HENLEY BROOK AVENUE EXTENSION – STAGE 3

ENVIRONMENTAL ASSESSMENT

Prepared for:	City of Swan
Report Date:	2 July 2025
Version:	1
Report No.	2025-898

pgv ENVIRONMENTAL

CONTENTS

LIST OF ATTACHMENTS

Tables

Plates

Figures

Appendices

1 INTRODUCTION

1.1 Background

The City of Swan is in the process of extending Henley Brook Avenue south of Gnangara Road. Stages 1 and 2 have either been built, are under construction or have approval for construction. The Stage 3 proposed works will further extend the road to just south of Park Street (Figure 1).

The northern part of the Stage 3 works is within two private properties (Lot 78 Brooklands Drive and Lot 65 Park Street) while the southern part is within an unmade part of the road reserve (Figure 2). A small portion of road reserve at the corner of Henley Street and Georgeff Street is also included in this assessment. The Stage 3 works area is referred to as the 'site' throughout this report.

The Stage 3 works will result in the clearing of some native vegetation. PGV Environmental was commissioned by the City of Swan to undertake an environmental assessment to support an application for a clearing permit to the Department of Water and Environmental Regulation (DWER).

1.2 Scope of Works

The following scope of work was undertaken for the Environmental Assessment:

Native Vegetation

- Identify and map the location of native vegetation along the alignment;

Basic Fauna Survey

- A search of the DBCA Databases for the general area for Threatened and Priority Species;
- A search of Atlas of Living Australia occurrence records for Conservation Significant Fauna;
- A search of the Commonwealth Government's Protected Matters Search Tool to identify species potentially occurring within the area that are protected under the EPBC Act or international migratory bird agreements (JAMBA/CAMBA);
- A review of studies previously undertaken in the vicinity of the site;
- A description of the fauna habitats present on the site from a field survey (to be undertaken at the same time as the Flora and Vegetation survey); and
- An assessment of the significance of the site for conservation significant species in a local and regional context.

Black Cockatoo Habitat

- Map and quantify the extent and quality of foraging habitat for Carnaby's and Forest Red-tailed Black Cockatoos;
- Record any evidence of foraging;
- Assess the foraging quality;
- Identify all suitable breeding habitat trees for Black Cockatoos;
- Identify any evidence of roosting on the site; and
- Provide advice on the significance of the impact on any Black Cockatoo habitat.

2 EXISTING ENVIRONMENT

2.1 Land Use

The earliest available historical aerial photograph of the site is from 1953 and shows the area contains native vegetation throughout with possibly some clearing at the northern end. Two east-west tracks exist where present day Park Street is (Plate 1). The central road reserve is shown as a reference point.

The 1981 aerial photograph shows that the northern and southern ends of the site have been cleared while some remnant vegetation remains in the central portion (Plate 2).

Plate 1: Aerial Photograph from 1953

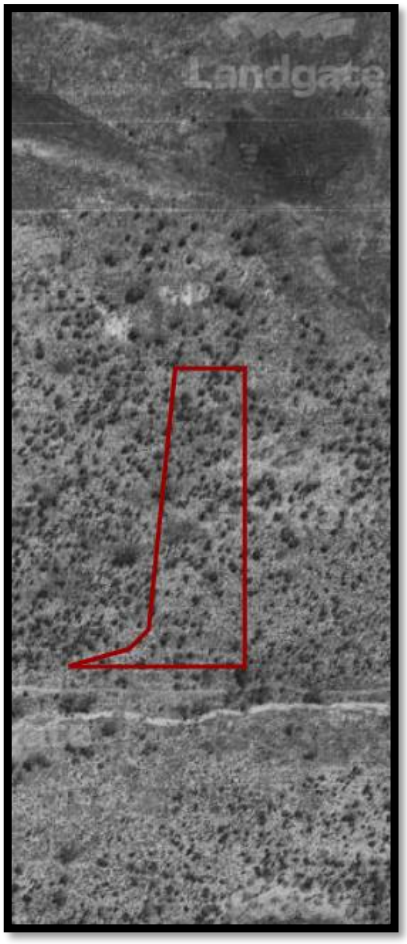

Plate 2: Aerial Photograph from 1981

The 2015 aerial photograph shows a section of road has been constructed at the southern end, linking Park Street to Pannage Way. Remnant trees remain in the central portion (Plate 3). The 2025 aerial photograph shows some regrowth of vegetation in the portion south of Park Street (Plate 4).

Plate 3: Aerial Photograph from 2015

Plate 4: Aerial Photograph from 2025

The small triangular part of the survey area at the corner of Henley Street and Georgeff Street was completely cleared in 1970 (Plate 5). Some landscaping of area's boundaries has occurred (Plate 6).

Plate 5: Aerial Photograph from 1970

Plate 6: Aerial Photograph from 2025

2.2 Topography

The site ranges in elevation from 31-37m Australian Height Datum (AHD) with the highest point being just north of Park Street (Figure 2). The small triangular portion of road reserve is at an elevation of around 32m AHD.

2.3 Geomorphology and Soils

The site is mapped on the Bassendean Dune System and consists of very low relief, leached, grey siliceous Pleistocene sand dunes, intervening sandy and clayey swamps and gently undulating plains (Bolland, 1998). These soils are very leached, infertile and mildly acidic (DPIRD, 2023).

The soil phases mapped on the site are:

- Bassendean, Jandakot Phase (212Bs_Ja) which is associated with low, gently sloping dunes on Aeolian sands. The soils are described as grey sand over pale yellow sands generally underlain by humic and iron podzols;
- Bassendean Yanga Phase (Bassendean) Phase (212Bs_Ya) which are located on poorly drained flats on alluvial deposits. The soils are semi-wet soils, yellow-brown shallow sands and grey deep sandy duplexes and are usually associated with dense *Melaleuca* scrub; and

2.4 Hydrology

Groundwater is at 27mAHD (DWER, 2023), which is between 4m and 10m below the surface.

A Multiple Use Palusplain is mapped over the northern end of the site (UFI 13396).

2.5 Vegetation

An assessment of the vegetation on the site was undertaken by Dr Paul van der Moezel on 9 April 2025. No areas of intact native vegetation were recorded. A total of 0.37ha of sparsely scattered native vegetation was mapped on the site (Figure 3). A description of each portion of the site follows:

- Small, triangular road reserve

The vegetation within the small, triangular road reserve at the corner of Henley Street and Georgeff Street is all planted WA Peppermint (*Agonis flexuosa*) (Plate 7).

Plate 7: WA Peppermint in small section of road reserve

- Lot 65 Park Street

The portion of Lot 65 Park Street required to construct the road contains four trees. Three of the trees are non-native Rose Gum trees (*Eucalyptus grandis*) and one tree is a native Marri tree (*Corymbia calophylla*).

- Lot 78 Brooklands Drive

All trees and shrubs on Lot 78 are non-native, including Japanese Pepper (*Schinus terebinthifolius*), Rose Gum, Lemon trees and False Bamboo (*Arundo donax*) (Plate 8).

Plate 8: Non-native vegetation on Lot 78

- Road reserve north of Park Street

As identified in the review of historical aerial photograph some remnant native vegetation remains on the portion of road reserve north of Park Street (Figure 3). The vegetation is almost all trees with one small patch of native shrubs. The trees are mostly *Eucalyptus todtiana* and *Banksia menziesii* with a few *Banksia attenuata, B. ilicifolia* and *Nuytsia floribunda* (Plate 9). A few Banksia trees had died recently. The small patch of native shrubs is mostly *Acacia pulchella* with some *Alexgeorgea nitens, Daviesia triflora, Haemodorum spicatum* and *Stirlingia latifolia* (Plate 10).

Plate 9: Native Trees in the Road Reserve north of Park Street

Plate 10: *Acacia pulchella* in the Road Reserve north of Park Street

One *Eucalyptus todtiana* tree and a Woolly Bush shrub occurs within the southern road reserve for Park Street.

- Road reserve south of Park Street

The portion of the road reserve south of Park Street was fully cleared between 1974 and 1977. Some vegetation has regrown over the last 25 years. The regrowth vegetation is mostly native Woolly Bush (*Adenanthos cygnorum*) which is a common native coloniser of bare sandy sites (Plate 11). Other native plants include *Acacia saligna* and one *Banksia attenuata* small tree (Plate 12).

Some native shrubs of *Jacksonia furcellata, Daviesia triflora* and *Scholtzia involucrata* also occur in this area.

Plate 11: Native Woolly Bush in the Road Reserve south of Park Street

Plate 12: *Acacia saligna* and *Banksia attenuata* in the Road Reserve south of Park Street

The vegetation condition on the site was assessed using the system devised by Keighery and described in Bush Forever (Government of Western Australia, 2000) (Table 1). The vegetation on the site is all Completely Degraded.

Table 1: Vegetation Condition Rating Scale

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

Source: Government of Western Australia, 2000.

3 BASIC FAUNA SURVEY

3.1 Methodology

A Basic Fauna Survey was undertaken in accordance with EPA Technical Guidance *Fauna Surveys for Environmental Impact Assessment* (EPA, 2020). Desktop studies were undertaken to identify habitats and potential threatened species that may occur on the site.

Searches of the following databases were undertaken prior to the site survey:

- DBCA Threatened and Priority Fauna Database (Appendix 1) for a radius of 10 km that provides a list of Threatened and Priority species recorded in the area (Reference 23-0425FA);
- Atlas of Living Australia (ALA, 2025) which shows all species that have been recorded within a 10km radius of the site (Appendix 2).
- The EPBC Act Protected Matters Search Tool (DCCEEW, 2025) (Appendix 3) which identifies species that are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that could potentially have habitat within a 5km radius of the site.

A site reconnaissance was conducted by PGV Environmental on 9 April 2025 to describe the fauna habitats on the site. Desktop studies were undertaken to identify habitats and potential threatened species that may occur on the site. The likelihood of the site providing habitat to identified conservation significant fauna species was determined.

3.2 Fauna Habitats

The fauna habitats on the site consist of:

- Open Woodland habitat (Plate 13);
- Shrubland Habitat (Plate 14); and
- Cleared areas (Plate 15).

Plate 13: Open Woodland Habitat

Plate 14: Shrubland Habitat

Plate 15: Cleared Habitat

Fauna habitat can be assessed using a number of factors including, the size of the habitat, the level of habitat connectivity, availability of specific resources (e.g., tree hollows) and overall vegetation quality. The habitat was assessed according to the categories in Table 3.

Table 3: Fauna Habitat Value

Habitat Value	Description
High Quality Fauna Habitat	These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.

Habitat Value	Description
Very Good Fauna Habitat	These areas show minimal signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally affected by disturbance.
Good Fauna Habitat	These areas showed signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.
Disturbed Fauna Habitat	These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.
Highly Degraded Fauna Habitat	These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Faunal assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.

From: Coffey Environments, 2009

The native vegetation on the site is Completely Degraded with little connectivity to surrounding habitats and therefore is considered to be Highly Degraded Fauna Habitat.

3.3 Database Searches for Conservation Significant Fauna Species

Outlined below in Table 4 is a short description of the preferred habitat for each of the species that were identified in the database searches and their preferred habitats. The preferred habitat has been compared to the habitats on the site described above and the likelihood of each species to be present was determined. Species recorded in the database search results that live in the ocean or birds that are marine and pelagic have not been included in the assessment. Conservation codes are in Appendix 4.

In summary, there was habitat on for the following species:

- Carnaby's Black Cockatoo (*Zanda latirostris*), Endangered;
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*), Vulnerable;
- Quenda (*Isoodon fusciventer*), Priority 4; and
- Rainbow Bee-eater (*Merops ornatus*), listed as Marine

Table 4: Identified Significant Fauna Species and Likelihood of Occurring on the Site

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	Critically Endangered	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	Highly Unlikely – not suitable habitat
Calidris tenuirostris	Great Knot	Critically Endangered	Vulnerable/ Marine/ Migratory	The Great Knot winters in Australia, occurring in sheltered coastal habitats such as inlets, bays, harbours, estuaries and lagoons with large intertidal mud and sandflats, oceanic sandy beaches with nearby mudflats, sandy spits and islets, muddy shorelines with mangroves and occasionally exposed reefs or rock platforms. It roosts in refuges such as shallow water in sheltered sites, on coastal dunes or on saltflats amongst mangroves during high tides (BirdLife International, 2015).	Highly Unlikely – not suitable habitat
Cherax tenuimanus	Margaret River Hairy Marron	Critically Endangered	Critically Endangered	The Margaret River Hairy Marron occurs in fresh water in the Margaret River Area.	No – no suitable habitat
Numenius madagascariensis	Eastern Curlew	Critically Endangered	Critically Endangered	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	Highly Unlikely – not suitable habitat
Pseudocheirus occidentalis	Western Ringtail Possum, Ngwayir	Critically Endangered	Critically Endangered	The Western Ringtail Possum is a medium sized nocturnal marsupial. This species occurs in and near coastal Peppermint Tree (*Agonis flexuosa*) forest and Tuart (*Eucalyptus gomphocephala*) dominated forest with a Peppermint Tree understorey.	Highly Unlikely – not suitable habitat
Botaurus poiciloptilus	Australasian bittern	Endangered	Endangered	The Australasian Bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Unlikely – not typical habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Calidris canutus	Red Knot	Endangered	Vulnerable/ Marine/ Migratory	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	Highly Unlikely – not suitable habitat
Charadrius mongolus	Lesser Sand Plover	Endangered	Marine/ Migratory	The Lesser Sand Plover species prefers coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves.	Highly Unlikely – not suitable habitat
Myrmecobius fasciatus	Numbat, Walpurti	Endangered	Endangered	Numbats occur in eucalypt forests and woodlands dominated by *Eucalyptus marginata*, *Corymbia calophylla* and *Eucalyptus wandoo*.	Highly Unlikely – not typical habitat and the surrounding area is too disturbed
Rostratula australis	Australian Painted Snipe	Endangered	Endangered Marine/ Migratory	The Australian Painted Snipe has been recorded at wetlands in all states of Australia but is most common in eastern Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include a cover of vegetation, including grasses.	Highly Unlikely – not suitable habitat
Zanda baudinii	Baudin's Black Cockatoo	Endangered	Endangered	Baudin's Black-Cockatoo mainly occurs in eucalypt forests, especially Jarrah (Eucalyptus marginata), Marri (Corymbia calophylla), also Karri (Eucalyptus diversicolor) forest, often feeding in the understorey on proteaceous trees and shrubs, especially banksias (DAWE, 2022).	Unlikely – Site is too far north for this species to occur

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Zanda latirostris	Carnaby's Black Cockatoo	Endangered	Endangered	Carnaby's Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of Banksia, Hakea, Eucalyptus, Grevillea, Pinus and Allocasuarina spp. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 - 12m above the ground and have an entrance 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell) (DAWE, 2022).	Possible intermittent visitor– habitat occurs on the site
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	Vulnerable	Vulnerable	Forest Red-tailed Black Cockatoos frequent the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (DAWE, 2022). It nests in tree hollows with a depth of 1-5m, that are predominately Marri (Corymbia calophylla), Jarrah (Eucalyptus marginata) and Karri (Eucalyptus diversicolor) and it feeds primarily on the seeds of Marri (DAWE, 2022).	Possible intermittent visitor– habitat occurs on the site
Charadrius leschenaultii	Greater Sand Plover	Vulnerable	Vulnerable/ Marine/ Migratory	In Australasia, the Greater Sand Plover is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons.	Highly Unlikely – not suitable habitat
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable	Vulnerable	The Chuditch have been known to occupy a wide range of habitats including woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. They are opportunistic feeders, and forage on the ground at night, feeding on invertebrates, small mammals, birds and reptiles.	Unlikely due to the large cleared areas surrounding the site and presence of domestic pets
Falco hypoleucos	Grey Falcon	Vulnerable	Vulnerable	The Grey Falcon favours timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined watercourses, but frequents other grassland and woodland habitats (Birdlife International, 2014).	Highly Unlikely – not suitable habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Leipoa ocellata	Mallee Fowl	Vulnerable	Vulnerable	Mallee fowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards in mallee bushland.	No – not mallee habitat
Setonix brachyurus	Quokka	Vulnerable	Vulnerable	Quokkas were originally very common on the Swan Coastal Plain, however, their distribution is now limited to Rottnest Island and a few isolated areas in the south-west of WA. On the mainland, they prefer densely vegetated areas around wetlands and streams, whereas on Rottnest Island they inhabit low scrubby coastal vegetation where water is not readily available year-round.	Highly Unlikely – species is though to be locally extinct
Sternula nereis nereis	Australian Fairy Tern	Vulnerable	Vulnerable	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	Highly Unlikely – not suitable habitat
Westralunio carteri	Carter's Freshwater Mussel	Vulnerable	Vulnerable	Carter's Feshwater Mussel is South-West Western Australia's only freshwater mussel (Murdoch University & SERCUL, 2012). Carter's Freshwater Mussel occurs in freshwater streams, rivers, reservoirs and lakes (ICUN, 2015b) and is intolerant to dehydration for more than three days and salinity (Murdoch University & SERCUL, 2012).	No - no suitable habitat
Actitis hypoleucos	Common Sandpiper	Migratory	Marine/ Migratory	The Common Sandpiper is mostly found around muddy margins or rocky shores. Generally the species forages in shallow water and on bare soft mud at the edges of wetlands.	Highly Unlikely – not suitable habitat
Arenaria interpres	Ruddy Turnstone	Migratory	Vulnerable/ Marine/ Migratory	The Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches.	Highly Unlikely – not suitable habitat
Calidris acuminata	Sharp-tailed Sandpiper	Migratory	Vulnerable/ Marine/ Migratory	The Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Unlikely – not typical habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Calidris alba	Sanderling	Migratory	Marine/ Migratory	Sanderlings occur on most of the coast from Eyre to Derby, and also around Wyndham. They are more often recorded on the south and southwest coasts, north to around southern Shark Bay, with more sparsely scattered records further north in Gascoyne and Pilbara Regions and the Kimberley Division.	Highly Unlikely – not suitable habitat
Calidris melanotos	Pectoral Sandpiper	Migratory	Marine/ Migratory	The Pectoral Sandpiper prefers shallow fresh to saline wetlands and is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely – not typical habitat
Calidris pugnax (Listed as *Philomachus pugnax* unde rthe EPBC Act)	Ruff	Migratory	Marine/ Migratory	The Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges and is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands.	Unlikely – not typical habitat
Calidris ruficollis	Red-necked Stint	Migratory	Marine/ Migratory	The Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores.	Highly Unlikely – not suitable habitat
Calidris subminuta	Long-toed Stint	Migratory	Marine/ Migratory	The Long-toed Stint prefers shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire.	Unlikely – not typical habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Gallinago megala	Swinhoe's Snipe	Migratory	Marine/ Migratory	Habitat for Swinhoe's Snipe specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes.	Unlikely – not typical habitat
Hydroprogne caspia (Listed as Marine under the EPBC Act as Sterna caspia)	Caspian Tern	Migratory	Marine/ Migratory	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred.	Highly Unlikely – not suitable habitat
Limosa lapponica	Bar-tailed Godwit	Migratory	Marine/ Migratory	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	Highly Unlikely – not suitable habitat
Limosa limosa	Black-tailed Godwit	Migratory	Endangered/ Migratory/ Marine	The Black-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	Highly Unlikely – not suitable habitat
Numenius phaeopus	Whimbrel	Migratory	Marine/ Migratory	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, un-vegetated mudflats.	Highly Unlikely – not suitable habitat
Pandion haliaetus	Osprey	Migratory	Marine/ Migratory	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They feed on fish, especially mullet where available, and rarely take molluscs, crustaceans, insects, reptiles, birds and mammals.	Highly Unlikely – not suitable habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Plegadis falcinellus	Glossy Ibis	Migratory	Marine/Migratory	The Glossy Ibis is the smallest ibis known in Australia. This species preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation but do not breed in South-west Western Australia.	Highly Unlikely – not suitable habitat
Pluvialis fulva	Pacific Golden Plover	Migratory	Marine/ Migratory	Pacific Golden Plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in salt works.	Highly Unlikely – not suitable habitat
Pluvialis squatarola	Grey Plover	Migratory	Vulnerable/ Marine/ Migratory	Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons.	Highly Unlikely – not suitable habitat
Thalasseus bergii (Sterna bergii)	Crested Tern	Migratory	Marine/ Migratory	The Crested Tern occurs in coastal areas and forages in the shallow waters of lagoons, coral reefs, estuaries, bays, harbours and inlets, along sandy, rocky, coral or muddy shores, on rocky outcrops in open sea, in mangrove swamps and also far out to sea on open water and prefers to nest offshore (Birdlife Australia, 2018).	Highly Unlikely – not suitable habitat
Tringa brevipes (Listed as marine under the EPBC Act as *Heteroscelus brevipes*)	Grey-tailed Tattler	Migratory/ Priority 4	Marine/ Migratory	The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide.	Highly Unlikely – not suitable habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Tringa glareola	Wood Sandpiper	Migratory	Marine/ Migratory	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially *Melaleuca* and River Red Gums *Eucalyptus camaldulensis* and often with fallen timber.	Unlikely – not typical habitat
Tringa nebularia	Common Greenshank	Migratory	Endangered/ Marine/ Migratory	The Common Greenshank is a wader and does not breed in Australia. This species can be found in many types of wetlands and has the widest distribution of any shorebird in Australia. This species typically feeds on molluscs, crustaceans, insects, and occasionally fish and frogs.	Unlikely – not typical habitat
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	Migratory	Marine/ Migratory	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks.	Highly Unlikely – not suitable habitat
Xenus cinereus	Terek Sandpiper	Migratory	Vulnerable/ Marine/ Migratory	The Terek Sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire (Halosarcia spp.).	Highly Unlikely – not suitable habitat
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale, Wambenger	Conservation Dependent		Southern Brush-tailed Phascogales are arboreal marsupials which require tree hollows in suitable woodland or forest and rely on abundant invertebrate prey to sustain populations (Pescott, 2012).	Unlikely – the site is too disturbed and impacted by surrounding developemnt

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Falco peregrinus	Peregrine Falcon	Other Specially Protected Species	Marine/ Migratory	The Peregrine Falcon is found in a variety of habitats but nests on high cliff ledges or artificial structures. It feeds primarily on small-medium sized birds, but occasionally taking insects, such as moths, cicadas and locusts (Birdlife Australia, 2012).	Highly Unlikely – not suitable habitat
Ardea alba	Great Egret, White Egret		Marine	The Eastern Great Egret has been reported in a wide range of wetland habitats and usually frequents shallow waters. This species feeds on fish, insects, crustaceans, molluscs, frogs, lizards, snakes and small birds and mammals.	Unlikely – not typical habitat
Bubulcus ibis	Cattle Egret		Marine	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands with breeding in Western Australia recorded in the far north in Wyndham in colonies in wooded swamps such as mangrove forest. This species forages away from water on low lying grasslands, improved pastures and croplands generally in areas that have livestock eating insects, frog, lizards and small mammals.	Highly Unlikely – not suitable habitat
Charadrius ruficapillus	Red-capped Plover		Marine	The Red-capped Plover is found in wetlands, especially in arid areas, and prefers saline and brackish waters (Birdlife Australia, 2014).	Highly Unlikely – not suitable habitat
Egretta sacra	Eastern Reef Egret, Eastern Reef Heron		Marine	The Eastern Reef Egret nests in trees in island woodlands, or on the ground under shrubs or rock ledges and feeds on small fish, crustaceans and insects (Birdlife Australia, 2014).	Highly Unlikely – not suitable habitat
Haliaeetus leucogaster	White-bellied Sea-eagle		Marine	The White-bellied Sea-Eagle is found in coastal habitats with large areas of open water, especially those close to the sea-shore. This species feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal.	Highly Unlikely – not suitable habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Himantopus himantopus	Black-winged Stilt		Marine	The Black-winged Stilt is found near coastal lagoons and shallow freshwater or brackish pools with extensive areas of mudflats, salt meadows, saltpans, coastal marshes and swamps (Birdlife International, 2014).	Highly Unlikely – not suitable habitat
Merops ornatus	Rainbow Bee-eater		Marine	Populations of the Rainbow Bee-eater that breed in northern Australia are considered to be resident, and in many northern localities the Rainbow Bee-eater is present throughout the year. The Rainbow Bee-eater nests in a burrow dug in the ground. It is found across the better-watered parts of WA including islands preferring lightly wooded, sandy country near water.	Possible – habitat may occur on the site
Recurvirostra novaehollandiae	Red-necked Avocet		Marine/ Migratory	The Red-necked Avocet occurs in wetland areas including bogs, marshes, swamps and permanent saline, brackish or alkaline lakes generally preferring saline habitats (BirdsSA, 2025).	Highly Unlikely – not suitable habitat
Geotria australis	Pouched Lamprey	Priority 3		The Pouched Lamprey is spawned in freshwater systems and then migrate to sea before returning to freshwater to spawn and die (OzFishNet, 2014).	No – no suitable habitat
Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	Priority 3		The Swan Coastal Plain Shield-backed Trapdoor Spider arranges fallen twigs from the sheoak tree around the rim of its burrow entrance, enabling it to feel the vibrations of unsuspecting prey that wander by (Curtin, 2018).	Unlikely due to past clearing
Lerista lineata	Perth Slider, Lined Skink	Priority 3		The Lined Skink is a burrowing species that occurs in pale sandy soils with coastal heath and shrubland areas in isolated populations in the south-west and mid-west coast of Western Australia. It feeds on termites and other small insects (AROD, 2014).	Unlikely – habitat too disturbed

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Tyto novaehollandiae novaehollandiae	Masked Owl (Southern)	Priority 3		The Masked Owl inhabits forests, woodlands, timbered waterways and open country on the fringe of these areas with tall trees with suitable hollows for nesting and roosting and adjacent areas for foraging (Birds in Backyards, 2014).	Highly Unlikely – not suitable habitat
Hydromys chrysogaster	Water-rat, Rakali	Priority 4		The Water Rat generally prefers wetland habitats characterised by dense, low-lying vegetation (0–30 cm from ground), low-density canopy cover and shallow, narrow water bodies (Speldewinde *et al*., 2013).	Unlikely – not suitable habitat
Isoodon fusciventer	Southern Brown Bandicoot, Quenda	Priority 4		Southern Brown Bandicoots are small grey marsupials that prefer dense scrub (up to one metre high). Their diet includes invertebrates (including earthworms, adult beetles and their larvae), underground fungi, subterranean plant material, and very occasionally, small vertebrates (DEC, 2012).	Possible – Habitat is open but potentially suitable
Notamacropus irma	Western Brush Wallaby	Priority 4		The Western Brush Wallaby is a medium sized marsupial and its optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets (DEC, 2012).	Unlikely due to surrounding development
Oxyura australis	Blue-billed Duck	Priority 4		The Blue-billed Duck is found on terrestrial wetlands in temperate regions, that are freshwater to saline, and may be natural or artificial. It nests in rushes, sedges, Lignum Muehlenbeckia cunninghamii and paperbark Melaleuca (Birdlife International, 2015). The species is almost completely aquatic, and is seldom seen on land. Non-breeding flocks, often with several hundred individuals, congregate on large, deep open freshwater dams and lakes in autumn. The daylight hours are spent alone in small concealed bays within vegetation or communally in large exposed rafts far from the shore (Birds in Backyards, 2015).	No – no suitable habitat

Scientific Name	Common Name	Conservation Status (WA)	Status under EPBC Act	Habitat*	Likelihood to occur on the site
Charadrius cucullatus (Listed under the EPBC Act as *Thinornis rubricollis*)	Hooded Plover	Priority 4	Marine	The Hooded Plover primarily inhabits sandy, ocean beaches, with the highest densities on beaches with large amounts of beach-washed seaweed that are backed by extensive open dunes. In Western Australia the species also inhabits inland and coastal salt lakes (Birdlife International 2014).	Highly Unlikely – not suitable habitat

* Sourced from the SPRAT Database (DoEE, 2018) unless otherwise indicated

3.4 Impact on Conservation Significant Species

An assessment of the potential impact on Carnaby's and Forest Red-tailed Black Cockatoos is contained in Section 4.

The Priority species Quenda may occur over the site and a preclearing fauna trapping and relocation plan should be required to mitigate the risk of harm to these species during clearing..

The Marine species Rainbow Bee-eater may also be an intermittent visitor to the site but is unlikely to rely on the site for survival and would not be impacted by the proposed development.

3.5 Pest Fauna

There are several pest species that are likely to be present on the site outlined in Table 5.

Table 5: Pest Species Likely to Occur on the Site

Taxa	Family	Species Name	Common Name
Mammalia	Canidae	*Vulpes vulpes*	Red fox
	Felidae	*Felis catus*	Feral cat
	Leporidae	*Oryctolagus cuniculus*	European Rabbit
	Muridae	*Mus musculus*	House Mouse
		Rattus rattus	Black Rat

3.6 Biodiversity Value

The EPA's (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No. 3* indicated an ecological assessment of a site must consider its biodiversity value at the genetic, species and ecosystem levels; and its ecological functional value at the ecosystem level. The vegetation on the site is fragmented with little to no ecological linkage and is disturbed, with the likely presence of feral species such as foxes, cats and rabbits which would have highly modified the fauna assemblage from pre-European settlement.

4 BLACK COCKATOO HABITAT ASSESSMENT

4.1 Carnaby's Black Cockatoo (*Zanda (Calyptorhynchus) latirostris*)

Carnaby's Black Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of *Banksia, Hakea, Eucalyptus, Grevillea, Pinus* and *Allocasuarina* spp. It is nomadic, often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 – 12m above the ground and have an entrance of 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell). Eggs are laid from July to October, with incubation lasting 29 days (DoE, 2014).

The site is inside the boundary of the modelled distribution for Carnaby's Black Cockatoos (DAWE, 2022). The site is shown as being within the buffer of a confirmed roost site but is not within a confirmed breeding area (SLIP, 2025).

4.2 Baudin's Black Cockatoo (*Zanda (Calyptorhynchus) baudinii*)

Baudin's Black Cockatoo is most common in the far south-west of Western Australia. It is known to breed from the southern forests north to Collie and east to near Kojonup. Baudin's Black Cockatoo is typically found in vagrant flocks and utilises the taller, more open Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands where it feeds mainly on Marri seeds and various Proteaceous species (Johnstone, Johnstone and Kirkby, 2011).

The site is outside the modelled 'distribution for Baudin's Black Cockatoos however the species may be a vagrant visitor to the site (DAWE, 2022).

4.3 Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)

Forest Red-tailed Black Cockatoos are endemic to the humid to sub-humid south-west of Western Australia (SEWPaC, 2012). The range of Forest Red-tailed Black Cockatoos is bound by Gingin in the north to Mt Helena, Christmas Tree Well, West Dale, North Bannister, Mt Saddleback, Kojonup, Rocky Gully, upper King River and Green Range (east of Albany) (DoE, 2014; DAWE, 2022). It nests in tree hollows with a depth of 1-5m, that are predominately Marri, Jarrah and Karri (*E. diversicolor*) and it feeds primarily on the seeds of Marri and Jarrah (Johnstone, Johnstone and Kirkby, 2011).

The site is inside the modelled distribution for Forest Red-tailed Black Cockatoos (DAWE, 2022).

5 METHODOLOGY

5.1 Habitat definitions

5.1.1 Foraging Habitat

'Foraging habitat' for Black Cockatoos is determined from the plant species that are present on the site and evidence of feeding such as direct observation of birds or by chewed nuts and cones. Foraging plants utilised by each species of Black Cockatoo varies, with Carnaby's Black Cockatoo foraging on Eucalypts, pines and proteaceous species, whereas Forest Red-tailed Cockatoos prefer Eucalypts and Allocasuarina and many exotic species and Baudin's prefer mostly seeds of Marri and Jarrah, also Allocasuarina cones (DAWE, 2022).

5.1.2 Breeding Habitat

'Breeding habitat' is defined as trees of species known to support breeding within the range of the species which either have a suitable nest hollow OR have a DBH of 500mm or greater (DAWE, 2022).

Past studies have found that on average hollow openings are 25 cm x 27 cm (Saunders *et al.,* 1982, Saunders and Dawson, 2017) and 30 cm x 34 cm (Johnstone *et al*., 2013). The height of a hollow entrance off the ground is on average 19.384 m (Johnstone *et al*., 2013). Nearly all hollows that are used for nesting by Black Cockatoos are located in the main trunk and have a vertical aspect (Johnstone *et al*., 2013, Saunders and Dawson, 2017). Black Cockatoos are large birds with shoulders that are about 100 mm wide, therefore they require hollows with an entrance bigger than this (as shown above they are typically much larger), but the internal dimensions (depth and floor base) need to be much larger in order for it to be suitable to lay eggs in and for adults to be able to move around.

Previous research has found for Carnaby's Black Cockatoo a mean depth of 1.2 m and a floor diameter of 40 cm is required in order for it to be suitable to lay eggs in and for adults to be able to move around (Johnstone *et al*., 2013, Saunders and Dawson 2017).

The Black Cockatoo Referral Guidelines define trees of certain species with a DBH of 300 to 500mm or greater, dependent on the tree species, as breeding habitat regardless of the presence or not of hollows. The theory behind this definition is the concept that while the trees may not currently contain hollows, they are mature enough that in the next 50 years or so a hollow might form and be of use to Black Cockatoos for the purposes of breeding.

5.1.3 Roosting Habitat

'Roosting habitat' is usually evident due to the presence of Black Cockatoos in the survey area in the evening and early morning and if there are scats or moulted feathers under the roosting area. Black Cockatoos utilise a wide range of native and non-native trees, situated within a variety of land-use types. Roosting habitat is generally in tall (average of > 25 m) tree species that have relatively thick trunks (average DBH of 1 m) and medium foliage density (average of 50%), and that are not too densely forested amongst other trees (average tree crown connectivity of 20 %) (Le Roux, 2017). Black cockatoos rely upon the availability of suitable night roosting sites in proximity to foraging resources, and particularly access to water within 2 km of the roost site (SEWPaC, 2012).

5.2 Site Survey

Dr Paul van der Moezel of PGV Environmental undertook a Black Cockatoo habitat assessment on 9 April 2025 in accordance with the Black Cockatoo Referral Guidelines and the methodology outlined in the SPRAT Database for each of the Black Cockatoo species.

The site was traversed on foot and information on Black Cockatoo foraging, roosting and breeding habitat was assessed. The extent, type and quality of the vegetation present, including the presence and extent of plants known to be used by Black Cockatoos was recorded.

6 BLACK COCKATOO HABITAT

6.1 Foraging

The site contains five species that are recognised as foraging habitat for Black Cockatoos (Table 2) (Davies 1966; Saunders 1980; Johnstone and Storr 1998; Johnstone and Kirkby 1999; Valentine and Stock, 2008; Groom 2011; Johnstone *et al*., 2011; SEWPaC, 2012; Johnstone, *et al*., 2013; Groom, 2015; Johnstone *et al*., 2016; DAWE, 2022).

Table 2: Foraging Species for Black Cockatoos on the Site

Species	Common Name	Carnaby's Black Cockatoo	Forest red-tailed Black Cockatoo
Acacia saligna	Orange Wattle	✓	
Banksia attenuata	Candlestick Banksia	✓	
Banksia menziesii	Firewood Banksia	✓	
Corymbia calophylla	Marri	✓	✓
Eucalyptus todtiana	Marri	✓	✓

No evidence of Black Cockatoo foraging was observed on the site. The extent of foraging habitat on the site is calculated to be 0.28ha (Figure 4).

The foraging habitat value for Carnaby's Black Cockatoos was determined using the scoring tool in the revised Black Cockatoo Referral Guidelines (DAWE, 2022) (Table 3). The tool starts with a score of 10 and then subtracts points for contextual attributes (Table 3). The tool gives a result of 6 which is considered Quality foraging habitat.

Table 3: Scoring Tool for Foraging Habitat for Carnaby's Black Cockatoos

Attribute	Context Adjustor	Score with Breeding and Roosting as per mapping
Foraging potential	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	2
Connectivity	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	0
Proximity to breeding	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	2
Proximity to roosting	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	0
Impact from significant plant disease	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	0
Score		**6**

6.2 Breeding

Black Cockatoos are known to breed in hollows of large eucalypts, including Jarrah trees. The site is not known as a breeding site for Black Cockatoos (DoP, 2011; SLIP, 2025).

There was one Marri tree recorded by PGV Environmental on 65 Park Street that met the definition of breeding habitat or potential breeding habitat due to the DBH being >500mm (Figure 4, Appendix 1). The tree did not have any hollows (Plate 16).

The nearest breeding sites for Black Cockatoos are located 20km to the west-north-west and 20km to the east-north-east (SLIP, 2025).

Plate 16: Marri Tree on Lot 65 Park Street

6.3 Roosting

Black Cockatoos are known to roost overnight in tall trees including native and introduced eucalypts and pine trees generally in close proximity to a fresh water source. The site contains mature trees, however no evidence of roosting was recorded during the survey.

The site is not mapped as containing a recorded roosting habitat for Black Cockatoos and is not within the buffer of known sites (SLIP, 2025). The nearest roosting sites are reported to be around 1.5km to the north-east and 1.7km to the east (SLIP, 2025) (Figure 4).

7 SIGNIFICANCE OF IMPACT

7.1 Background

Any proposal that is likely to have a significant impact on Black Cockatoos is required to be referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Development of the site is highly likely to result in some clearing of Black Cockatoo habitat.

The significance of an impact can be assessed using the EPBC Act Significant Impact Guidelines 1.1 which is a generic guideline for species and communities, or the Black Cockatoo Referral Guidelines which are guidelines more specific to Black Cockatoos.

The following section identifies what level of clearing would be considered significant under both guidelines and therefore may require a Referral under the EPBC Act.

7.2 Significant Impact Guidelines

According to the EPBC Act Significant Impact Guidelines 1.1 (DoE, 2013), the significance of the impact on Black Cockatoos depends on the sensitivity, value and quality of the environment and the intensity, duration, magnitude and geographic extent of the impacts. The category of listing (for example; Endangered, Vulnerable or Migratory) determines the significant impact criteria for listed flora and fauna species and ecological communities.

The following assessments are for the Carnaby's Black Cockatoo which is listed as Endangered and the Forest Red-tailed Black Cockatoo which is listed as Vulnerable.

Carnaby's Black Cockatoos

The criteria for a significant impact on an Endangered species as set out in the Significant Impact Guidelines 1.1 is described below:

• *Lead to a long-term decrease in the size of a population*

There was no evidence that the site supports breeding or roosting of Carnaby's Black Cockatoos. There are large areas of habitat within 12km consisting of large areas of foraging, roosting and potential breeding habitat. Therefore, clearing of any trees on the site is not likely to result in this outcome.

• *Reduce the area of occupancy of the species*

Clearing for the road works would not result in a reduction of any known breeding and roosting habitat although it would result in a small reduction of foraging habitat. Within 12km of the site, however, there is a large area of foraging habitat and therefore the proposal would not result in this outcome.

• *Fragment an existing population into two or more populations*

Clearing of the site is unlikely to fragment the population of Carnaby's Black Cockatoos in the area into sub-populations due to the State Forest, Regional Parks and National Parks in the area providing linkages consisting of large areas of Black Cockatoo habitat. Carnaby's Black Cockatoos can fly large

distances between foraging areas. Clearing for the road works would therefore not result in this outcome.

• *Adversely affect habitat critical to the survival of a species*

There was no evidence of breeding or roosting by Carnaby's Black Cockatoos on the site. The approximately 0.28ha of foraging habitat is not considered to be critical to the survival of this species due to the large amount of foraging and potential breeding habitat within 12km of the site. Therefore, clearing for the road works would not result in this outcome.

• *Disrupt the breeding cycle of a population*

The area proposed to be cleared for the road works does not contain breeding habitat therefore clearing of the site would not result in this outcome.

• *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

Clearing of the site would not result in this outcome due to the large extent of Black Cockatoo habitat reserved within 12km of the site.

• *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

The site is surrounded by residential housing and rural residential lots. Clearing of the site would not result in the establishment of an invasive species harmful to Carnaby's Black Cockatoos.

• *Introduce disease that may cause the species to decline*

Clearing of the site would not cause disease to be introduced therefore would not result in this outcome.

• *Interfere with the recovery of the species*

The Carnaby's Black Cockatoos that would utilise the site have access to a large amount of foraging habitat within 12km in reserves. Therefore, any clearing of habitat on the site would not interfere substantially with the recovery of the species.

The conclusion of this assessment in accordance with the criteria set out in the Significant Impact Guidelines 1.1 is that any clearing on the site would not have a significant impact on Carnaby's Black Cockatoos.

Forest Red-tailed Black Cockatoo

The criteria for a significant impact on a Vulnerable species as set out in the Significant Impact Guidelines 1.1 is described below:

• *Lead to a long-term decrease in the size of an important population of a species*

In the Significant Impact Guidelines 1.1 an important population is defined as "a population that is necessary for a species' long-term survival and recovery" and may be "key source populations either

for breeding or dispersal, populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species' range".

There was no evidence of breeding occurring on the site. The surrounding area contains greater than several reserves providing large areas of foraging and potential breeding habitat for Forest Red-tailed Black Cockatoos that may utilise the site. Development in the site would therefore not result in this outcome.

• *Reduce the area of occupancy of an important population*

There was no evidence found of Forest Red-tailed Black Cockatoos breeding or roosting on the site. Clearing of the site would slightly reduce the area of foraging available, however there is a large amount of foraging habitat within 12km of the site in surrounding reserves therefore clearing on the site would not result in this outcome.

• *Fragment an existing important population into two or more populations*

The large area of reserves containing habitat within 12km of the site that provide foraging and potential breeding habitat. Forest Red-tailed Black Cockatoos can fly large distances between foraging areas. Therefore, clearing on the site would not result in this outcome.

• *Adversely affect habitat critical to the survival of a species*

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site and there are large areas of foraging habitat within 12km of the site, as formal reserves, therefore the site is not considered critical to the survival of this species.

• *Disrupt the breeding cycle of an important population*

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site, therefore clearing of the site would not result in this outcome.

• *Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

The large areas of foraging and breeding habitat located in reserves within 12km of the site would prevent the population from declining as a result of clearing of the site.

• *Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

Clearing the site would not result in invasive species being introduced, therefore would not result in this outcome.

• *Introduce disease that may cause the species to decline*

Clearing the site would not result in disease being introduced as it is already present, therefore would not result in this outcome.

• *Interfere substantially with the recovery of the species*

The Forest Red-tailed Black Cockatoos that would utilise the site have access to a large amount of habitat within 12km in reserves. Therefore, the clearing of foraging habitat on the site would not interfere substantially with the recovery of this species.

In accordance with the criteria set out in the Significant Impact Guidelines 1.1 the conclusion of this assessment is that any clearing on the site would not have a significant impact on Forest Red-tailed Black Cockatoos.

7.3 Black Cockatoo Referral Guidelines

The *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black- cockatoo* (DAWE, 2022) (Black Cockatoo Referral Guidelines) contain several steps to determine whether or not a referral is required. These steps are:

1. Will the action directly or indirectly impact on Black Cockatoo Habitat;
2. Does your action involve loss of any habitat as defined in Section 4 and Appendix A of the guidelines;
3. Formulation of a mitigation strategy to reduce the scale of impact; and
4. A flowchart to assist in decision making on whether or not an action should be referred.

Step 1 Black Cockatoo Habitat

The site contains approximately 0.28ha of foraging habitat for Black Cockatoos with no evidence of foraging by Black Cockatoos on site. There is no known breeding or roosting on the site.

Step 2 Loss of Habitat

Breeding

According to the Black Cockatoo Referral Guidelines the clearing of any known nesting tree has a high risk of being a significant impact. A known nesting tree is defined in the Black Cockatoo Referral Guidelines as any existing tree in which breeding has been recorded or suspected. There are no known nesting trees that occur on the site and therefore there is no risk of a significant impact on known breeding habitat of Black Cockatoos.

The Black Cockatoo Referral Guidelines also consider that the clearing or degradation of any part of a vegetation community known to contain breeding habitat is likely to have a high risk of a significant impact. Breeding habitat is defined as woodlands, forests or isolated trees that contain or consist of live or dead trees of certain species with either a DBH of or greater than 500mm or the presence of suitable nest hollows.

There is one tree on the site that meets the definition of breeding habitat due to the size of the trunk diameter. The tree is on the edge of the proposed road work and may not need to be cleared for the road works. Therefore the proposed development is not likely to have a significant impact on breeding habitat according to the Guidelines.

Roosting

The Black Cockatoo Referral Guidelines consider the clearing of a known roosting site as a high risk of being a significant impact. The site is not a known roosting site however roosting sites are nearby. Clearing of any trees on the site would not have a significant impact on roosting habitat on the site.

Foraging

According to the Black Cockatoo Referral Guidelines the clearing of more than 1ha of quality foraging habitat or more than 10ha of low quality foraging habitat has a high risk of causing a significant impact. Degradation of more than 1ha of quality habitat by things such as altered hydrology or fire regimes has an uncertain risk. The significance of degradation depends on the type of degradation and the quality of the habitat.

The site contains approximately 0.28ha of foraging habitat of which is less than 1ha and the foraging habitat quality scoring tool does not apply. Therefore, the proposed clearing of the site is unlikely to have a significant impact.

Step 3 Mitigation

The consideration of a mitigation strategy during the determination of the level of impact and requirement to refer is allowed by the Black Cockatoo Referral Guidelines and setting in place the best practice mitigation strategy may reduce the level of impact and in turn the risk of a significant impact. Mitigation strategies include avoiding impact, managing impact so that there is no net decline in habitat and monitoring the effectiveness of mitigation.

Depending on the amount of clearing proposed and the area of vegetation to be retained there may be opportunities to plant some of the bare areas with Black Cockatoo habitat species.

Step 4 Referral Advice

The Decision Making flowchart in Figure 1 of the Black Cockatoo Referral Guidelines was applied to the site and is shown in sequence below:

1 Will your action(s) directly or indirectly impact on black cockatoo habitat (see Section 3)? – YES
2 Does your action involve loss of
    - any breeding habitat (i.e. known, suitable or potential nesting trees) OR
    - part of a night roosting site OR
    - >1 ha of high quality foraging habitat OR
    - >10 ha of low quality foraging habitat for one of the black cockatoo species – NO
3 Have you adopted the mitigation standards to remove the likelihood of significant impact? – YES

RESULT – The clearing of less than 1ha of foraging habitat and no roosting habitat is unlikely to have a significant impact. The clearing of one potential breeding habitat tree is not likely to have a significant impact and a Referral is not recommended.

8 SUMMARY AND CONCLUSIONS

The Environmental Assessment resulted in the following findings:

- The site is mostly cleared of native vegetation at the northern and southern ends. Some native shrubs, particularly Woolly Bush, have regrown in the southern section south of Park Street. The central area north of Park Street contains some remnant native trees and some shrubs, including *Eucalyptus todtiana* and *Banksia menziesii* trees;
- The amount of native vegetation is 0.37ha;
- The condition of all areas of native vegetation was rated as Completely Degraded;
- The site contains limited habitat for four conservation significant species to potentially use: Carnaby's Black Cockatoo; Forest Red-tailed Black Cockatoo; Quenda; and Rainbow Bee-eater;
- The site contains 0.28ha foraging habitat for Carnaby's and Forest Red-tailed Black Cockatoos;
- No evidence of foraging by Black Cockatoos was observed;
- There was no evidence of roosting or breeding activity on the site and there are no records of roosting or breeding on the site;
- The site contains 1 Marri tree with a DBH large enough to be considered potential breeding habitat trees. The tree does not have any hollows. The tree is on the edge of the proposed road works and may not need to be cleared;
- There is a large amount of Black Cockatoo habitat within 12km of the site; and
- The amount of foraging habitat is below the threshold of 1ha of quality foraging habitat that could lead to a significant impact. The possible clearing of only one potential breeding habitat tree is highly unlikely to lead to a significant impact and a Referral under the EPBC Act should not be required.

9 REFERENCES

Bolland, M. (1998) *Soils of the Swan Coastal Plain.* Department of Agriculture. Bunbury, Western Australia.

Civica (2022) *Armstrong Collective Kelmscott Senior High School Third Avenue, Kelscott WA Aboricultural Impact Assessment* Perth, Western Australia

Davies, S. J. J. F. (1966) The movements of the White-tailed Black Cockatoo (*Calyptorhynchus baudinii*) in south-western Australia, *Western Australian Naturalist* 10: 33-42. Perth, Western Australia

Department of Planning (DoP) (2011) *Carnaby's Cockatoo foraging, breeding and roosting mapping*. Produced by the Mapping and GeoSpatial Data Branch. Perth, Western Australia.

Department of Primary Industries and Regional Development (DPIRD) (2022) *Natural Resource Information*. Accessed September 2022 http://maps.agric.wa.gov.au/nrm-info/ Government of Western Australia, Perth.

Department of Agriculture, Water and the Environment (DAWE) (2022) *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black- cockatoo,* Canberra, Commonwealth of Australia.

Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012) *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris; Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii; Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*. Commonwealth of Australia.

Department of the Environment (DoE) (2013) *Matters of National Environmental Significance. Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999.* Commonwealth of Australia.

Department of the Environment (DoE) (2014) Species Profile and Threats (SPRAT) Database. Accessed May 2014 http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl Commonwealth of Australia.

Department of Water and Environmental Regulation (DWER) (2022) *Perth Groundwater Map.* Accessed September 2022 https://maps.water.wa.gov.au/#/webmap/gwm Government of Western Australia, Perth.

Government of Western Australia (2000) Bush Forever - *Keeping the Bush in the City. Volume 2: Directory of Bush Forever Sites*. Perth, Western Australia.

Groom, C. (2011) *Plants Used by Carnaby's Black Cockatoo.* Published by the Department of Environment and Conservation. Perth, Western Australia.

Groom, C. (2015) *Roost site fidelity and resource use by Carnaby's cockatoo, Calyptorhynchus latirostris, on the Swan coastal plain, Western Australia* Thesis for Doctor of Philosophy University of Western Australia Perth, Western Australia

Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980) Vegetation complexes of the Darling System, Western Australia. In *Atlas of Natural Resources of the Darling System of Western Australia*. Department of Conservation and Environment. Perth, Western Australia.

Johnstone, R. E. and Kirkby, T. (1999) Food of the Red-tailed Forest Black Cockatoo *Calyptorhynchus banksii naso* in Western Australia, *Western Australian Naturalist*, 22: 167-178. Perth, Western Australia

Johnstone, R. E. and Storr, G. M. (1998) *Handbook of Western Australian Birds. Volume 1 - Non-Passerines (Emu to Dollarbird)*, Western Australian Museum, Perth, Western Australia

Johnstone, R. E. C. and Kirkby, T. (2011) *Carnaby's Cockatoo (Calyptorhynchus latirostris), Baudin's Cockatoo (Calyptorhynchus baudinii) and the Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes.* Report for the Department of Planning, Perth, Western Australia.

Johnstone, R. E., Kirby, T., and Sarti, K. (2013) The breeding biology of the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* Gould in south-Western Australia. II. Breeding behaviour and diet. *Pacific Conservation Biology*, 19(2), 143. Victoria

Johnstone, T.R., Stock, W.D., and Mawson, P.R. (2016) Foraging by Carnaby's Black-Cockatoo in Banksia woodland on the Swan Coastal Plain, Western Australia. *Emu*, 116(3), 284-293. Australia

Landgate (2022) Historical Aerial Photography Accessed September 2022 https://www.landgate.wa.gov.au/bmvf/app/mapviewer/ Government of Western Australia, Perth.

Le Roux, C. (2017) *Nocturnal roost tree, roost site and landscape characteristics of Carnaby's Black-Cockatoos (Calyptorynchus latirostris) on the Swan Coastal Plain* Thesis Edith Cowan University Perth, Western Australia

Peck, A. Barrett, G. and Williams, M. (2019) *The 2019 Great Cocky Count: a community-based survey for Carnaby's Black-Cockatoo (Calyptorhynchus latirostris), Baudin's Black-Cockatoo (Calyptorhynchus baudinii) and Forest Red-tailed Black-Cockatoo (Calyptorhynchus banksii naso).* BirdLife Australia, Floreat, Western Australia.

Saunders, D. A. (1980) Food and Movements of the Short-billed Form of the White-tailed Black Cockatoo, *Australian Wildlife Research*, 7: 257-269. Australia

Saunders, D.A. and Dawson, R. (2017) Cumulative learnings and conservation implications of a long-term study of the endangered Carnaby's Cockatoo *Calyptorhynchus latirostris Australian Zoology* (2017), 10.7882/AZ.2017.010 Australia

Saunders, D.A., Smith, G.T. and Rowley, I. (1982) The Availablity and Dimensions of Tree Hollows that Provide Nest Sites for Cockatoos (Psittaciformes) in Western Austrlaia *Australian Wildlife Research* 9: 541-556 Western Australia

Valentine, L. E., Fisher, R., Wilson, B. A., Sonneman, T., Stock, W. D., Fleming, P. A., and Hobbs, R. J. (2014) Time since fire influences food resources for an endangered species, Carnaby's cockatoo, in a fire-prone landscape. Biological Conservation, 175, 1-9.

Valentine, L.E. and Stock, W. (2008) *Food Resources of Carnaby's Black Cockatoo (Calyptorhynchus latirostris) In The Gnangara Sustainability Strategy Site*. Report for the Gnangara Sustainability Strategy. Government of Western Australia, Perth.

FIGURES

APPENDIX 1

TREE DATA

APPENDIX 2

Tree Data