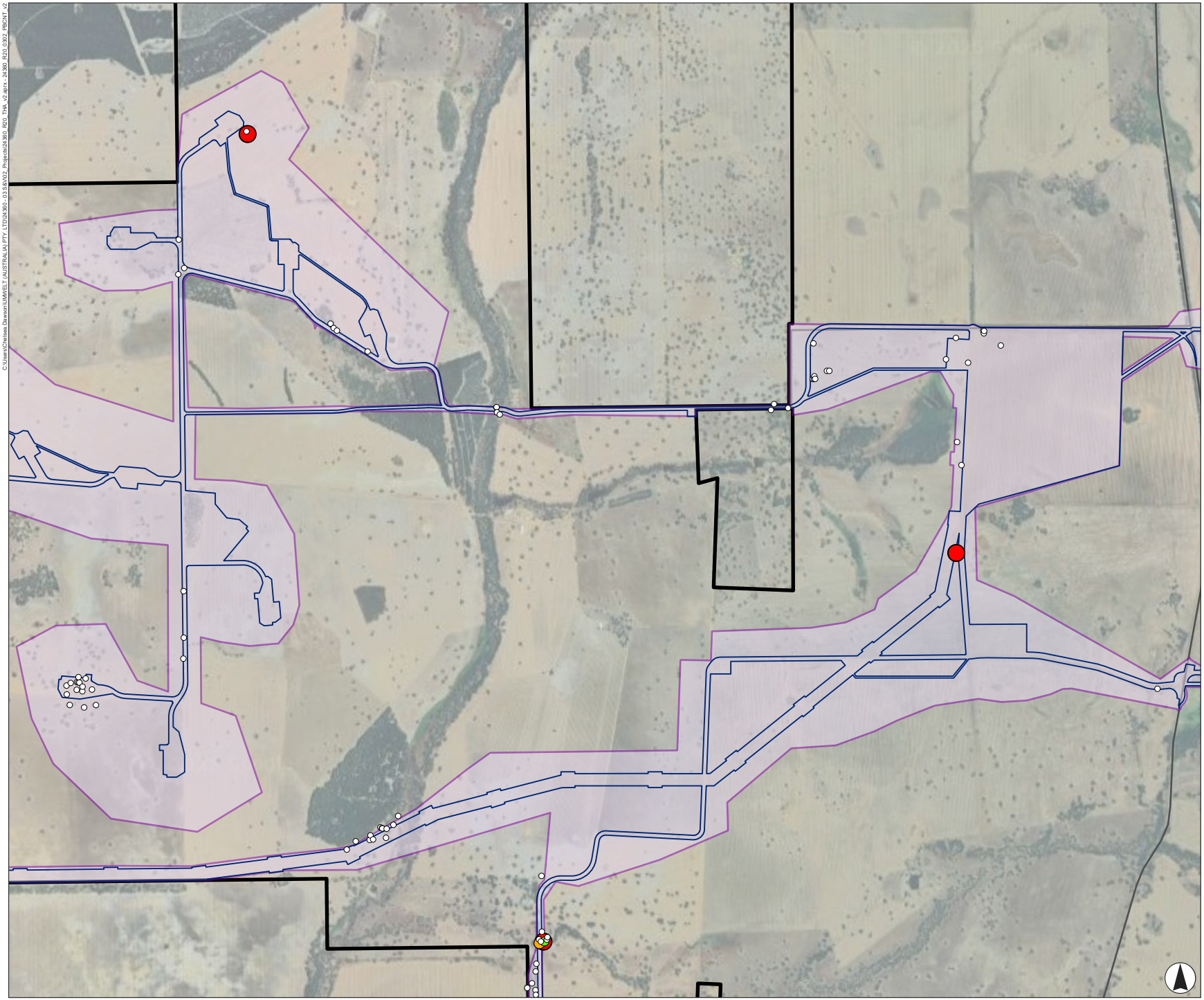


FIGURE 3.2.4

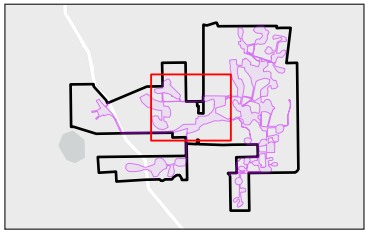
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 2
- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.2.5

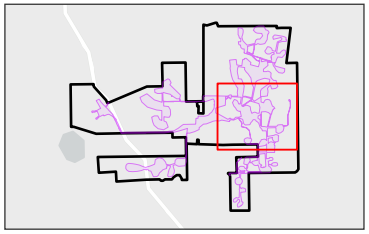
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

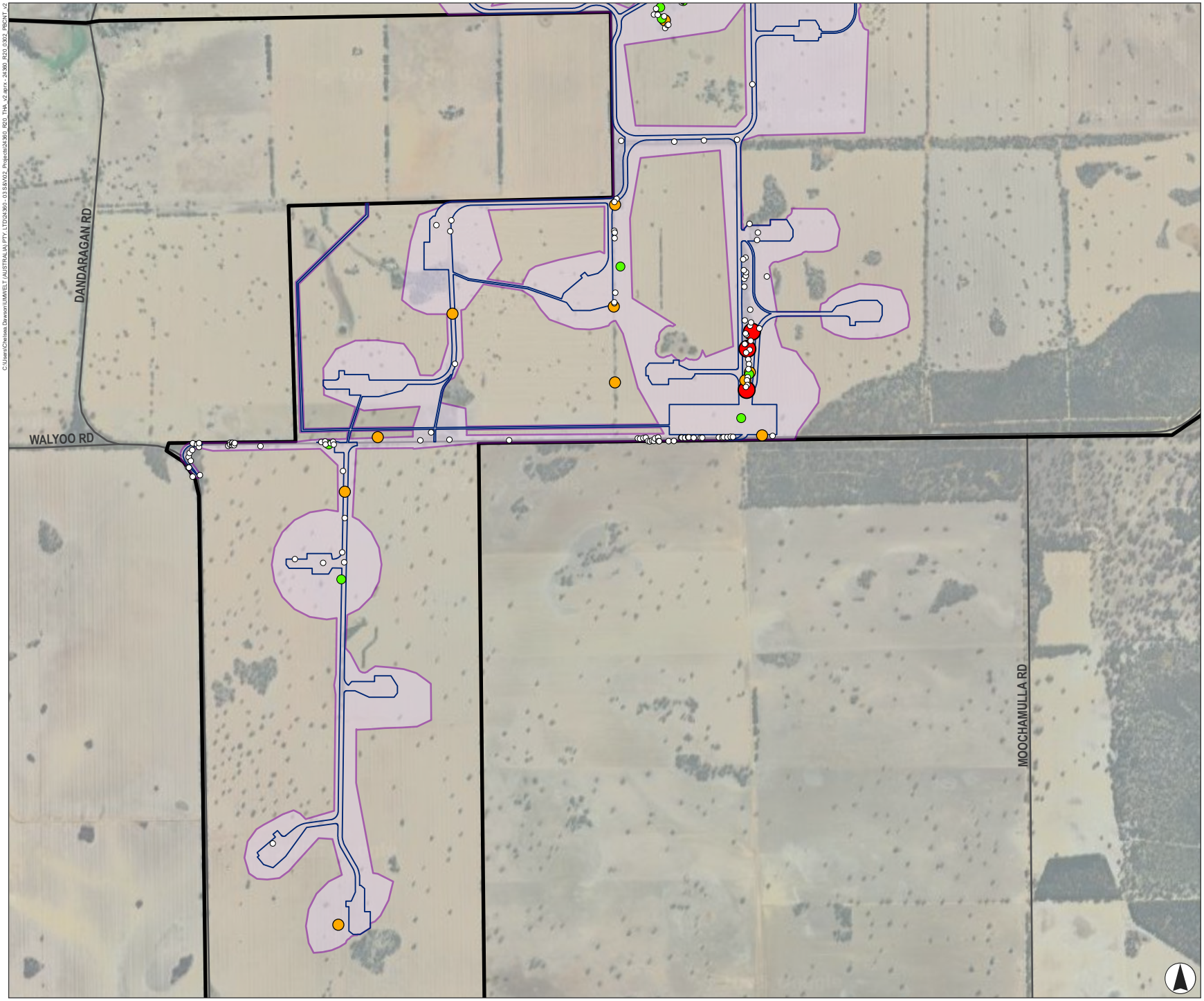


FIGURE 3.2.6

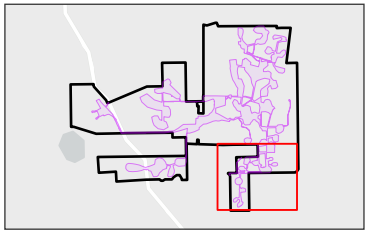
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 2
- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

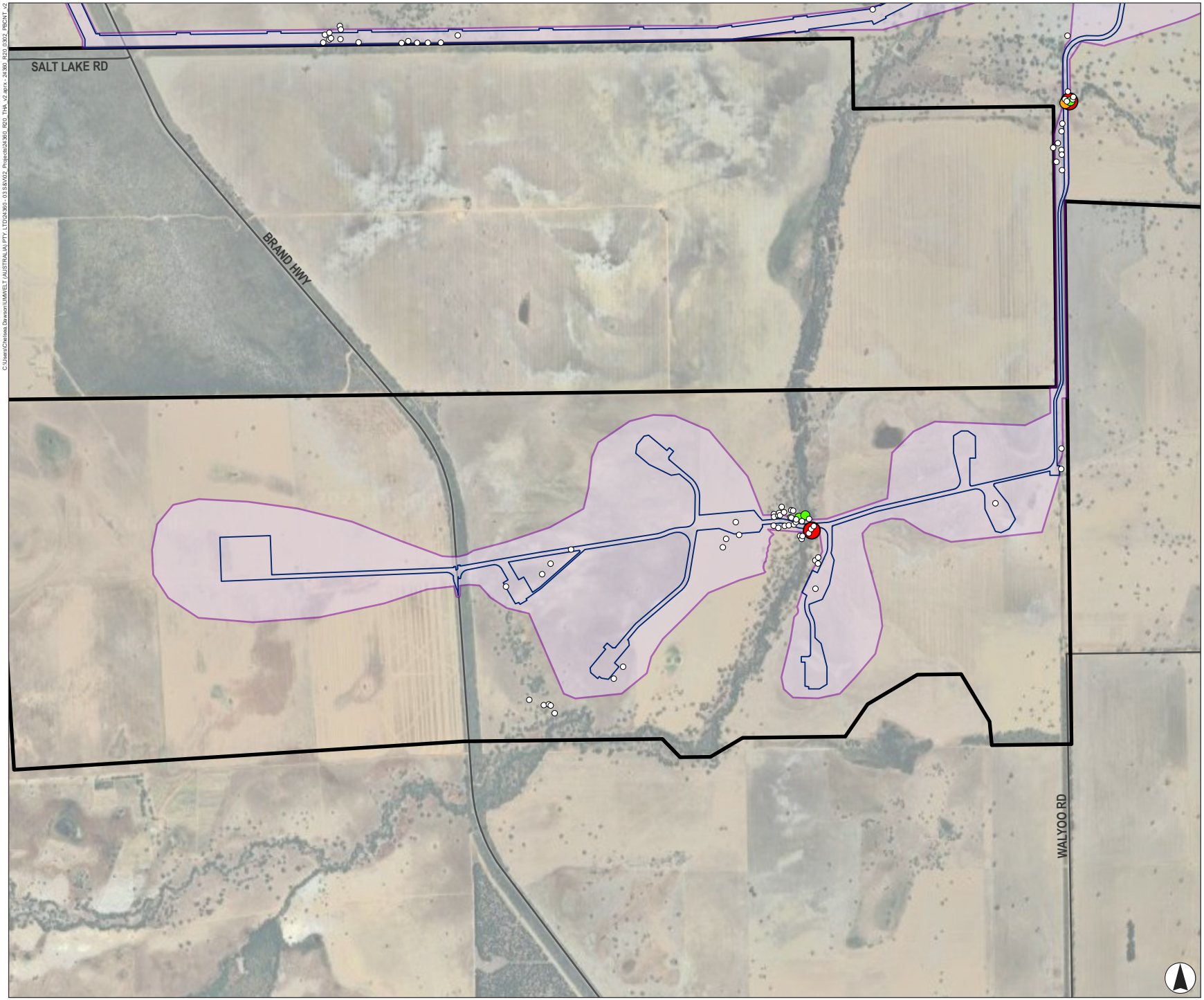


FIGURE 3.2.7

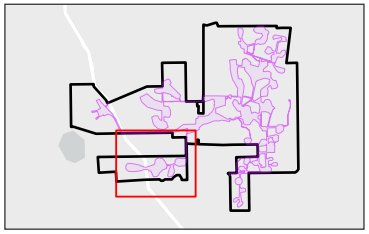
Potential Black-cockatoo Nest-trees Within the Survey Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Bamford Rank

- 2
- 3
- 4
- 5



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

Table 3.1 Summary of Potential Black-Cockatoo Nest-trees Surveyed Within the Disturbance Footprint

Bamford Rank	Marri		Flooded Gum		Coastal Blackbutt		Wandoo		Total	Percentage
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead		
1	0	0	0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0	0	0.0
3	4	0	1	0	0	0	0	0	5	4.5
4	7	0	0	0	0	0	0	0	7	6.2
5	77	1	10	0	9	0	3	0	100	89.3
Subtotal	88	1	11	0	9	0	3	0	112	100.0
Total	89		11		9		3		**112**	
Percentage	79.5		9.8		8		2.7		**100**	

3.2.2 Foraging Habitat

3.2.2.1 Foraging Habitat Quality

Foraging habitat for Forest Red-tailed Black-Cockatoo was present in the Development Corridor, with the mainstay foraging species Marri present (usually in low density) across the site. Foraging habitat for Carnaby's Black-Cockatoo was also present in the Development Corridor, with mainstay foraging species such as Banksia tree species (in particular Candlestick Banskia, *Banksia attenuata*; Holly-leafed Banksia, *B. ilicifolia;* and Firewood Banksia, *B. menziesii),* Marri, proteaceous shrubs (including Parrot Bush, *B. sessilis*, and Pingle, *B. squarrosa*) and planted pines (e.g. *Pinus* spp.) present (in variable densities and locations) across the site.

Maps of the Bamford Foraging Habitat Quality Scores (FHQSs) within the Development Corridor are presented for Forest Red-tailed Black-Cockatoo in **Figure 3.3** and for Carnaby's Black-Cockatoo in **Figure 3.4**. A summary of the areas of each FHQS category is presented in **Table 3.2** for each taxon. A breakdown of the FHQS scores by re-evaluated fauna habitat type (RFHT) is provided in **Appendix C**. A few brief comments on these data follow:

- Almost 93% of the Development Corridor was assessed as having Low, Negligible or No value for foraging by both Forest Red-tailed Black-Cockatoo and Carnaby's Black-Cockatoo.
- For both taxa, areas of upper Moderate or better value were isolated and mostly occurred in the south-east of the Development Corridor (in the vicinity of, but not the same areas as, the higher value potential Black-Cockatoo nest trees within the Disturbance Footprint, as noted in **Section 3.2.1**). There were also narrow areas of this higher-quality foraging habitat along Walyer Walyer Road (in central-south of the Development Corridor).
- The Development Corridor, as whole, was generally of very low value for foraging by Forest Red-tailed Black-Cockatoo (an overall weighted FHQS of 1 out of 10) and low value for foraging by Carnaby's Black-Cockatoo (an overall weighted FHQS of 2 out of 10).
- Even within a RFHT, the health and condition of the vegetation varied from patch to patch and this has implications for the value of these patches for foraging by Black-Cockatoos.
- *Paddocks* and *Paddocks with scattered Corymbia calophylla* RFHTs together accounted for more than 83% of the Development Corridor and these were generally poor for foraging potential for both taxa of Black-Cockatoo.
- The higher value RFHT areas (for both Black-Cockatoo taxa) of *Corymbia calophylla woodland* and *Paddocks with Corymbia calophylla* represented 1.1% and 5.8% of the Development Corridor, respectively. The *Banksia woodland* RFHT was higher value for Carnaby's Black-Cockatoo and represented less than 0.03% of the Development Corridor.
- Given the fine-scale (patch) assessment and the considerable number of RFHTs (19) assessed it is unsurprising that there was a wide range of FHQSs across the RFHTs but this demonstrates the merit of the patch-assessment process (and its resolution) in providing assessment data that are very much more specific and refined than the initial (necessarily) broader-scale studies.
- 3.49 ha (0.1% of the Development Corridor) remains unassessed.

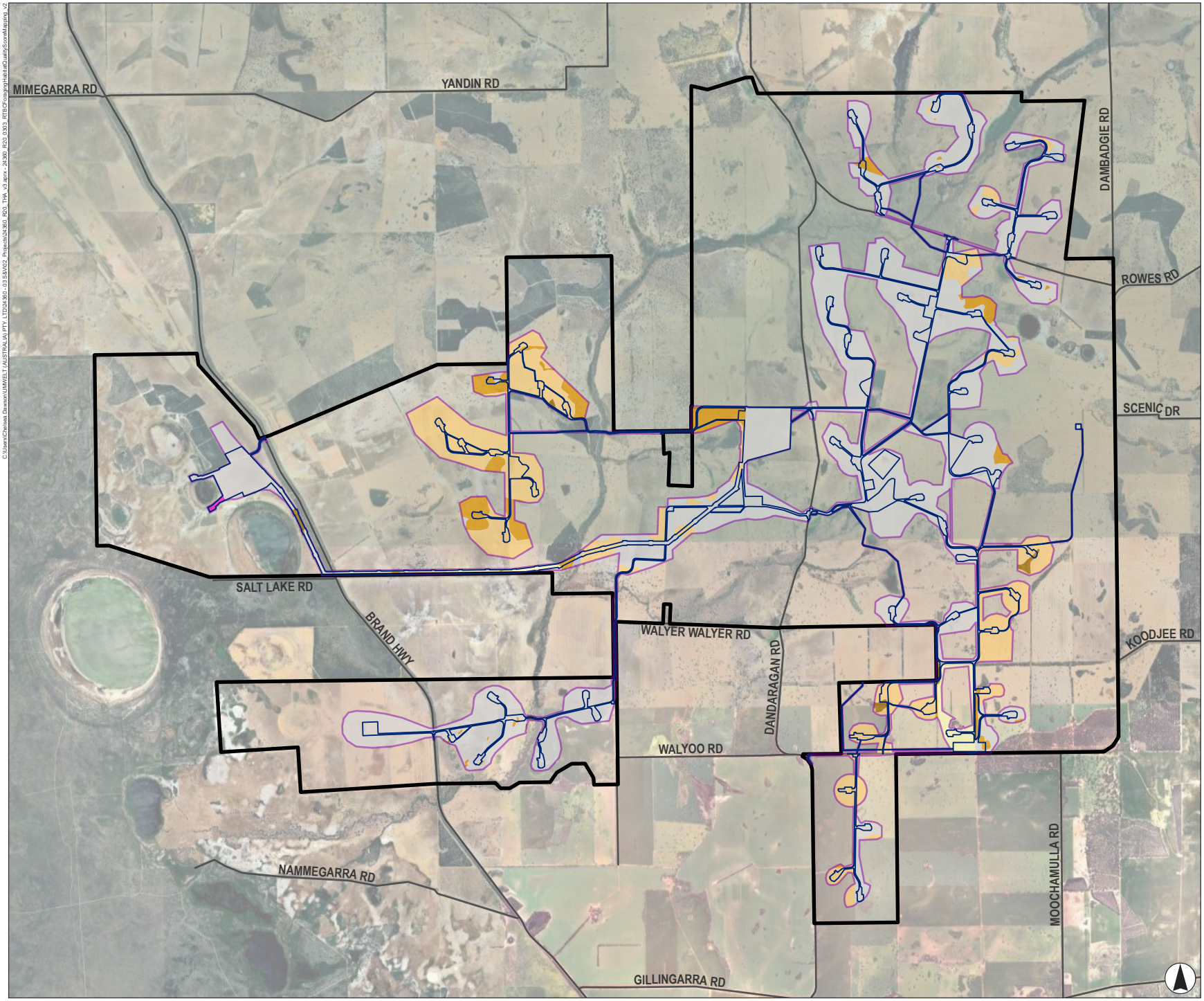


FIGURE 3.3.1

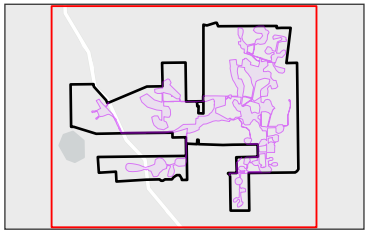
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 10: Pristine
- 9: Very High
- 8: High
- 7: Moderate to High
- 6: Moderate
- 5: Moderate
- 4: Low to Moderate
- 3: Low
- 2: Very Low
- 1: Negligble
- 0: Nil
- Unassessed



0 0.5 1
Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

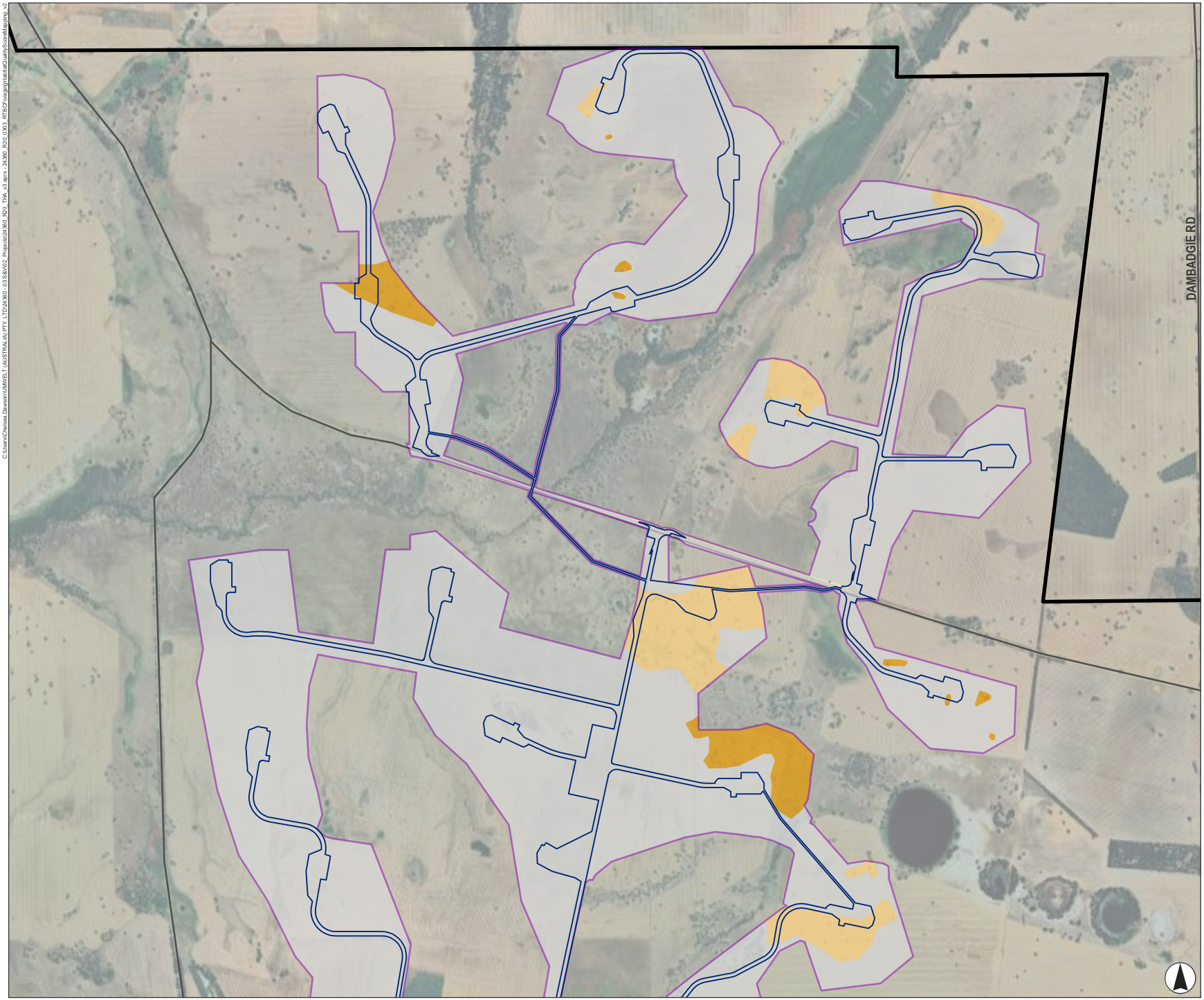


FIGURE 3.3.2

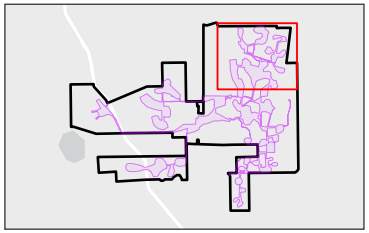
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 5: Moderate
- 2: Very Low
- 1: Negligible
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

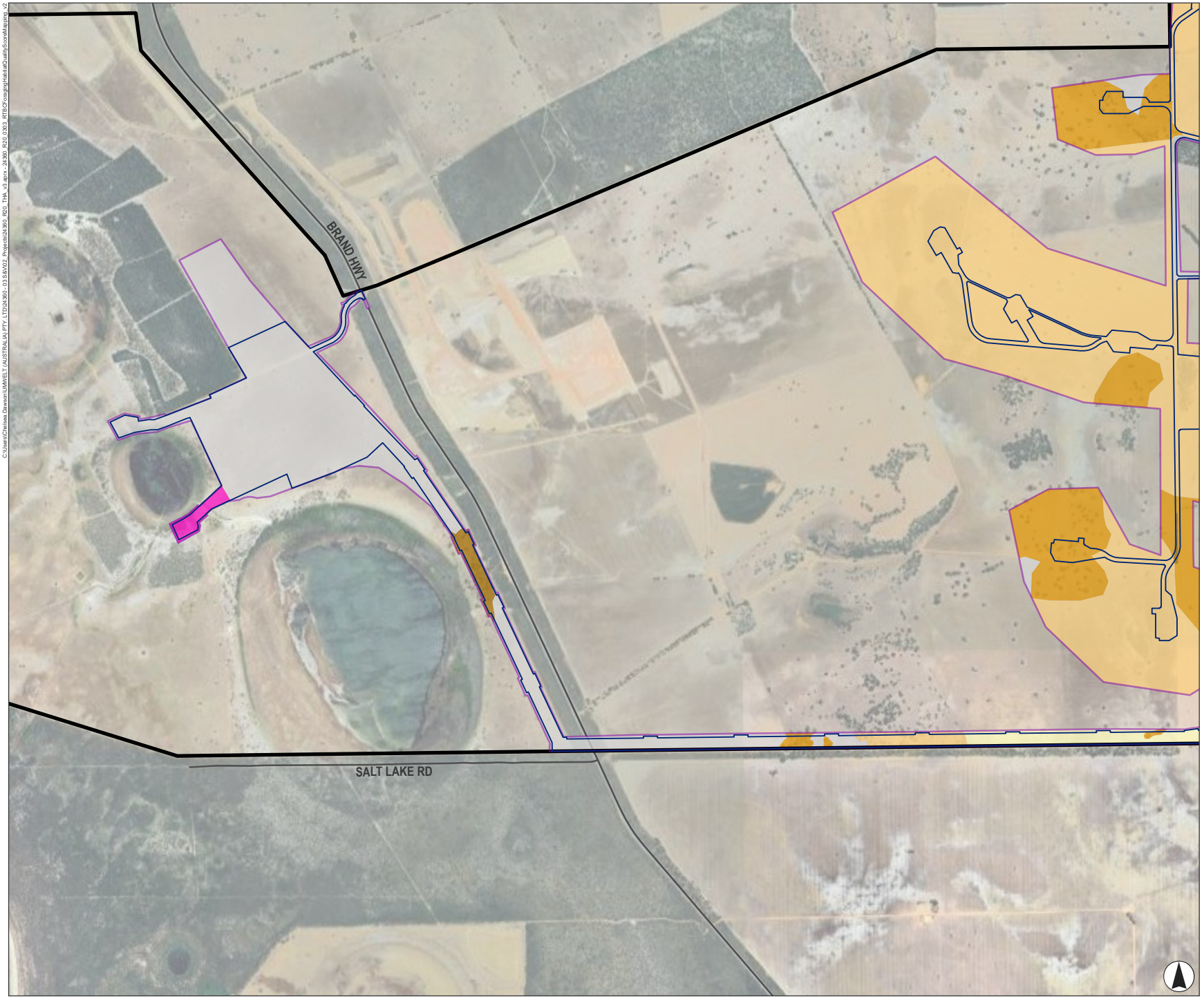


FIGURE 3.3.3

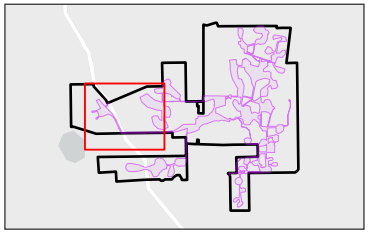
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligible
- 0: Nil
- Unassessed



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

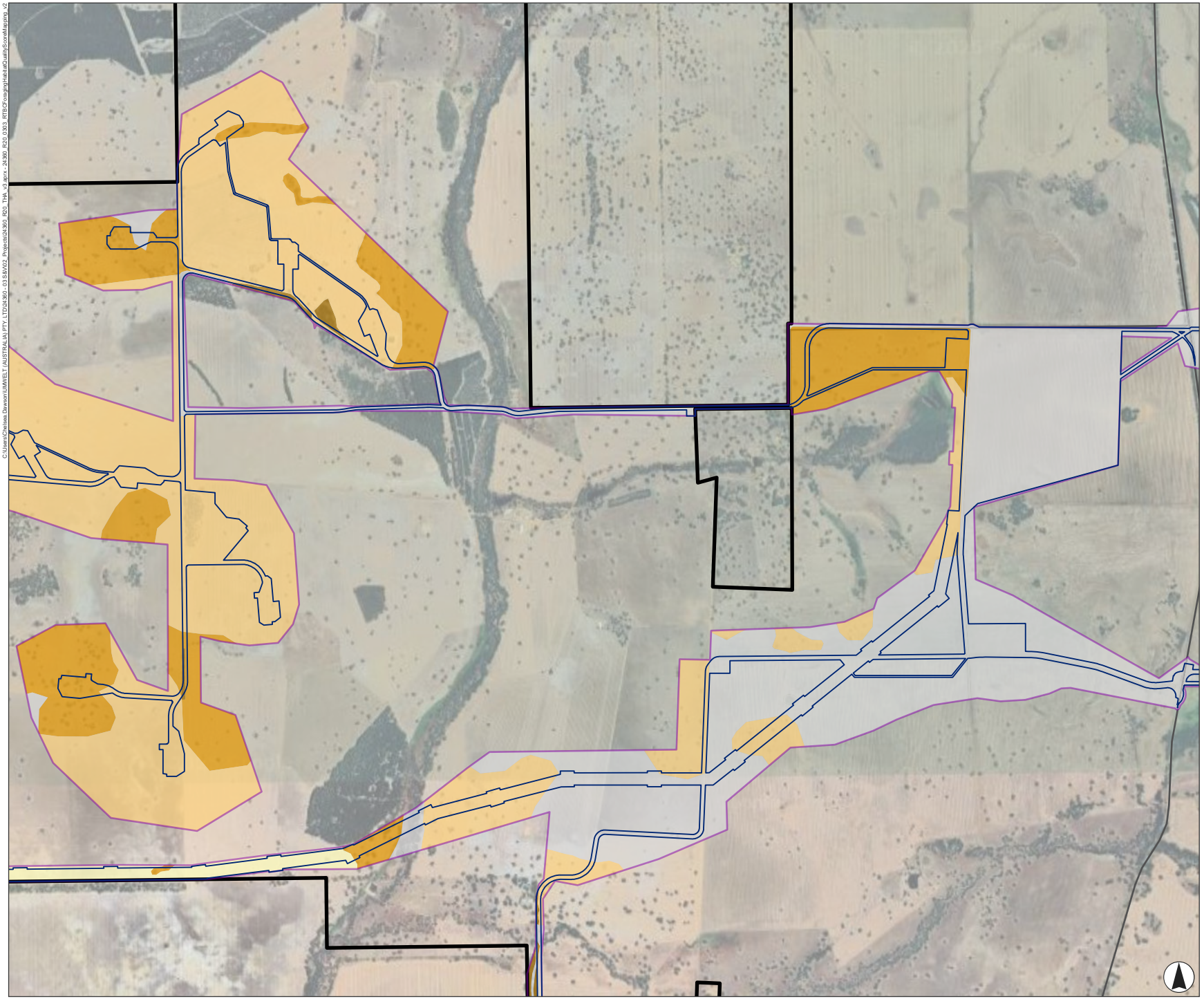


FIGURE 3.3.4

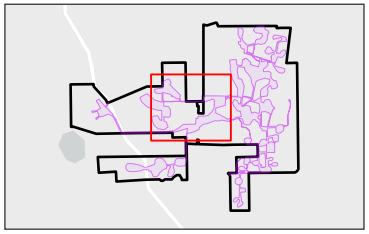
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligible
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

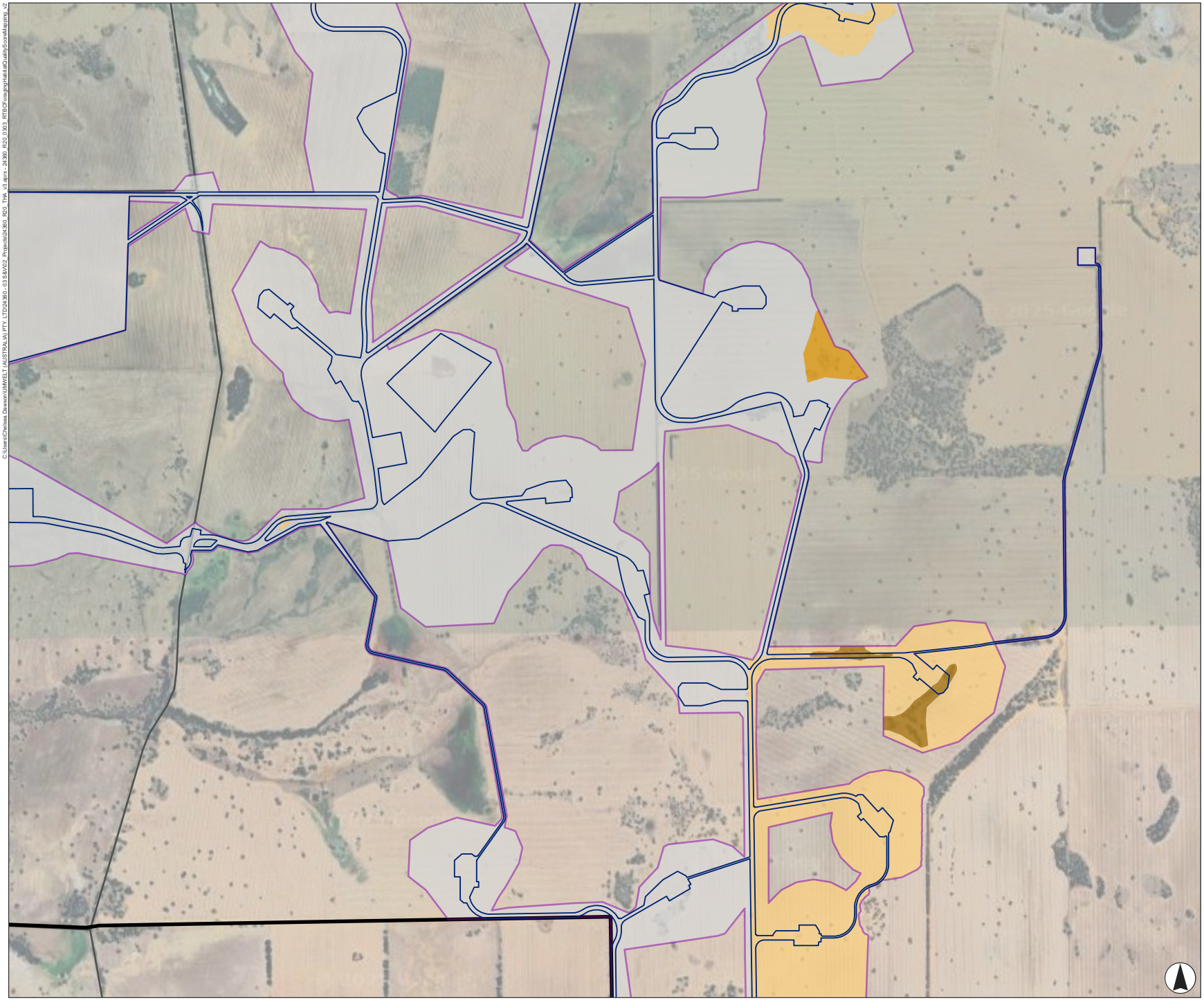


FIGURE 3.3.5

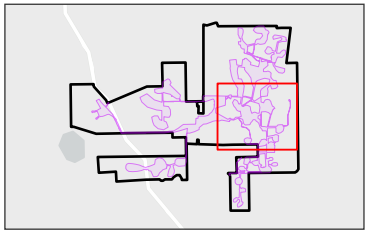
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.3.6

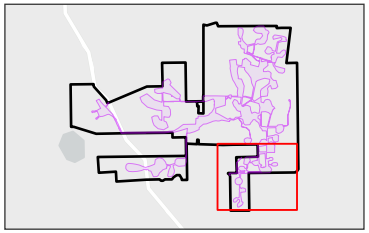
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 7: Moderate to High
- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligible
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

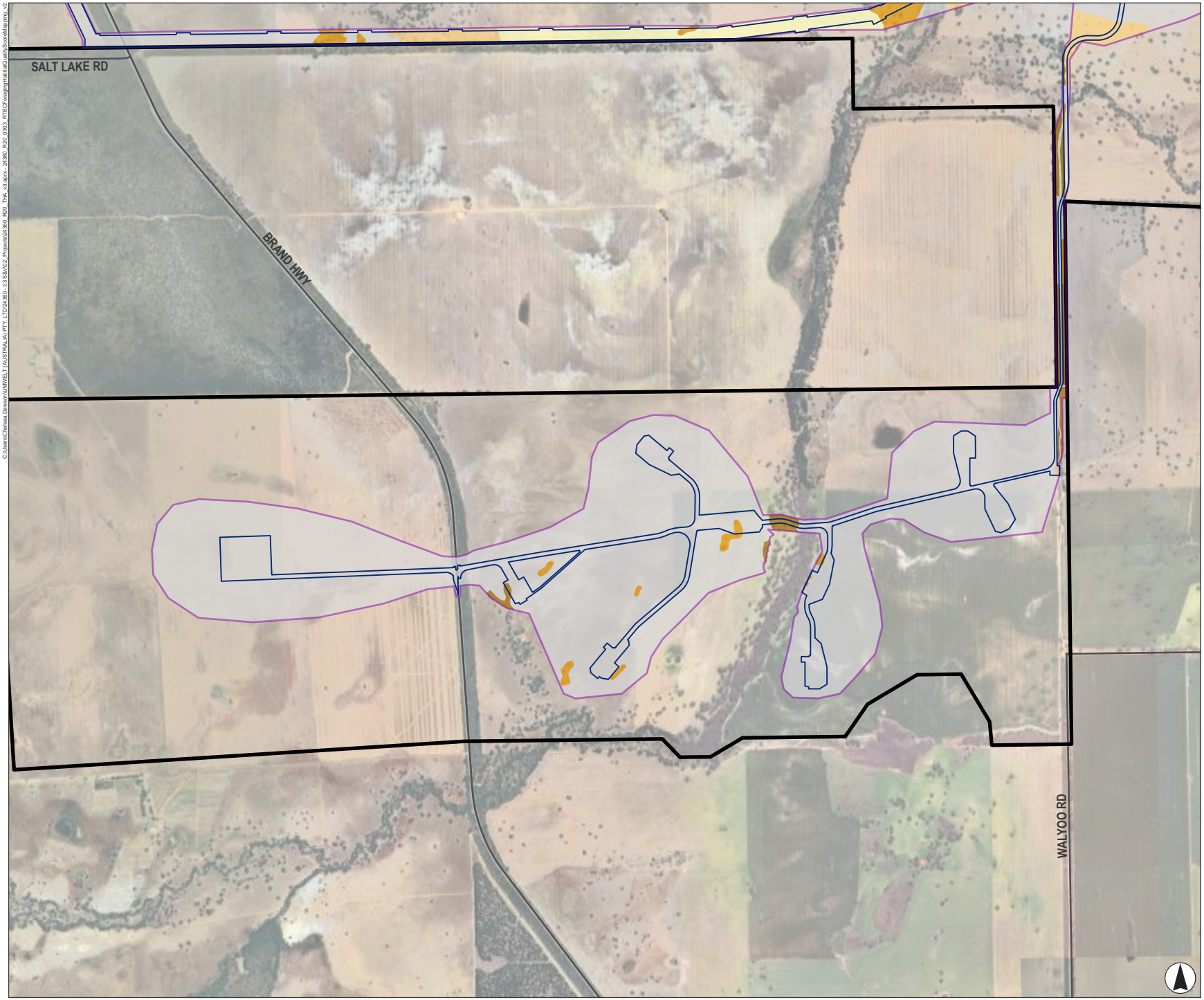


FIGURE 3.3.7

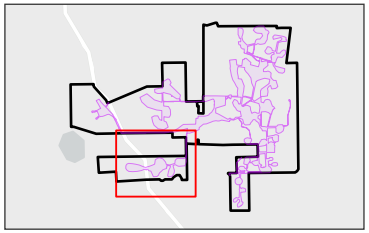
Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligible
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

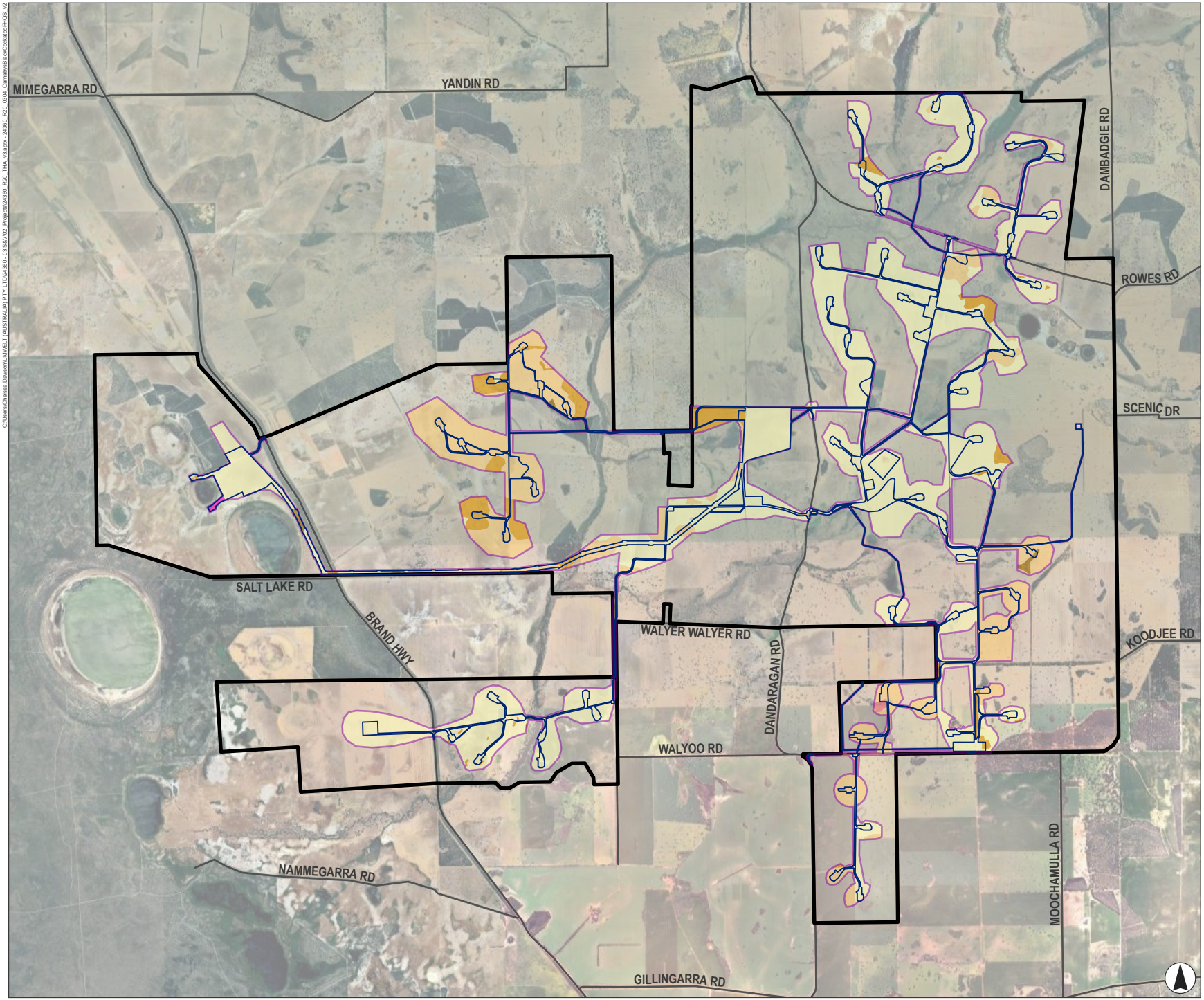


FIGURE 3.4.1

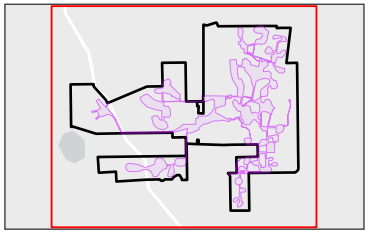
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 10: Pristine
- 9: Very High
- 8: High
- 7: Moderate to High
- 6: Moderate
- 5: Moderate
- 4: Low to Moderate
- 3: Low
- 2: Very Low
- 1: Negligble
- 0: Nil
- Unassessed



0 0.5 1
Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

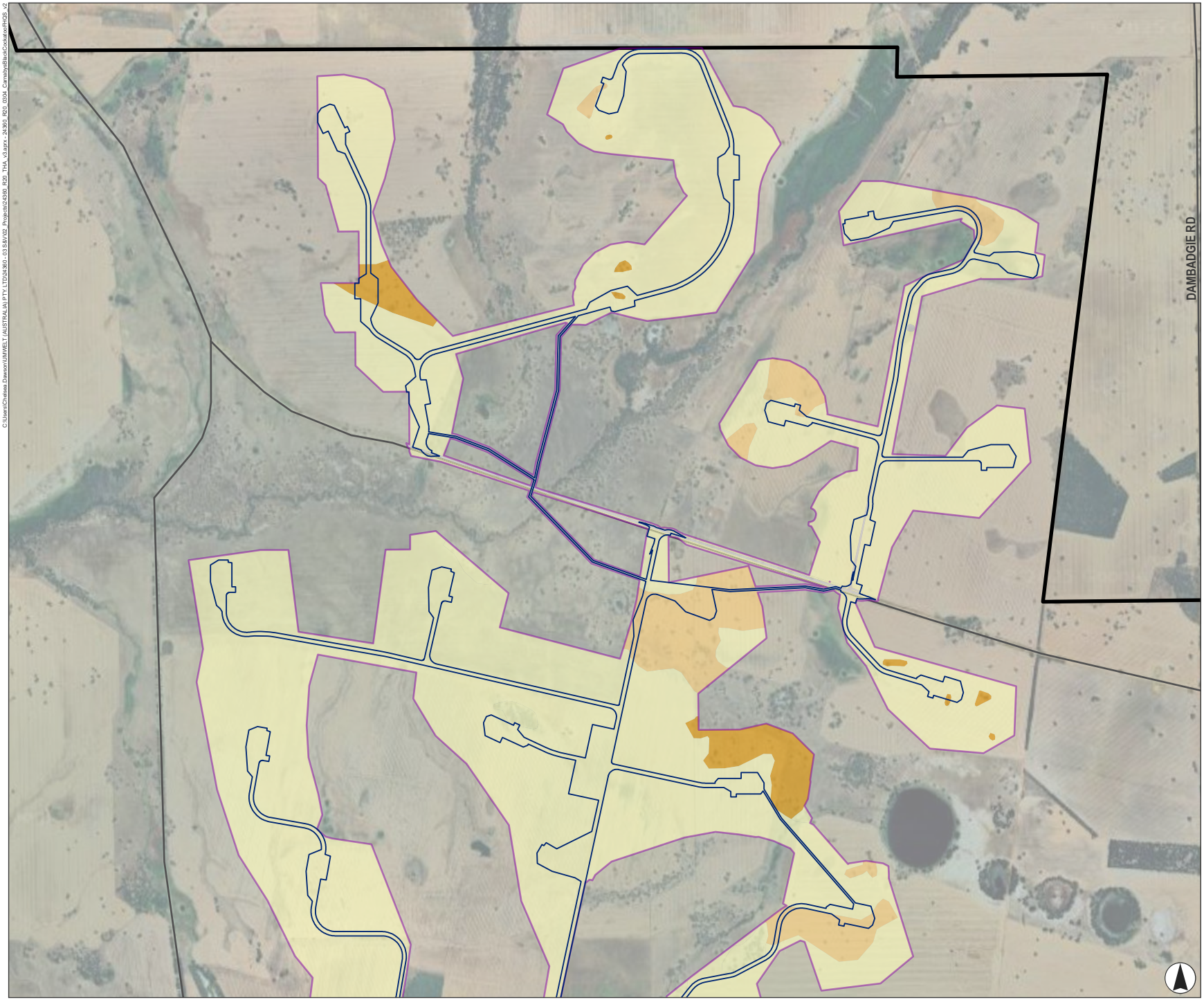


FIGURE 3.4.2

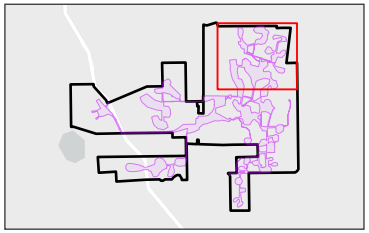
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

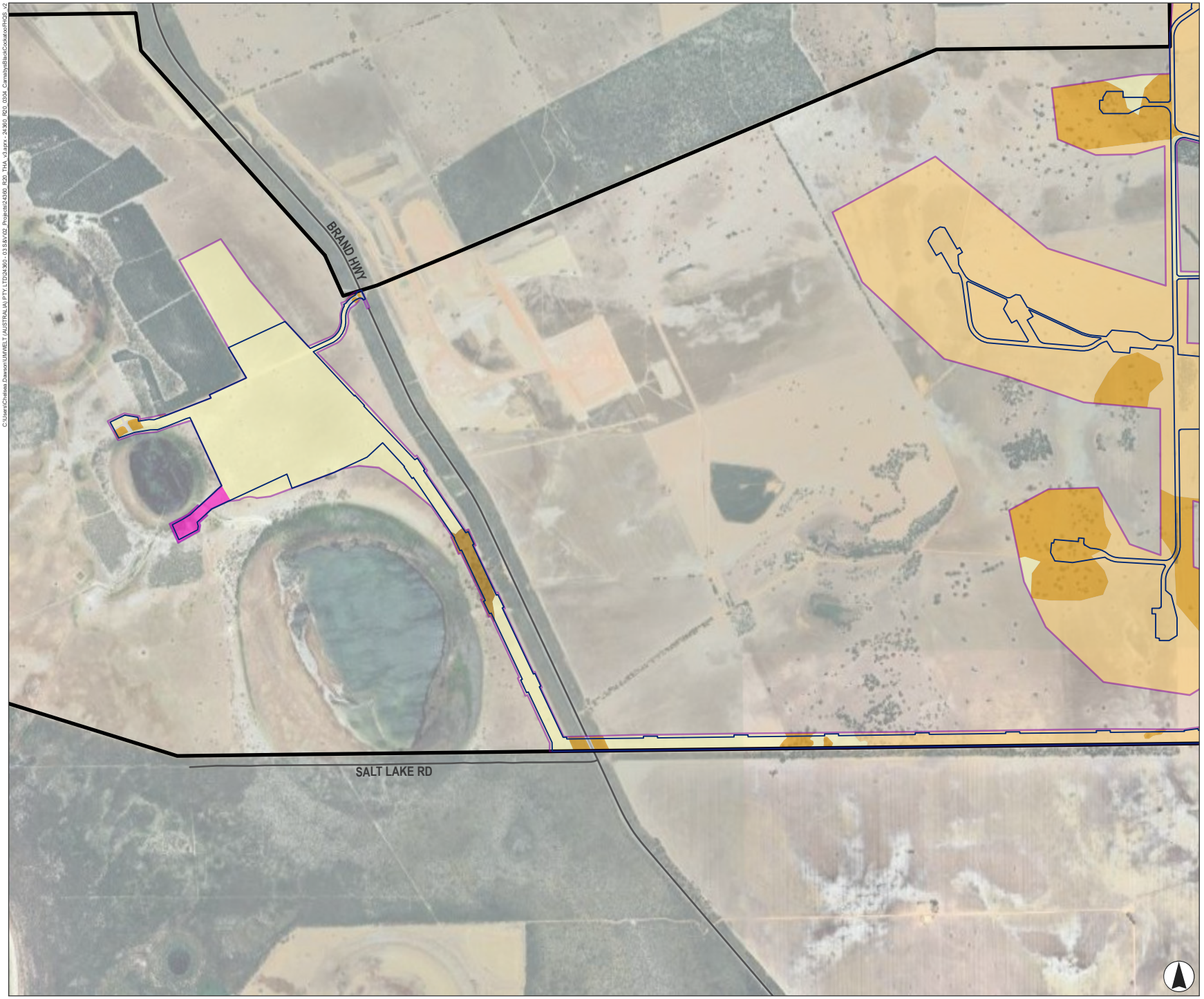


FIGURE 3.4.3

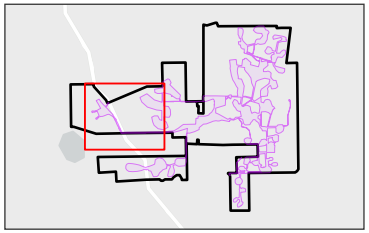
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil
- Unassessed



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

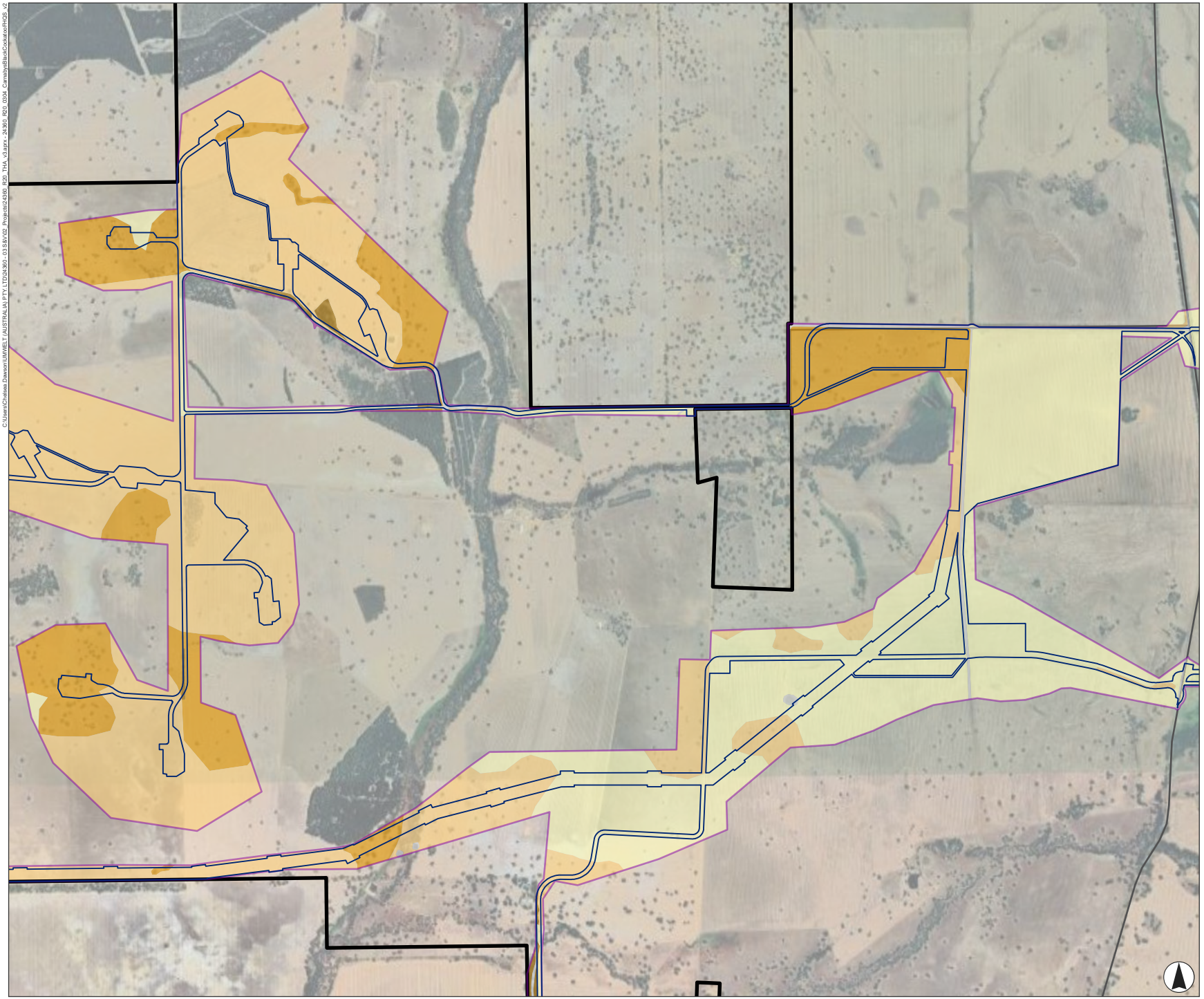


FIGURE 3.4.4

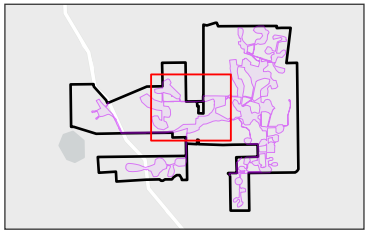
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.4.5

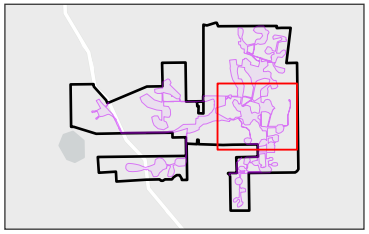
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.4.6

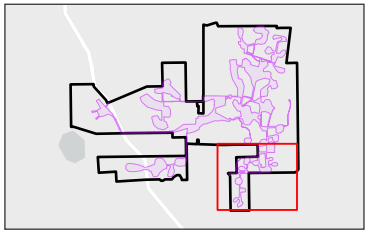
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 7: Moderate to high
- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

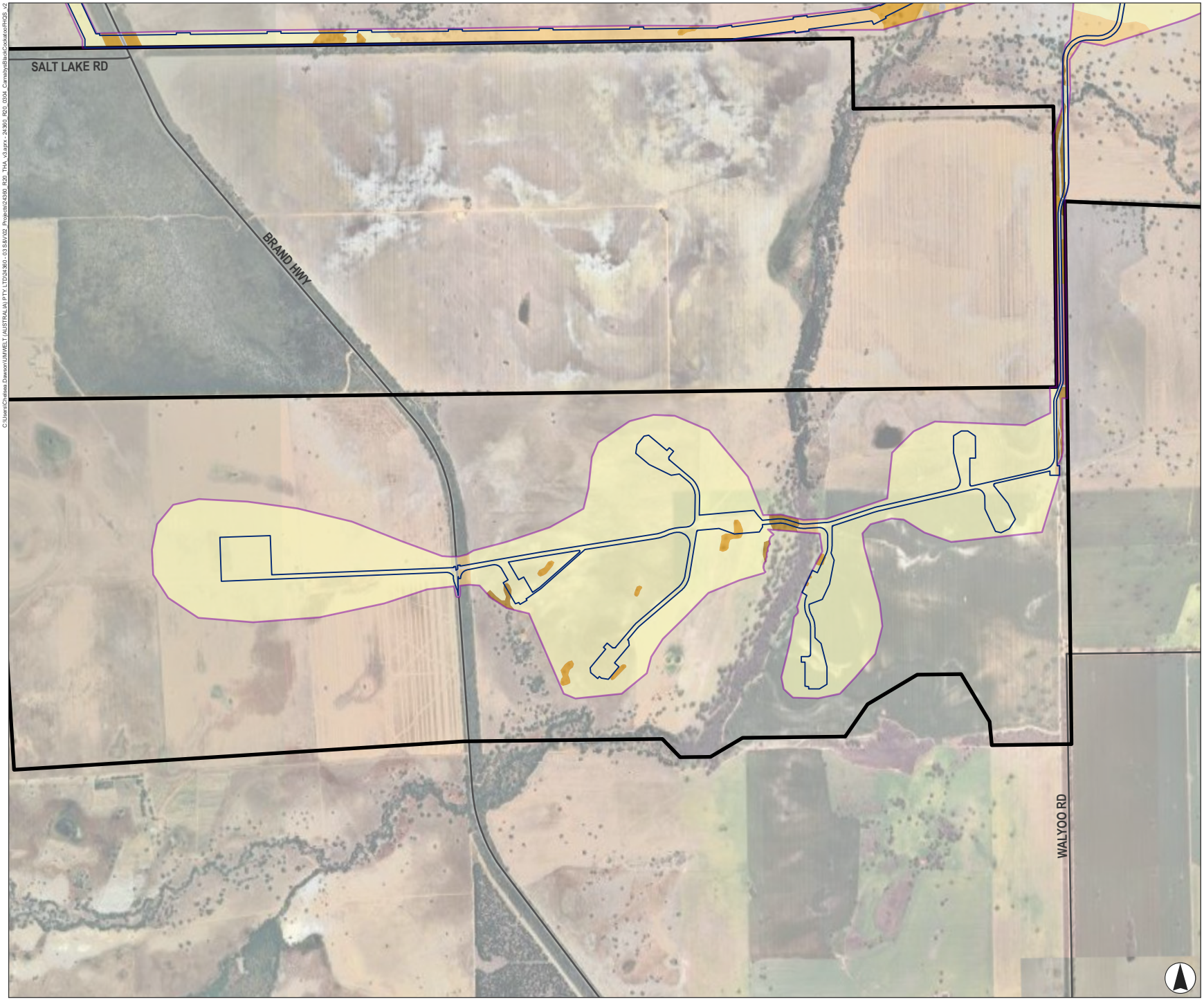


FIGURE 3.4.7

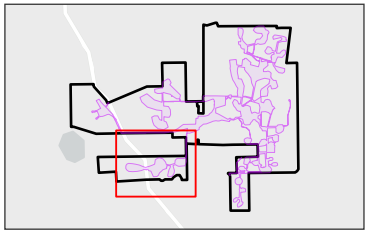
Carnaby's Black-Cockatoo Foraging Habitat Quality Score Mapping

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Foraging Habitat Quality Score

- 7: Moderate to high
- 6: Moderate
- 5: Moderate
- 2: Very Low
- 1: Negligble
- 0: Nil



0 0.5 1

Kilometres

Scale 1:30,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

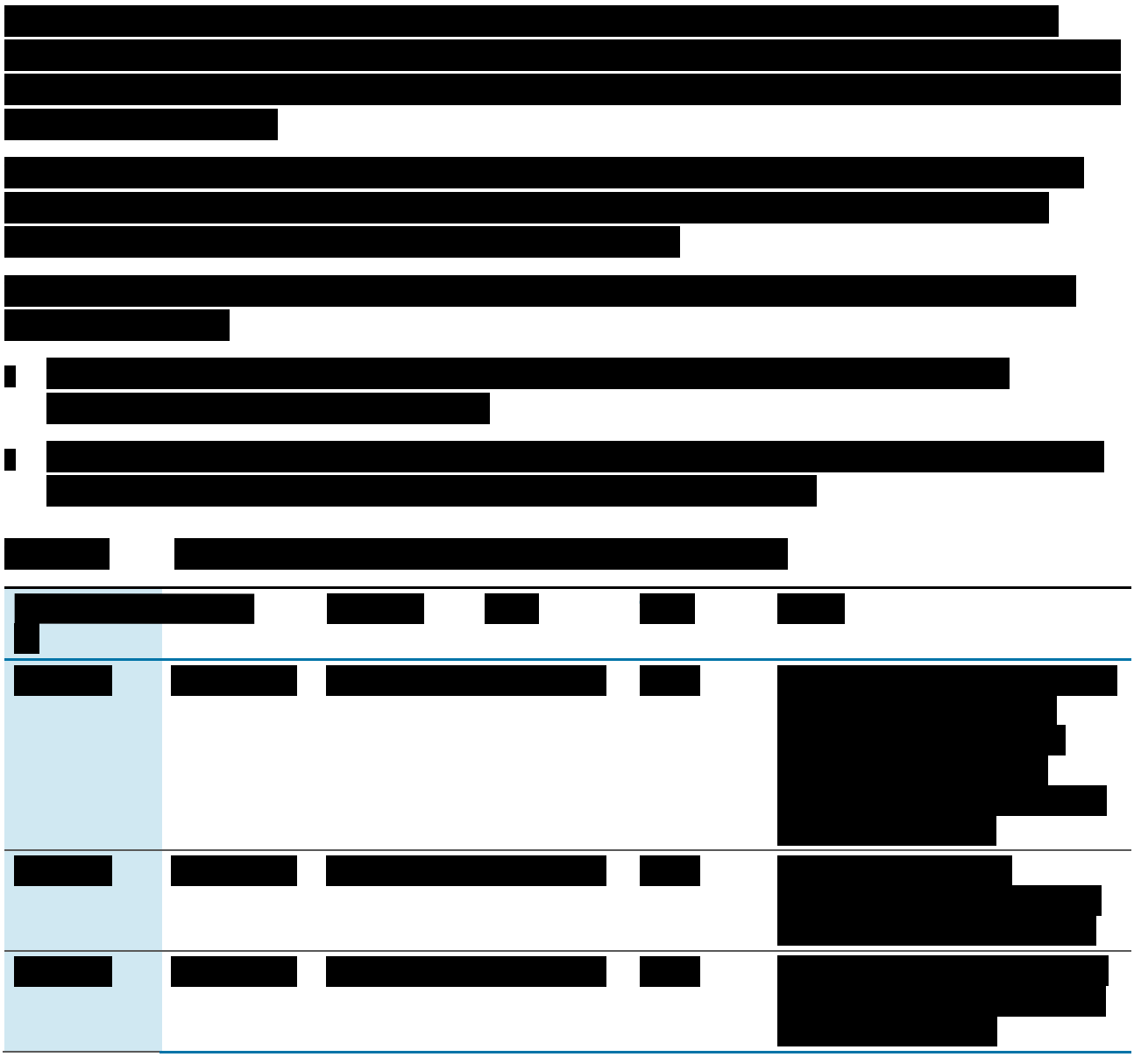
Table 3.2 Site Condition, Site Context, Density and overall Foraging Habitat Quality Scores for Forest Red-tailed Black-Cockatoo and Carnaby's Black-Cockatoo within the Development Corridor

	Forest Red-tailed Black-Cockatoo		Carnaby's Black-Cockatoo	
Vegetation Score	**Area (ha)**	**%**	**Area (ha)**	**%**
6: High	0	0	0	0
5: Moderate to High	1.44	0	8.93	0.3
4: Moderate	34.96	1.0	27.68	0.8
3: Low to Moderate	202.85	5.9	211.18	6.1
2: Low	821.41	23.9	848.61	24.6
1: Negligible	77.49	2.3	2314.32	67.2
0: Nil	2301.25	66.8	28.67	0.8
Unassessed	3.49	0.1	3.49	0.1
Total	**3442.89**	**100**	**3442.88**	**100**
Context Score	0 (where VS ≤ 2)		0 (where VS ≤ 2)	
	1 (where VS ≥ 3)		1 (where VS ≥ 3)	
Species Density Score	0 (where VS ≤ 2)		0 (where VS ≤ 2)	
	1 (where VS ≥ 3)		1 (where VS ≥ 3)	
Foraging Score	**Area (ha)**	**%**	**Area (ha)**	**%**
10: Pristine	0	0	0	0
9: Very high	0	0	0	0
8: High	0	0	0	0
7: Moderate to High	1.44	0	8.93	0.3
6: Moderate	34.96	1.0	27.68	0.8
5: Moderate	202.85	5.9	211.18	6.1
4: Low to Moderate	0	0	0	0
3: Low	0	0	0	0
2: Very low	821.41	23.9	848.61	24.6
1: Negligible	77.49	2.3	2314.32	67.2
0: Nil	2301.25	66.8	28.67	0.8
Unassessed	3.49	0.1	3.49	0.1
Total	**3442.89**	**100**	**3442.89**	**100**

3.2.2.2 Foraging Evidence

Evidence of foraging by both Forest Red-tailed Black-Cockatoo and Carnaby's Black-Cockatoo has been located within, and adjacent to, the Project Area and this demonstrates that both taxa make use of food resources within the general area. Forest Red-tailed Black-Cockatoo foraging signs were wholly Marri debris and were generally restricted to the southern edge of the Project Area (the south-western corner, in particular). Foraging signs were mostly of a single 'age' (see **Table 2.3**) which suggests that this taxon has only used the site intermittently for feeding. Contrastingly, evidence of foraging by Carnaby's Black-Cockatoo was from a range of species (including native species such *Banksia* trees and shrubs, Marri and Coastal Blackbutt, and also planted pines) and a range of ages that indicates that this taxon has a history of foraging within the Project Area and surrounds. While the Carnaby's Black-Cockatoo foraging appears to be more widespread than the Forest Red-tailed Black-Cockatoo, it is certainly concentrated on the coastal plain in the west where Banksia woodlands and pine plantations are more prevalent.

3.2.3 Night-roosting Habitat



[redacted]

FIGURE 3.5

Carnaby's Black-Cockatoo Night-roost Observation Locations

Legend

- Carnaby's Black-Cockatoo Night Roost Observation Location
- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Nature Reserve
- Directory of Nationally Important Wetlands

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

FIGURE 3.6

Known Carnaby's Black-Cockatoo Night-roost Locations within the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Nature Reserve
- Directory of Nationally Important Wetlands
- Known Night Roost Locations

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

3.3 Migratory Shorebird and Blue-billed Duck Habitat Assessment and Surveys

3.3.1 Expected Migratory Shorebird Taxa

Previous desktop assessment has identified thirty-six taxa of migratory shorebird that may occur in the broader region (i.e. surrounding the Project Area) with ten of these either known to occur or considered to have a moderate or higher likelihood to occur within the Project Area (see Umwelt, 2025d for details). Those taxa are:

Family Charadriidae

1. Pacific Golden Plover (*Pluvialis fulva*).

Family Scolopacidae

2. Black-tailed Godwit (*Limosa limosa*)
3. Common Greenshank (*Tringa nebularia*)
4. Wood Sandpiper (*Tringa glareola*)
5. Common Sandpiper (*Actitis hypoleucos*)
6. Ruff (*Calidris pugnax*)
7. Curlew Sandpiper (*Calidris ferruginea*)
8. Sharp-tailed Sandpiper (*Calidris acuminata*)
9. Red-necked Stint (*Calidris ruficollis*)
10. Long-toed Stint (*Calidris subminuta*).

Four of the above taxa (Black-tailed Godwit, Common Greenshank, Curlew Sandpiper and Sharp-tailed Sandpiper) are also listed as Threatened under the EPBC Act and/or BC Acts (Umwelt, 2025e). In addition, one taxon of migratory waterbird (that is not within a family considered to be 'shorebirds', *sensu stricto*) is expected to occur with a moderate or higher likelihood in the Project Area:

Family Threskiornithidae

11. Glossy Ibis (*Plegadis falcinellus*)

The ibis has a similar ecology and habitat requirements to many 'shorebirds' and, thus, is assessed alongside the true shorebirds in this report.

3.3.1.1 Feeding ecology

Shorebird feeding ecology can be grouped into three broad categories that reflect preferred habitat:

1. Coastal Mudflat and Estuarine Specialists. These taxa prefer intertidal mudflats and sandflats along estuaries, bays, coastal lagoons and tidal shores where they feed mainly on benthic invertebrates (worms, molluscs) by deep probing or surface pecking in soft sediments.

2. Freshwater Wetland Foragers. These taxa prefer inland wetlands, floodplains, and shallow freshwater lakes where they probe or pick for aquatic invertebrates and small crustaceans in soft mud or shallow water.
3. Grassland/Open Area Foragers. These taxa prefer open grassy plains or dry mudflats, often away from water where they use visual cues to pick insects and other terrestrial invertebrates from the substrate surface.

The associations for each of the eleven higher-likelihood migratory shorebird/waterbird taxa are shown in **Table 3.4**. While not always the first-preferred habitat, the Project Area provides at least some suitable foraging opportunities for all of the highlighted taxa. While many shorebird taxa may be adaptable (at least occasionally) and use habitats outside of their core preference (even temporarily), it is the presence of prey species (driven by habitat) and accessibility (e.g. through appropriate water levels) that usually dictate the suitability of a site for shorebirds. Any factors that influence these, such as the water pH, salinity of the water, water discharge and/or groundwater drawdown are also likely to impact on the species composition (and abundance) of a site. This may be especially true for species that have a strong preference for freshwater in the region (e.g. Black-tailed Godwit, Common Greenshank, Wood Sandpiper and Sharp-tailed Sandpiper).

Table 3.4 Shorebird Foraging Ecology Group Associations for the Taxa Most Likely to Occur within the Project Area

Species	Coastal Mudflat and Estuarine Specialists	Freshwater Wetland Foragers	Grassland/Open Area Foragers
Pacific Golden Plover	++	++	+++
Black-tailed Godwit	+	+++	
Common Greenshank	+++	+++	
Wood Sandpiper		+++	
Common Sandpiper	+++	++	
Ruff	++	+++	+
Curlew Sandpiper	+++	++	
Sharp-tailed Sandpiper	+++	++	
Red-necked Stint	+++	++	
Long-toed Stint	++	+++	
Glossy Ibis	+	+++	+

3.3.2 Blue-billed Duck

The Blue-billed Duck is a highly aquatic deep-diving taxon that generally prefers large, permanent, freshwater to mildly saline wetlands with deep water and, often, dense aquatic vegetation. It may also use artificial wetlands (including sewage ponds) with suitable water depth and quality. Blue-billed Ducks feed on aquatic invertebrates and vegetation, predominantly collected by diving.

The Blue-billed Duck has been recorded within the Project Area and is ranked as a Priority 2 (poorly-known species) taxon by DBCA (but is not presently listed under the EPBC Act and/or BC Act).

3.3.3 Habitat Assessment

A total of 76 wetlands that have been recognised by DBCA (2025) occur within the Project Area and these fall into the following Semeniuk and Semeniuk (1995) geomorphic wetland categories: three lakes, 43 sumplands, 21 damplands, one floodplain, four palusplains and four paluslopes. One sumpland that was not mapped by DBCA (2025) also occurs within the Project Area (in the chain of wetlands adjacent to Yangy Lake) and this has been included in the habitat assessment here. A map of the wetlands within the Project Area boundary is provided in **Figure 3.7**.

Field observations (of wetland features and waterbird presence), database searches (conducted during desktop assessment) and the wetland characteristics provided by DBCA (2025) were used in conjunction with the group- or taxon-specific information (summarised in Sections >>>3.3.1 and 3.3.2<<<) to assess the likelihood of each of the 77 wetlands within the Project Area to support one or more of the eleven migratory shorebird/waterbird taxa. Migratory shorebirds/waterbirds are known or considered likely to occur at four of the Project Area wetlands (two lakes and two sumplands), as summarised in **Table 3.5** and mapped in **Figure 3.8**. Three of these sites are located adjacent to one another in the west of the Project Area, with the remaining site, Lake Yangy, in the east. Shorebirds are not reasonably expected at the vast majority of geomorphic wetlands (68 of the 77 were considered 'unlikely' to support these taxa) primarily due to a lack of suitable habitat (surface water, mudflats etc.). The remaining five wetlands ('possible') may occasionally provide suitable habitat for this group of taxa (as seasonal or interannual conditions change).

Table 3.5 Expected Occurrence of Migratory Shorebirds/Waterbirds at Wetlands Within the Project Area

Geomorphic Wetland Type	Likelihood of Supporting Migrant Shorebirds/Waterbirds				
	Known	Likely	Possible	Unlikely	Total
Lake	1	1		1	**3**
Sumpland	1	1	4	38	**44**
Dampland			1	20	**21**
Floodplain				1	**1**
Palusplain				4	**4**
Paluslope				4	**4**
Total	**2**	**2**	**5**	**68**	**77**

The Blue-billed Duck is known or considered likely to occur at four of the Project Area wetlands (two lakes and two sumplands), as summarised in **Table 3.6** and mapped in **Figure 3.9**. Two of these sites are located in the west of the Project Area, and two, in the Lake Yangy chain, are in the east. Blue-billed Ducks are not reasonably expected at the vast majority of geomorphic wetlands (69 of the 77 were considered 'unlikely' to support these taxa) primarily due to a lack of suitable habitat (deep water). The remaining four wetlands ('possible') may occasionally provide suitable habitat for this taxon (as seasonal or interannual conditions change).

Table 3.6 Expected Occurrence of Blue-billed Duck at Wetlands Within the Project Area

Geomorphic Wetland Type	Likelihood of Supporting Blue-billed Duck				
	Known	Likely	Possible	Unlikely	Total
Lake	2			1	**3**
Sumpland		2	4	38	**44**
Dampland				21	**21**
Floodplain				1	**1**
Palusplain				4	**4**
Paluslope				4	**4**
Total	**2**	**2**	**4**	**69**	**77**

3.3.4 Waterbird Surveys

The results of the June 2025 wetland waterbird surveys are presented in **Table 3.7**. No migrant shorebirds were recorded within the Project Area during this survey. It is noted however that the survey falls within their breeding season and, hence numbers in Australia (the non-breeding destination) are expected to be very low at this time. It is not expected that the wetlands of the Project Area will be important over-wintering sites for these individuals. The numbers of waterfowl, otherwise, on these wetlands also appeared to be less than some previous counts and may reflect birds dispersing to more seasonal locations following the onset of winter rainfall.

A brief description of the four surveyed wetlands is provided below, with their locations shown in **Figure 2.3**:

i. **WE-C2; large unnamed lake in the west of the Project Area.** The largest wetland within the Project Area appears to be permanently flooded with broad areas of adjacent flooded grassland in winter and broad areas of exposed mudflats in the summer. Fringed by extensive beds of rushes and has numerous dead stag trees across much of its area. Deep-diving ducks have been noted so water-depth in the centre of the lake must be appreciable but it also offers plenty of shallow water opportunities. Cattle appear to have access to the lake. It is expected that this wetland will support the greatest diversity of waterbirds, generally, and that will provide the greatest opportunity for migrant shorebirds.

ii. **WE-02; Lake Yangy in the mid-east of the Project Area.** The second-largest open-water wetland in the Project Area. Generally barren with bare edges; entire shoreline is unvegetated. Substrate appears to be harder-pan than (i). Water permanency uncertain. Appears to be shallower throughout. It may provide suitable foraging habitat for migrant waders but the exposed nature of the lake may limit some species.

iii. **WE-C1; Smaller sumpland to the north-west of (i).** Seasonally flooded with large areas of (live) *Melaleuca* sp. trees. Clay base. Areas of flooded grass and rushes. Likely to offer a range of microhabitats for shorebirds but probably less suited to those species that prefer open, exposed areas. Extensively and regularly impacted by cattle.

iv. **WE-01; Sumpland on Yandin Road in the north of Project Area.** Smaller but likely to be permanently (or near-permanently) flooded. Dead stag trees and water-level branches are dense across much of its area. Some fringing grasses, rushes and *Melaleuca* sp. trees but also muddy shorelines present. Somewhat secluded. Stock appear to be restricted (fenced). This may be very well suited to some of the migrant waders that strongly prefer freshwater environments.

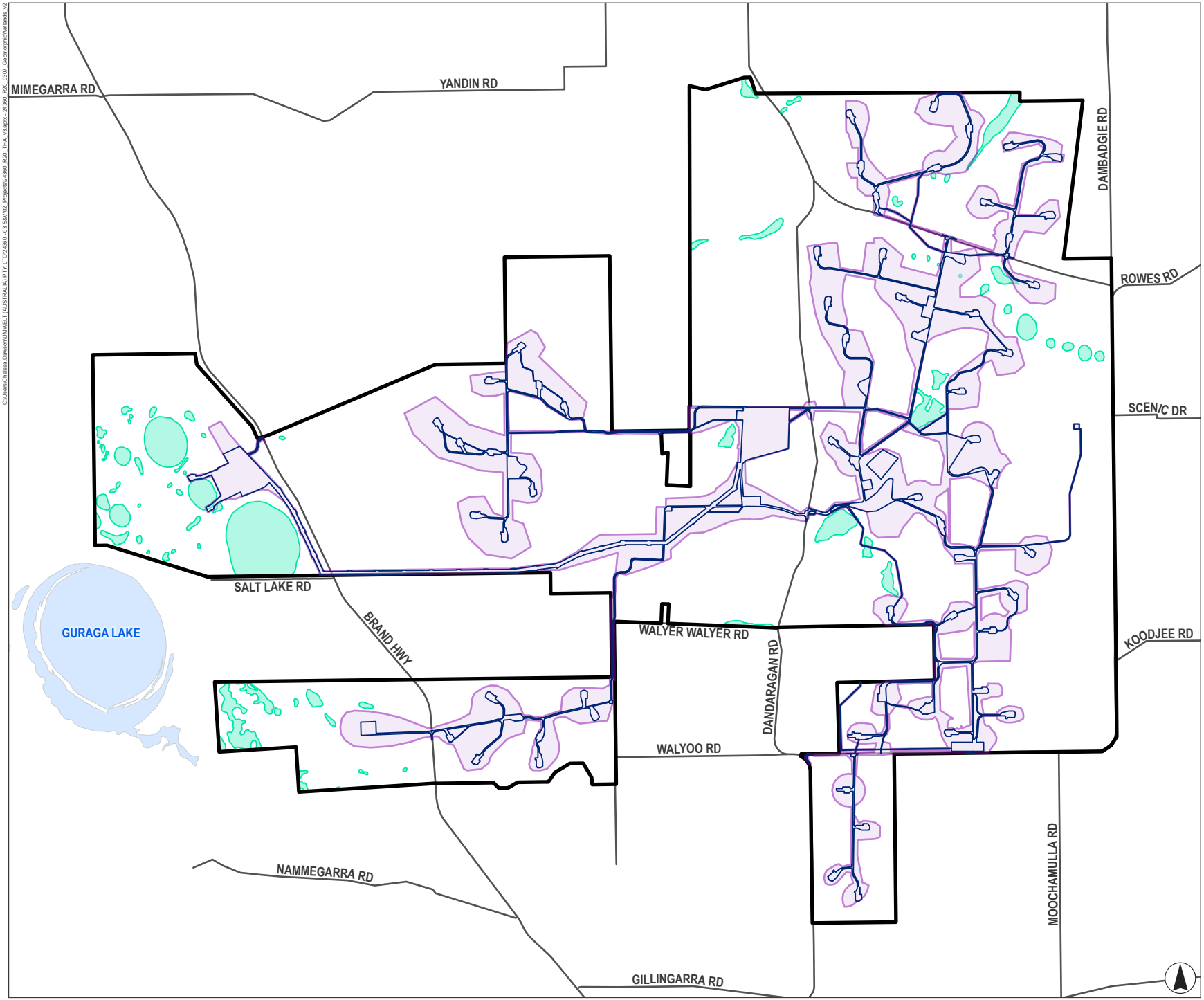


FIGURE 3.7

Geomorphic Wetlands Within the Project Area Boundary

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Directory of Nationally Important Wetlands
- Nature Reserve
- Geomorphic Wetlands

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.8

Expected Occurrence of Migratory Shorebirds/ Waterbirds at Wetlands Within the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Migratory Shorebird Suitability

- Known
- Likely
- Possible
- Unlikely

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

FIGURE 3.9

Expected Occurrence of Blue-billed Duck at Wetlands Within the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Blue-billed Duck Suitability

- Known
- Likely
- Possible
- Unlikely

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

Table 3.7 Wetland Bird Survey Results (Total Individuals)

Family	Scientific Name	Common Name	WE-C2	WE-02 (Lake Yangy)	WE-01 (Yandin Road)
Anatidae	*Cygnus atratus*	Black Swan	13		2
	Tadorna tadornoides	Australian Shelduck (Mountain Duck)	68	24	6
	Malacorhynchus membranaceus	Pink-eared Duck	7	147	
	Spatula rhynchotis	Australasian Shoveler	23	5	2
	Anas gracilis	Grey Teal	30	52	23
	Aythya australis	Hardhead			7
	Biziura lobata	Musk Duck	7		
Rallidae	*Fulica atra*	Eurasian Coot			6
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe (Black-throated Grebe)			13
	Poliocephalus poliocephalus	Hoary-headed Grebe		6	2
	Tachybaptus/Poliocephalus sp.	Unidentified small grebe	3		
Recurvirostridae	*Himantopus himantopus leucocephalus*	Pied Stilt (White-headed Stilt)	18	10	
	Recurvirostra novaehollandiae	Red-necked Avocet	4	11	
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover		3	
	Elseyornis melanops	Black-fronted Dotterel	2	6	2
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull	15		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	28		
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	1		

Family	Scientific Name	Common Name	WE-C2	WE-02 (Lake Yangy)	WE-01 (Yandin Road)
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	Present (1)		
	Haliastur sphenurus	Whistling Kite	Present		
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra			Present (2)
Falconidae	*Falco cenchroides*	Australian Kestrel (Nankeen Kestrel)	Present (1)	Present (1)	
Cacatuidae	*Eolophus roseicapilla*	Galah			Present (2)
	Cacatua sanguinea	Little Corella			Present
	Cacatua sp.	Unidentified corella		Present	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		Present	Present (17)
Maluridae	*Malurus splendens*	Splendid Fairywren			Present (3)
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	Present		
	Gavicalis virescens	Singing Honeyeater	Present		
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	Present		
	Rhipidura albiscapa	Grey Fantail	Present		
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow	Present	Present	
	Hirundo neoxena	Welcome Swallow	Present		
	Petrochelidon nigricans	Tree Martin	Present (300)	Present (30)	
Locustellidae	*Poodytes gramineus*	Little Grassbird	Present		
Motacillidae	*Anthus australis*	Australian Pipit	Present		
		Total Waterbirds	**219**	**264**	**63**

Note that no birds were recorded on wetland WE-C1 during the June 2025 survey.

4.0 Conclusion

The targeted fauna habitat assessment for the Yathroo Wind Farm focused on two groups of species that are either known from, or deemed most likely to occur, within the Project Area and that fall under at least one of the Matters of National Environmental Significance (MNES) categories within the EPBC Act:

- Black-Cockatoos – listed threatened species. Initially the investigations solely focussed on Carnaby's Black-Cockatoo (Endangered under both the EPBC Act and also the Western Australian BC Act) which was previously recorded in surveys for the Project within the Project Area but, unexpectedly, a red-tailed Black-Cockatoo taxon was also observed during the initial field assessments. This is likely to be the listed Forest Red-tailed Black-Cockatoo (Vulnerable under the EPBC and BC Acts).
- Migratory shorebirds – listed migratory species (and in some cases may also be listed threatened species). This includes a migratory waterbird, the Glossy Ibis, that is assessed along with the true shorebirds.

Additionally, one species ranked as a priority species by DBCA was also assessed in these investigations:

- Blue-billed Duck - ranked as a Priority 2 (poorly-known species).

Black-Cockatoo breeding habitat was present within the Development Corridor (and the Disturbance Footprint within this) and is largely attributed to the presence of large, hollow-bearing Marri trees. These trees are favoured nest-tree species within the Jarrah forest (further to the south of the Project Area), with white-barked eucalypts (e.g. Wandoo) providing nest-hollows in the north (particularly for Carnaby's Black-Cockatoo). These white-barked species were limited in presence within the Development Corridor.

No active Black-Cockatoo nests were located. Five trees within the Disturbance Footprint were found to presently have hollow-entrances that were of suitable size, height and orientation to support Black-Cockatoo breeding. None had indications that they may have been used by Black-Cockatoos (chew marks around the entrance). Further inspection of these trees, including observation during breeding season or inspection with pole-camera or drone may provide additional certainty as to their breeding value.

While not yet confirmed, breeding by Black-Cockatoos within the Project Area is possible, and caution should be exercised around areas of high potential Black-Cockatoo breeding habitat (i.e. those trees of Rank 1, 2 or 3 status) to minimise impact to these taxa.

Foraging habitat for Forest Red-tailed Black-Cockatoo was present in the Development Corridor and largely restricted to one key species, Marri, which was present in low density across the site. Foraging habitat for Carnaby's Black-Cockatoo was also present in the Development Corridor, with a range of palatable species such as *Banksia* spp., Marri and planted pines recorded. These feed species were patchily distributed within the largely cleared agricultural matrix, The Development Corridor, as whole, was generally of very low value for foraging by Forest Red-tailed Black-Cockatoo and low value for foraging by Carnaby's Black-Cockatoo. Some smaller, isolated areas of higher-quality foraging habitat exist but when viewed in context of the Project Area, the higher-value foraging areas make up a

relatively minor part of the overall agricultural landscape. While the higher quality areas were often physically fragmented from each other this is unlikely to impact their use by (highly mobile) Forest Red-tailed Black-Cockatoos and Carnaby's Black-Cockatoos (that are capable of transiting across the landscape to access preferred areas) and clearing or disturbance to these should be minimised, wherever practicable, to reduce potential impacts to these taxa.

A previously discovered Carnaby's Black-Cockatoo night-roost site was again observed in use by up to 200 Carnaby's Black-Cockatoos in the present survey. Two night-roost locations have been detected in surveys for the Project but neither of these fall within the Development Corridor.

Carnaby's Black-Cockatoo have been previously recorded in the central and eastern parts of the Project Area (i.e. on the Dandaragan Plateau) but none was seen in this area in the June 2025 survey; birds were only recorded in western areas. These observations suggest that Carnaby's Black-Cockatoo activity may be concentrated along the western side of the Project Area, in association with the Banksia Woodlands of the Swan Coastal Plain where there are more extensive food resources (noting that much of these areas fall outside of the Development Corridor assessed here).

The presence of Forest Red-tailed Black-Cockatoos was not expected; the Project Area falls outside of the currently published core distribution of this taxon. They have, however, been recorded during the field investigations but appear to be intermittently present, in low numbers, in the very south of the Project Area.

There are 77 recognised geomorphic wetlands within the Project Area and these were assessed for their potential to support migratory shorebirds/waterbirds and the Blue-billed Duck. The taxa are known or likely to occur at six of the wetlands, with two wetlands in common (suited to both migratory shorebirds/waterbirds and Blue-billed Duck) and two additional wetlands for each. Several wetlands may occasionally have conditions suited to support migratory shorebirds/waterbirds and Blue-billed Duck, should seasonal conditions be favourable. The vast majority of wetlands, however, are not expected to support these taxa (68 unsuitable wetlands for migratory shorebirds/waterbirds and 69 for the Blue-billed Duck).

Waterbird counts have been regularly undertaken at least four wetlands (two lakes and two sumplands) within the Project area. No migrant shorebirds were recorded during the June 2025 survey and this suggests that the site does not support a substantial population of these birds in the breeding season (when birds are generally not expected in Australia). As a precautionary and conservative approach, targeted migratory shorebird surveys are being undertaken between September 2025 and March 2026 to gather further information on flight heights, population density and usage of the various wetlands within the Project Area. Outcomes from this monitoring will be used to inform the Project detailed design and the management and mitigation measures in the Project BBAMP. Blue-billed Duck was also not recorded in the June 2025 survey.

Data collected in the targeted assessments here can be used to highlight areas of greatest concern with respect to impacts to Black-Cockatoos (high-quality potential Black-Cockatoo nest-trees, higher quality patches of foraging habitat and roost site locations), migratory shorebirds/waterbirds and the Blue-billed Duck, and these can inform Project design and/or operation accordingly.

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Appendix A

Bamford (2020) Black-Cockatoo Foraging Habitat Quality Score Method

Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos. Revised 5th June 2020

Bamford Consulting Ecologists

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 Federal Department of Agriculture, Water and the Environment (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 but the scoring approach was developed by BCE and includes a fourth (moderation) component.

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.

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; • Open 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.	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*.
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/Mallee of small-fruited species; • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (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 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (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 20-40% projected foliage cover.	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, Carnaby's 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.

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.

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 and 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.

Keighery (1994).

Scott, J. K. and Black, R. (1981). Selective Predation by White-Tailed Black Cockatoos on Fruit of *Banksia attenuata* Containing the Seed-Eating Weevil *Alphitopis nivea*. *Australian Wildlife Research* **8(2)**, 421-430.

Stock, W.D., Finn, H., Parker, J. and Dods, K. (2013). Pine as Fast Food. Foraging Ecology of an Endangered Cockatoo in a Forestry Landscape. PlosOne 8: issue 4.

Appendix B

Summary of Potential Black-Cockatoo Nest-trees Surveyed Within Various Assessment Boundaries

See **Figure 2.1**, **Section 2.1** and **Section 2.3.2.2** for delineation of boundaries.

	Bamford Rank	Marri		Flooded Gum		Coastal Blackbutt		Wandoo		Total	Percentage
		Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead		
Survey Area (All Trees)	1	0	0	0	0	0	0	0	0	***0***	0.0
	2	5	0	2	0	0	0	0	0	***7***	1.1
	3	15	0	7	0	0	0	0	0	***22***	3.6
	4	13	1	13	0	1	0	0	0	***28***	4.6
	5	316	18	185	2	29	0	3	0	***553***	90.7
	Subtotal	349	19	207	2	30	0	3	0	***610***	100.0
	Total	368		209		30		3		***610***	
	Percentage	60.3		34.3		4.9		0.5		***100.0***	
Outside of Development Corridor	1	0	0	0	0	0	0	0	0	***0***	0.0
	2	0	0	1	0	0	0	0	0	***1***	2.0
	3	3	0	0	0	0	0	0	0	***3***	6.0
	4	1	0	2	0	0	0	0	0	***3***	6.0
	5	32	1	10	0	0	0	0	0	***43***	86.0
	Subtotal	36	1	13	0	0	0	0	0	***50***	100.0
	Total	37		13		0		0		***50***	
	Percentage	74.0		26.0		0.0		0.0		***100.0***	
Development Corridor - All Trees	1	0	0	0	0	0	0	0	0	***0***	0.0
	2	5	0	1	0	0	0	0	0	***6***	1.1
	3	12	0	7	0	0	0	0	0	***19***	3.4
	4	12	1	11	0	1	0	0	0	***25***	4.5
	5	284	17	175	2	29	0	3	0	***510***	91.1
	Subtotal	313	18	194	2	30	0	3	0	***560***	100.0
	Total	331		196		30		3		***560***	
	Percentage	59.1		35.0		5.4		0.5		***100.0***	
Development Corridor – Complete Survey	1	0	0	0	0	0	0	0	0	***0***	0.0
	2	5	0	1	0	0	0	0	0	***6***	1.2
	3	9	0	7	0	0	0	0	0	***16***	3.1
	4	10	1	11	0	1	0	0	0	***23***	4.4
	5	250	16	175	2	29	0	3	0	***475***	91.3
	Subtotal	274	17	194	2	30	0	3	0	***520***	100.0
	Total	291		196		30		3		***520***	
	Percentage	56.0		37.7		5.8		0.6		***100.0***	
Development Corridor – Partial Survey	1	0	0	0	0	0	0	0	0	***0***	0.0
	2	0	0	0	0	0	0	0	0	***0***	0.0
	3	3	0	0	0	0	0	0	0	***3***	7.5
	4	2	0	0	0	0	0	0	0	***2***	5.0
	5	34	1	0	0	0	0	0	0	***35***	87.5
	Subtotal	39	1	0	0	0	0	0	0	***40***	100.0
	Total	40		0		0		0		***40***	
	Percentage	100.0		0.0		0.0		0.0		***100.0***	

Appendix C

FHQS Scores for Re-evaluated Fauna Habitat Type

Forest Red-tailed Black Cockatoo Re-evaluated Fauna Habitat Type (RFHT)	Area (ha)	Percentage	Site Condition (out of 6)	Context (out of 3)	Density (out of 1)	Foraging Habitat Quality Score
Banksia woodland	1.01	0.0	0	0	0	0
Cleared	27.62	0.8	0	0	0	0
Corymbia calophylla woodland	39.43	1.1	3 to 5	1	1	5 to 7
Dams	1.04	0.0	0	0	0	0
Dampland	0.97	0.0	0	0	0	0
Drainage with *Eucalyptus rudis*	14.48	0.4	0	0	0	0
Eucalyptus loxophleba woodland	4.70	0.1	0	0	0	0
Grasses	0.77	0.0	0	0	0	0
Grasses with scattered shrubs and trees	1.80	0.1	0 to 2	0	0	0 to 2
Paddocks	2025.40	58.8	0	0	0	0
Paddocks with *Corymbia calophylla* and *Eucalyptus rudis*	33.48	1.0	2	0	0	2
Paddocks with *Corymbia calophylla*	199.82	5.8	3 to 4	1	1	5 to 6
Paddocks with scattered *Corymbia calophylla* and *Eucalyptus todtiana*	5.58	0.2	2	0	0	2
Paddocks with scattered *Corymbia calophylla*	855.99	24.9	1 to 2	0	0	1 to 2
Paddocks with scattered *Eucalyptus rudis*	4.40	0.1	0	0	0	0
Paddocks with scattered *Eucalyptus todtiana*	198.73	5.8	0	0	0	0
Pine plantation	5.86	0.2	0	0	0	0
Planted	13.37	0.4	0 to 2	0	0	0 to 2
Shrubland	4.94	0.1	0 to 1	0	0	0 to 1
Unassessed	3.49	0.1	NA	NA	NA	NA
Total	**3442.89**	**100**	**Rounded weighted overall FHQS:**			**1**

Carnaby's Black Cockatoo Re-evaluated Fauna Habitat Type (RFHT)	Area (ha)	Percentage	Site Condition (out of 6)	Context (out of 3)	Density (out of 1)	Foraging Habitat Quality Score
Banksia woodland	1.01	0.0	3 to 4	1	1	5 to 6
Cleared	27.62	0.8	0	0	0	0
Corymbia calophylla woodland	39.43	1.1	3 to 5	1	1	5 to 7
Dams	1.04	0.0	0	0	0	0
Dampland	0.97	0.0	1	0	0	1
Drainage with *Eucalyptus rudis*	14.48	0.4	1 to 2	0	0	1 to 2
Eucalyptus loxophleba woodland	4.70	0.1	1	0	0	1
Grasses	0.77	0.0	1	0	0	1
Grasses with scattered shrubs and trees	1.80	0.1	1 to 2	0	0	1 to 2
Paddocks	2025.40	58.8	1	0	0	1
Paddocks with *Corymbia calophylla* and *Eucalyptus rudis*	33.48	1.0	2	0	0	2
Paddocks with *Corymbia calophylla*	199.82	5.8	3 to 4	1	1	5 to 6
Paddocks with scattered *Corymbia calophylla* and *Eucalyptus todtiana*	5.58	0.2	2	0	0	2
Paddocks with scattered *Corymbia calophylla*	855.99	24.9	1 to 2	0	0	1 to 2
Paddocks with scattered *Eucalyptus rudis*	4.40	0.1	1	0	0	1
Paddocks with scattered *Eucalyptus todtiana*	198.73	5.8	1	0	0	1
Pine plantation	5.86	0.2	1 to 3	0 to 1	0 to 1	1 to 5
Planted	13.37	0.4	1 to 2	0	0	1 to 2
Shrubland	4.94	0.1	1 to 3	0 to 1	0 to 1	1 to 5
Unassessed	3.49	0.1	NA	NA	NA	NA
Total	**3442.89**	**100**	**Rounded weighted overall FHQS:**			**2**

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