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Kwinana Freeway Upgrade (Roe Highway to Mortimer Road)

EPBC Referral Supporting Documentation

D25#720153

August 2025

EXECUTIVE SUMMARY

The Commissioner of Main Roads Western Australia (Main Roads) is proposing to widen and upgrade approximately 20 kilometres of the Kwinana Freeway between Roe Highway and Mortimer Road (the Proposed Action; the Proposal) to improve safety, reduce congestion, enhance user journeys and provide better connection to Perth's southern suburbs. This work will include constructing additional lanes, which will increase the freeway's capacity and will improve road user safety, smooth traffic flow and freight efficiency.

The Proposed Action will include the construction of:

- Additional lanes in each direction
- Freeway ramp upgrades
- Noise walls, Principal Shared Paths.
- Other road infrastructure such as safety barriers, drainage structures and landscaping.

To accommodate the Proposed Action, a Proposed Action Area (PAA; development envelope) of approximately 151 ha has been established. The majority of the PAA is highly disturbed and significant effort has been undertaken to avoid and minimise the Proposal's impacts. Although the Proposal will require the clearing of approximately 59 ha of vegetation, less than 3.5 ha is considered to be good or better condition, with more than 91% of the PAA considered to be Cleared or Completely Degraded.

The large majority of the vegetation within the PAA is revegetation, following the construction of previous freeway works during the 1990s and 2000s.

The Proposal will impact up to 3.04 ha of Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plan Threatened Ecological Community (Tuart TEC), with 2.17 ha mapped as Degraded to Completely Degraded. All of the Tuart trees within the Tuart TEC that will be impacted by the proposal are small (less than 500mm DBH), with the majority within roadside vegetation of degraded condition and the remainder being roadside vegetation that occurs within the 30 m buffer of Tuart canopy. Additionally, the Tuart TEC within the PAA only meets the condition and biotic thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA. The Tuart TEC clearing will be contained to the edge of three patches, so does not fragment or significantly impact the quality or viability of each patch.

The Proposal will impact up to 7.24 ha of Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC), with the majority (4.82 ha) being mapped as Degraded to Completely Degraded. Banksia TEC within the PAA is only considered to meet the size and condition thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA. The Banksia TEC clearing will be contained to the edges of five patches, with the largest patch being 62.59 ha and the smallest being 7.15 ha. The Proposal will not fragment any patches.

The Proposal will not impact any High quality foraging, roosting nor breeding habitat. The avoidance and minimisation measures undertaken for the Proposal has resulted in all but twelve large trees (trees with a DBH above 500 mm) being avoided within the 20 km corridor. Although all High-quality foraging habitat has been avoided, the Proposal will impact up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for Forest Red-tailed Black Cockatoo. Given almost the entire PAA is cleared or degraded in nature, although the Proposal will impact MNES, this impact is not considered significant.

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Document Control

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1 INTRODUCTION

1.1 Overview of the Proposed Action

Main Roads Western Australia (Main Roads) is proposing to widen and upgrade approximately 20 kilometres of the Kwinana Freeway between Roe Highway and Mortimer Road (the Proposed Action; the Proposal) to improve safety, reduce congestion, enhance user journeys and provide better connection to Perth's southern suburbs. These improvements, which includes additional lanes being added to both north and south carriageways, will increase the freeway's capacity, improving road user safety, traffic flow and freight efficiency.

The widening and upgrade of Kwinana Freeway includes the construction of:

- Additional lanes in each direction
- Freeway ramp upgrades
- Noise walls, Principal Shared Paths and other road infrastructure such as safety barriers, drainage structures and landscaping.

The Proposal location and Proposed Action Area (PAA) are shown in Figure 1.

1.2 Purpose and Scope

1.2.1 Background and justification

The Kwinana Freeway is one of the busiest roads in Perth and experiences very heavy congestion between Roe Highway and Mortimer Road during peak periods and was considered by Infrastructure Australia (2019) as one of Australia's worst roads for congestion in an audit published in 2019. With Perth's population predicted to increase from 2.17 million in 2025 to 3.5 million by 2050, the freeway network south of Roe Highway in its current form will not adequately support future opportunities that depend on it for access. The Proposed Action will enable the transport infrastructure to support this growth and facilitate future economic opportunities. .

The upgrade will:

- Address rising traffic demands
- Improve accessibility and road safety, servicing 100,000+ vehicles per day
-

1.3 Proponent

The proponent for the Proposed Action is the Commissioner of Main Roads and formal contact details are listed in Table 1.1.

Table 1.1: Proponent and Proposed Action Key Contact

Proponent / Contact	Contact Details
Proponent	Commissioner of Main Roads Main Roads Western Australia PO Box 6202 East Perth WA 6002 ABN/ACN 50 860 676 021
Proposed Action Key Contact	Martine Scheltema Director Environment and Heritage Planning and Technical Services Directorate PO Box 6202 East Perth WA 6002

2 PURPOSE OF THIS DOCUMENT

This referral supporting document presents information to inform assessment of the Kwinana Freeway Upgrade (Roe Highway to Mortimer Road) under the EPBC Act. The structure and content of this document has been prepared to align with Department of Climate Change, Energy, the Environment and Water's (DCCEEW's) EPBC Act Referral Form submission guide (see Table 2.1).

Table 2.1: Structure and content of this document

Information Requested	Section
Description of the Action	Section 3
Description of the environment	Section 4
Relevant Matters of National Environmental Significance	Section 5
Assessment of impacts	Section 6
Risk assessment	Section 7
Avoidance and mitigation measures	Section 8
Ecologically sustainable development	Section 9
Economic and social matters	Section 10
Environmental record of the person(s) proposing to take the action	Section 11
International obligations	Section 12
Other approvals and conditions	Section 13

3 DESCRIPTION OF THE ACTION

3.1 Location and extent

The Kwinana Freeway widening and upgrade extends from Roe Highway in the City of Cockburn through to Mortimer Road in the City of Kwinana local government areas (LGAs). The Proposal location and PAA are shown in Figure 1.

The Proposed Action comprises a PAA of 151.07 ha, including 10.70 ha of native vegetation, 48.70 ha of roadside revegetation and 91.67 ha of cleared areas. The Proposed Action is predicted to have the following impacts to MNES:

- Clearing of up to 0.87 ha of Very Good condition Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plan Threatened Ecological Community (Tuart TEC), as well as 2.17 ha of Degraded or worse condition Tuart TEC.
- Clearing of up to 1.47 ha of Very Good condition Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC), as well as 0.95 ha of Good condition and 4.82 ha of Degraded or worse condition Banksia TEC.
- Clearing of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo (*Zanda latirostris*)
- Clearing of up to 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate, and 6.89 ha of Low quality foraging habitat for Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*)
- Clearing of up to 12 Potential Black Cockatoo Breeding Trees (>500 mm at breast height), none with hollows.

The Proposal will avoid trees suitable for Black Cockatoo breeding, or used by Black Cockatoo for roosting, and will avoid High quality Black Cockatoo foraging habitat. Although the Tuart TEC will be impacted, this impact largely relates to the vegetation within the 30 m buffer of the canopy of tuart trees. All large Tuarts (DBH greater than 500mm) that form the Tuart TEC have been avoided by the Proposal.

3.2 Components and Phases

The Proposal will result in additional northbound and southbound lanes being constructed, along with improvements to on and off ramps, safety barriers and drainage. The Proposed Action also accommodates for noise mitigation works, improving the Principal Shared Path network and undertaking utility works.

3.3 Phase Activities

3.3.1 Pre-construction

The design of the Proposed Action will continue to be refined during the pre-construction phase, in order to minimise the environmental impacts where possible, while maintaining or improving safety and usability.

3.3.2 Construction

Construction will be undertaken using traditional earth-moving equipment and construction techniques. Construction activities that have the potential to impact on MNES that are required for the Proposed Action include:

- Earthworks and site preparation, including clearing of vegetation
- Incorporation of additional lanes and associated infrastructure.

3.3.3 Operation

The Proposed Action relates to the construction of the Kwinana Freeway upgrades. It should be noted that the normal routine, recurrent and periodic maintenance of the roads within the PAA will be undertaken in a manner consistent with the maintenance of the existing freeway. Once completed, the operation of the upgraded freeway is unlikely to have any impact on MNES, noting the current infrastructure already in place. The day to day operation and maintenance of the freeway itself following construction is therefore not considered to be included in the Proposed Action.

3.4 Commencement of Proposed Action

Construction is expected to commence in 2026, subject to the granting of environmental approvals, and final design development.

3.5 Description and timing of rehabilitation activities

All revegetation within the PAA will be undertaken in accordance with *MRWA Vegetation Placement within the Road Reserve Doc. No. 6707/022* (Main Roads, 2013). This guide defines the recommended setbacks and clearance requirements that apply to revegetation or landscaping associated with new road construction.

Planting will predominantly utilise local native species. Species of foraging habitat for Black Cockatoos, including but not limited to, Banksia spp., Hakea spp., Grevillea spp. and Eucalyptus spp., will not be planted within 10 m of the constructed road carriageway to reduce the risk of Black Cockatoo deaths due to vehicle strike.

3.6 Feasible Alternatives to the Proposed Action

Kwinana Freeway is the primary north-south road transport corridor for the southern Perth Metropolitan area and is currently one of the busiest roads in Perth experiencing heavy congestion regularly during peak periods. It was found to be among the 10 worst roads in Australia for delays by Infrastructure Australia, with the 2019 Australian Infrastructure Audit estimating congestion in Perth will cost $3.1 billion per annum in 2031.

With the predicted increase in Perth's population from 2.17 million in 2025 to 3.5 million in 2050, the freeway network south of Roe Highway in its current form will not adequately support future opportunities that depend on it for access, the lane widening and upgrades are required to safely and efficiently service current and future predicted traffic volumes on Kwinana Freeway.

No feasible alternatives for the Proposed Action were identified given the current and predicted traffic congestion issues that affect Kwinana Freeway and that increasing the capacity of the

freeway is the only solution.

Although no feasible alternative options are available to alleviate current and future congestion, it should be noted that the Government of Western Australia is continuing to implement an integrated approach to public and freight movement, with the recent extension of the passenger rail network (Thornlie-Cockburn Link) and future consideration for freight rail upgrades.

For example, the Thornlie-Cockburn Link, which was jointly funded by the state and federal governments, is Perth's first east-west domestic train cross line connection, making travel more flexible while providing a higher level of public transport service to Perth's south-eastern suburbs. Connecting the Mandurah and Armadale-Thornlie lines provides additional flexibility for public transport use, resulting in less private vehicles using the road network. The opening of the Thornlie-Cockburn Link will support growth and accessibility across the south-eastern suburbs by providing direct access to employment and recreation opportunities.

4 DESCRIPTION OF THE ENVIRONMENT

4.1 Existing land use

The Proposed Action is located within the Perth Metropolitan Region. The current condition of the environment within and adjacent to the PAA is largely degraded, with almost all of the PAA occurring within the disturbance footprint of previous freeway construction projects that took place in the 1990s and early 2000s.

The Metropolitan Region Scheme (MRS) divides land into zones and reservations and provides the legal basis for future land use planning throughout the Perth Metropolitan Region. The land within the PAA is reserved as 'Primary regional roads' (the existing Kwinana Freeway) and other 'Primary regional roads' (Department of Planning, Lands and Heritage (DPLH), 2019a). There are two small areas within the PAA designated 'Urban', although their respective land tenure type is 'Road'. MRS land use within the PAA and in the vicinity of the Proposal is mapped on Figure 2, with the extents in the PAA summarised in Table 4.1.

Table 4.1: Land zoning and reservation within the PAA

MRS description	Area within the PAA (ha)	Proportion of the PAA (%)
Primary regional roads	148.74	98.46%
Urban (Land Tenure designated 'Road')	2.33	1.54%

4.1.1 Conservation reserves and estates

A total of 66 Department of Biodiversity Conservation and Attractions (DBCA) managed lands occur within 5 km buffer of the PAA, comprising 55 Crown freehold DBCA-managed lands, 3 conservation parks, seven nature reserves and one Section 5(1)(h) reserve (DBCA, 2024a).

While no conservation reserves intersect the PAA, a group of reserves east of The Spectacles do lie on the survey area boundary (identifiers R 53313, 1758/697, 2781/538) (DBCA, 2024a). DBCA managed land is mapped in Figure 3.

4.2 Topography

The Kwinana Freeway varies in height from approximately 30 mAHD (at various locations near Berrigan Drive) to approximately 45 mAHD at Roe Highway and Beeliar Drive. Because of the length of road involved, the gradient is generally less than 2%.

4.3 Geology

The PAA intersects two geological units at the broad 1:500,000 scale (DMIRS, 2018):

- Coolyena Group: Composition of chalk, greensand, glauconitic sandstone, siltstone, marl; and glauconite (136.97 ha of the PAA (90.67%))
- Warnbro Group: Interbedded sandstone, siltstone, and shale; minor conglomerate (14.10 ha of the PAA (9.33%)).

4.4 Soils

The PAA area intersects the following unique soil landscape zones (DPIRD, 2025).

- Bassendean Zone (212): Mid Pleistocene Bassendean sand. Fixed dunes inland from coastal dune zone. Non-calcareous sands, podsolised soils with low-lying wet areas (133.61 ha of the PAA (88.44%)).
- Perth Coastal Zone (211): Coastal sand dunes and calcarenite. Late Pleistocene to Recent age. Calcareous and siliceous sands and calcarenite (17.46 ha of the PAA (11.56%)).

4.5 Groundwater

The PAA intersects two Groundwater Areas proclaimed under the Rights in Water and Irrigation Act 1914:

- Jandakot Groundwater Area (101.51 ha (67.19% of PAA))
- Serpentine Groundwater Area (49.56 ha (32.81% of PAA)).

There is one Public Drinking Water Source Area (PDWSAs) proclaimed under the *Metropolitan Water Supply, Sewage and Drainage Act 1909* within the PAA, this being Priority 3 areas of the Jandakot Underground Water Pollution Control Area (DWER, 2018b). Priority 3 areas are designated to manage the risk of water contamination while allowing for higher-intensity land uses like urban and commercial development. Roads are considered a compatible land in this area.

4.6 Wetlands

No globally or nationally significant wetlands occur within the PAA.

The desktop study of various databases reported one wetland system of global RAMSAR listing significance occurring within a 5 km buffer of the PAA, the Thomsons and Forestdale Lakes wetland system (DBCA, 2017b). Thomson Lake is 1.8 km west of the PAA, between Beeliar Drive and Gibbs Road, while Forestdale Lake is more than 5 km to the east of the PAA (Figure 4). The Proposed Action does not have a direct surface water connection to Thomsons and Forestdale Lakes wetland system. Groundwater flow in the PAA is westerly, away from Forrestdale Lake. Furthermore, given the distance to Thomsons Lake and urban development there is a lack of direct hydrological connectivity.

A further two wetlands listed in the Directory of Important Wetlands in Australia were identified within a 5 km buffer of the PAA (DBCA, 2018), Spectacles Swamp and Gibbs Road Swamp System. The nearest of these is The Spectacles, which is 0.3 km west of the survey area, between Anketell Road and Thomas Road.

Wetlands cover more than 25% of the Swan Coastal Plain, with approximately 75% of these occurring as seasonally waterlogged flats or basins. DBCA (2024b) have mapped geomorphic wetlands on the Swan Coastal Plain, with the PAA intersecting the following extents

- Conservation – nine wetlands, intersecting 0.97 ha (0.64%) of the PAA.
- Resource Enhancement – seven wetlands, intersecting 10.68 ha (7.07%) of the PAA.
- Multiple Use – fifteen wetlands, intersecting 15.00 ha (9.93%) of the PAA.
- Not Applicable – five wetlands, intersecting 9.43 ha (6.24%) of the PAA.

Wetlands in the vicinity of the PAA are shown in Figure 5.

4.7 Vegetation and Flora

4.7.1 Broad vegetation

The PAA lies within the Swan Coastal Plain subregion of the Swan Coastal Plain 2 (SWA2) bioregion in Western Australia:

- The Swan Coastal Plain is a low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials (CALM, 2002).

4.7.1.1 Vegetation associations

Broad scale (1:250,000) pre-European vegetation mapping identified two Vegetation Associations as present within PAA, as listed in Table 4.2. The pre-European mapping has been adapted and digitised by Shepherd et al. (2002). The extent of vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by DBCA (GoWA, 2019). The current remaining extent of the vegetation associations that are mapped to intersect the PAA at all scales is greater than 22 %.

Table 4.2: Pre-European Vegetation Associations that intersect the PAA

Pre-European Vegetation Association	Extent (ha) in PAA	**Remaining Statewide (%)**
6: Medium woodland of Tuart and Jarrah.	2.39	23.72
1001: Medium very sparse Jarrah woodland with low woodland of Banksia and Casuarina.	148.68	22.05

4.7.1.2 Vegetation Complexes

Regional vegetation has been mapped by Heddle et al (1980) with updates from Webb et al. (2016) based on major geomorphic units of the Swan Coastal Plain. The mapping indicates three complexes intersect the PAA (Table 4.3 and Figure 6).

Table 4.3: Vegetation complexes mapped as intersecting the PAA

Vegetation Complex	Structure	Landform	Description	Extent (ha) within PAA
Cottesloe Complex – Central and South	Woodland and open forest and closed heath	Aeolian deposits	Mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri); closed heath on the Limestone outcrops.	7.23

Vegetation Complex	Structure	Landform	Description	Extent (ha) within PAA
Herdsman Complex	Sedgelands and fringing woodland	Aeolian deposits	Sedgelands and fringing woodland of *Eucalyptus rudis* (Flooded Gum) - Melaleuca species.	3.29
Bassendean Complex – Central and South	Woodland to low woodland and sedgelands	Aeolian deposits	Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* (Jarrah) to *Eucalyptus todtiana* (Pricklybark) in the vicinity of Perth.	140.55

GoWA (2018) assessed the vegetation complexes against presumed pre-European extents within the Swan Coastal Plain (SCP) IBRA bioregion, Perth sub-region and the Cities of Cockburn and Kwinana respectively. The vegetation complex remaining extents is greater than 26 % at the SCP IBRA bioregion (Table 4.4) scale (GoWA, 2018).

Table 4.4: Remaining extents of vegetation complexes (Swan Coastal Plain IBRA Bioregion scale) mapped as intersecting the PAA

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed lands
Cottesloe Complex – Central and South	45,299.61	14,571.43	32.17	14.55
Herdsman Complex	9,665.15	3,081.05	31.88	10.97
Bassendean Complex – Central and South	87,476.25	23,533.09	26.90	4.99

4.7.2 Vegetation types and condition

A detailed flora and vegetation assessment was conducted by GHD (2025a) along the Kwinana Freeway in a 285.44 ha survey area, which included the majority of the PAA. The northern extent of the PAA, associated with Roe Highway was included within the Contextual Area considered by the survey, which was supplemented by additional surveys completed by GHD (2025b, c, d) along Roe Highway. These surveys included targeted flora searches for significant flora species. The GHD (2025a) Biological Survey Report is presented in Appendix 2.

Infrastructure such as roads and urban development were mapped as Cleared and made up the majority of the PAA (91.67 ha, 60.7%). The vegetation within the PAA occurs either side of the Kwinana Freeway and consists mostly of roadside revegetation (48.70 ha, 32.2%), from circa 2002 or earlier, with isolated patches of native vegetation (10.70 ha, 7.1 %).

Five native vegetation types were mapped for within the PAA. Descriptions and representative photographs for native vegetation types are presented in Table 4.5. Three were Banksia woodlands, differentiated by the presence or absence of *Eucalyptus* spp., one was a *Corymbia calophylla* woodland and the fifth represented wetlands. The dominant remnant vegetation type in the PAA is EgBspp. -*Eucalyptus gomphocephala* and *Banksia* spp. woodland with 5.07 ha. This vegetation type

was mapped predominately between Anketell and Mortimer Roads where the Spearwood system intersects the PAA. *Corymbia calophylla* woodland (Cc) is the most restricted in extent, occurring adjacent to *Eucalyptus rudis* and *Melaleuca rhaphiophylla* woodland (ErMr) vegetation types. *Corymbia calophylla* woodland made up 0.12 ha of the PAA.

Roadside revegetation was split into seven vegetation types, primarily to assist with Black Cockatoo foraging habitat mapping. Endemic flora species were selected when areas were being revegetated and as a result the revegetation has in some places integrated with remnant native vegetation adjacent to the PAA. Although not to the same condition and diversity as remnant native vegetation some of the revegetation has established enough to be able to be mapped using the same description as the remnant bushland vegetation types BmBa and *Eucalyptus gomphocephala* and *Banksia* spp. woodland (EgBspp). Descriptions and representative photographs for roadside revegetation are shown in Table 4.6. Mixed shrubland was the most dominant roadside vegetation and was mapped in patches along the entire length of the PAA with 31.95 ha.

Vegetation type mapping including both native and roadside revegetation is provided in Figure 7 (GHD, 2025a, b).

The vegetation of the survey was variable and ranged from Very Good to Completely Degraded. Native vegetation ranged from Very Good to Completely Degraded, with 69.3% in Degraded or worse condition. Roadside revegetated areas also ranged from Very Good to Completely Degraded with the majority (93.7%) in Completely Degraded condition. Vegetation condition extent and percentage of the survey area and per vegetation type are quantified in Table 4.7. Vegetation condition within the PAA is mapped in Figure 8.

4.7.2.1 Significant vegetation

Vegetation types EgBspp., EmBspp. and BmBa showed affinities to significant ecological communities Banksia TEC and Tuart TEC. However, not all patches of these vegetation types met the key criteria set out by Threatened Species Scientific Committee (TSSC, 2016) and Department of Environment and Energy (DotEE, 2019). This is discussed in more detail in sections 5.3.1 and 5.3.2.

Table 4.5: Native vegetation types within the PAA

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Photograph
BmBa - *Banksia menziesii B. attenuata* woodland	*Banksia menziesii* and *Banksia attenuata* woodland over *Hibbertia hypericoides Scholtzia involucrata Styphelia conostephioides* low shrubland over *Patersonia occidentalis, Desmocladus flexuosus* and *Lyginia barbata* open herb/sedgeland	Bassendean system	Very Good to Completely Degraded	0.468 ha	
Cc – *Corymbia calophylla* woodland	*Corymbia calophylla* tall woodland over *Kunzea glabrescens* tall sparse shrubland over *Xanthorrhoea preissii* and *X. gracilis* mid shrubland over *Phlebocarya ciliata, Dasypogon bromeliifolius* and *Desmocladus flexuosus* herbland/ sedgeland	Bassendean system	Very Good to Good	0.123 ha	
EgBspp. -*Eucalyptus gomphocephala* and *Banksia* spp. woodland	+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella var pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia* and **Ehrharta calycina* sedgeland/ grassland	Spearwood system and Bassendean system	Very Good to Degraded	5.067 ha	

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Photograph
EmBspp. *Eucalyptus marginata* and *Banksia* spp. woodland	+/- *Eucalyptus marginata* tall open woodland over *Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* woodland over *Acacia pulchella* var *pulchella Hibbertia hypericoides, Bossiaea eriocarpa* low open shrubland over weedy grasses	Bassendean system	Good to Completely Degraded	2.955 ha	
ErMr - *Eucalyptus rudis* over *Melaleuca rhaphiophylla +/- M. preissiana* woodland	*Eucalyptus rudis* over *Melaleuca rhaphiophylla +/- M. preissiana* over *Kunzea glabrescens* tall sparse shrubland over *Xanthorrhoea preissii* low shrubland over *Lepidosperma longitudinale* sedgeland	Bassendean system	Very Good to Completely Degraded	2.083 ha	

Table 4.6: Roadside revegetation types within the PAA

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Isolated *Corymbia calophylla*	Isolated stands of *Corymbia calophylla* over scattered natives and weeds	Completely Degraded	1.144 ha	

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Isolated *Eucalyptus* spp.	Native and planted naturalised *Eucalyptus* spp. over scattered natives and weeds	Completely Degraded	5.079 ha	
Isolated *Banksia* spp.	Isolated *Banksia menziesii* and *B. attenuata* over scattered natives and weeds	Degraded to Completely Degraded	5.404 ha	
Mixed shrubs	Native and Introduced shrubs	Completely Degraded	31.945 ha	

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Modified wetland	Modified wetland/ drainage area	Completely degraded	2.973 ha	
BmBa	*Banksia menziesii* and B. *attenuata* woodland	Good to Completely Degraded	0.899 ha	
EgBspp.	*Eucalyptus gomphocephala* and *Banksia* spp. woodland	Good to Degraded	1.258 ha	

Table 4.7: Vegetation condition extent and percentage per vegetation type within the PAA (GHD, 2025a,b)

Vegetation Condition	Vegetation type							Extent in PAA ha	Extent in PAA (%)
	BmBa	EgBspp.	EmBspp	ErMr	Cc	Roadside revegetation	Cleared		
Very Good	0.047	1.287		0.099	0.033	0.155		1.621	1.07
Good	0.259	1.034	0.078	0.068	0.090	0.045		1.574	1.04
Good - Degraded				0.290				0.290	0.19
Degraded	0.162	2.746	2.819	0.784		2.871		9.384	6.21
Degraded to Completely Degraded								0	0.00
Completely Degraded			0.058	0.842		45.635		46.535	30.80
Cleared							91.669	91.669	60.68
Total	0.468	5.067	2.955	2.083	0.123	48.706	91.669	151.073	100.00

4.7.3 Flora

Desktop searches of the EPBC Protected Matters Search Tool (EPBC PMST), NatureMap, DBCA and WA Herbarium Threatened and Priority flora spatial datasets identified the potential occurrence of 15 significant flora species within a 5 km buffer of the PAA. Figure 9 presents historic MNES flora records within 5km of the PAA.

No EPBC Act listed flora were recorded within the PAA. Three Priority state listed flora species were recorded, however two of these species are considered naturalised:

- *Jacksonia gracillima* (P3)
- *Grevillea curviloba* listed as Endangered under the BC Act (naturalised)
- *Grevillea olivacea* (P4) (naturalised).

Although *Grevillea curviloba* and *Grevillea olivacea* are Priority state listed flora they are both considered to be planted within the PAA and outside their natural range and habitat. The natural range of *Grevillea curviloba* is north of the survey area around Bullsbrook and Muchea and is found growing in winter wet heaths. The natural range of *G. olivacea* is north of the PAA in the Geraldton Sandplains and northern part of the SCP (Dandaragan Plateau) IBRA regions, however it is commonly used around the Perth metropolitan area as a horticultural species.

The likelihood of occurrence assessment post-field survey concluded no EPBC Act listed flora are considered likely to occur in the PAA.

4.7.4 Introduced and invasive species

Two species listed as Weeds of National Significance (WoNs) (Australian Weeds Commitee, 2012), **Asparagus asparagoides* (Bridal Creeper) and **Opuntia stricta* (Prickly Pear) were recorded in the PAA. These species are also listed as a Declared pest under the state *Biosecurity and Agriculture Management Act 2007* (BAM Act). Four additional Declared pests were recorded in the PAA:

- **Gomphocarpus fruticosus* (DP)
- **Moraea flaccida* (DP)
- **Solanum linnaeanum* (DP)
- **Zantedeschia aethiopica* (DP)

Several common grass weed species were recorded along Kwinana Freeway within the PAA. The GHD (2025a) survey recorded 64 introduced flora species representing 29.4% of the total flora species recorded. This level of weed incursion is expected to be consistent with the PAA, which this survey mostly represents, considering the high level of previous disturbance and lack of native vegetation remaining.

4.8 Fauna

A fauna survey, including a desktop assessment and targeted Black Cockatoo survey, was conducted by GHD (2025a) (Appendix 2) along the Kwinana Freeway in a 285.44 ha survey area, which included the majority of the PAA. The northern extent of the PAA, associated with Roe Highway was included within the Contextual Area considered by the survey, which was supplemented by additional surveys completed by GHD (2025c, d) along Roe Highway.

Eight broad fauna habitat types including cleared areas have been delineated and described as

described in Table 4.8 and mapped in Figure 10. Each fauna habitat type aligns with at least one vegetation community type described during the flora and vegetation survey and listed in section 4.7.2.

An initial desktop search of the EPBC Act PMST, *NatureMap*, DBCA Threatened Fauna databases identified the potential occurrence of up to 17 Threatened fauna species. During the GHD (2025a) field survey three significant fauna species were recorded:

- Carnaby's Cockatoo *(Zanda latirostris)* – Endangered under EPBC Act and BC Act
- Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksia naso)* – Vulnerable under EPBC Act and BC Act
- *Quenda (Isoodon fusciventer)* – listed Priority 4 under DBCA.

A likelihood of occurrence assessment for significant fauna presented in the desktop assessment was revised following the field survey (GHD, 2025a). This assessment was refined with consideration to the ecological field observations, including habitat suitability and previous disturbance. No additional Threatened fauna species listed under the EPBC Act were considered likely to occur.

Table 4.8: Habitat types within the PAA (GHD, 2025a,b)

Habitat Type	Description	Extent (ha)	Representative photograph
Banksia woodland	This habitat type corresponds with vegetation types BmBa and Isolated *Banksia* spp. It is present as several small areas and includes isolated scattered patches. Floristically characterised by *Banksia attenuata, B.menziesii* and scattered areas of *B.ilicifolia* woodland over *Hibbertia* species, *Scholtzia involucrata Styphelia conostephioides* over, *Patersonia occidentalis Desmocladus flexuosus Lyginia barbata*. Patches of understory include *Xanthorrhoea preissii* and *Hibbertia subvaginata* over *Dasypogon bromeliifolius, Phlebocarya ciliata, Schoenus caespititius* shrub layer. Substrate is pale grey deep sand. Habitat condition varies widely from degraded too very good. But retention of upper stratum *Banksia* maintains foraging value for Black Cockatoos. Where this habitat is in good or better condition, it supports a wide range of woodland birds and reptiles that continue to persist in sandplain Banksia woodland remnant patches including New Holland and White-cheeked Honeyeater and Grey Shrike-thrush, Splendid Fairy-wren and Rufous Whistler. Reptile examples include Burton's Legless Lizard and Sandplain Worm Lizard. **Significant fauna species**: Moderate quality foraging habitat for Carnaby's Cockatoo (*Zanda latirostris*), and Low quality foraging habitat for FRTBC (*Calyptorhynchus banksii naso*).	6.77 4.48%	
Eucalyptus woodland over Banksia	This habitat type corresponds with vegetation types EgBspp and EmBspp. It is characterised as emergent sparse to open Tuart or Jarrah and occasional patches of *Allocasuarina* over B*anksia attenuata* and *B.menziesii* woodland over *Acacia, Xanthorrhoea* and *Hibbertia* low shrubland over weedy sedgeland/ grassland. Substrate is deep pale grey sandy soil. Habitat condition varies widely from degraded too very good. But retention of upper emergent eucalypts and mid-story *Banksia* maintains foraging value for Black Cockatoo. It comprises a relatively small and scattered proportion of the survey area. Where this habitat is in good or better condition, it supports a wide range of woodland birds and reptiles that continue to persist in remnant patches including Crested Pigeon, Striated Pardalote, and Weebil. Reptile examples include Bobtail, Western Bearded Dragon, and Marbled Gecko. **Significant fauna species**: Moderate quality foraging habitat for Carnaby's Cockatoo (*Zanda latirostris*), and Low – Moderate quality foraging habitat for FRTBC (*Calyptorhynchus banksii naso*).	9.28 6.14%	

Habitat Type	Description	Extent (ha)	Representative photograph
Melaleuca dampland and sparse flooded gum	This habitat type corresponds with vegetation type ErMr and is comprised of occasional to sparse Flooded Gum over *Melaleuca rhaphiophylla* and / or *M. preissiana* over *Kunzea glabrescens, Xanthorrhoea preissii* and *Lepidosperma longitudinale*. Soil is sandy grey Bassendean formation but tends to be poor draining and relatively low elevation. Habitat condition varies from degraded to very good however the lower stratum vegetation tends to retain high density although tends to be weedy. Total extent area is low and limited to few patches. Due to the degraded condition and small area of this habitat, fauna species present are limited to those with a degree of resilience and habitat generality such as Brown Honeyeater, Silvereye, and frogs such as Glauert's Froglet, and Gunther's False Toadlet **Significant fauna species**: Negligible to Low habitat for Black Cockatoos.	2.08 1.38%	
Marri woodland	This habitat type corresponds with the Isolated *Corymbia calophylla* vegetation type and comprises relatively small remnant patches and isolated stands of tall *Corymbia calophylla* over scattered natives such as occasional Grass trees and weeds. The lower strata understory and shrub layers are highly degraded to absent. The retained canopy provides habitat for a range of locally occurring woodland birds including Black Cockatoos. Due to the degraded condition and small area of this habitat, fauna species present are limited to those with a degree of resilience and habitat generality that persist in fragmented Marri woodland patches such as Pied Butcherbird, Australian Magpie, Red-wattlebird, and Singing Honeyeater. **Significant fauna species**: Moderate quality foraging habitat for Carnaby's Cockatoo (*Zanda latirostris*) and Low – Moderate and Moderate - High quality foraging habitat for FRTBC (*Calyptorhynchus banksii naso*).	1.27 0.84%	
Naturalised and native trees	This habitat type corresponds with the Isolated Eucalyptus spp vegetation type and comprises a range of *Eucalyptus* species. over scattered natives and weeds and is considered highly degraded. Trees include River Red-Gum, Spotted Gum, Lemon-scented Gum, occasional Tuart, Marri and Jarrah. Usually associated with disturbed areas along road verges and cycle path embankments. The lower strata are absent, replaced by weed grasses and annual herb species. The habitat provides foraging and nesting habitat for a wide range of common native nectivore insectivore bird species such as honeyeaters and Weebill. **Significant fauna species**: Negligible to Low habitat for Black Cockatoos.	5.08 3.36%	

Habitat Type	Description	Extent (ha)	Representative photograph
Native and introduced shrubs	This habitat type corresponds with Mixed shrubland vegetation type and comprises a range of naturalised, introduced and native planted shrubs, with weed grasses and herbaceous weeds, and usually associated with disturbed areas along road verges and cycle path embankments, often planted or regenerated vegetation in disturbed areas post-road construction. It is comprised of Acacia and myrtaceous shrubs and relatively low density to patchy proteaceous shrubs including banksia, hakea and grevillea. Vegetation condition is highly degraded. Due to the degraded condition of this habitat, fauna species present are limited to those with resilience and habitat generality that persist in highly disturbed and modified vegetation structure such as Singing Honeyeater, Rainbow Bee-eater, and Willie Wagtail. **Significant fauna species**: Negligible to Low habitat for Black Cockatoos.	31.95 21.15%	
Modified wetland drainage area	This habitat corresponds with Modified wetland drainage area vegetation type. It includes small artificial lakes and sumps and associated fringing trees, shrubs, and Typha rushes. Vegetation of these areas is generally highly degraded. The water bodies are seasonal and fluctuate providing temporary habitat for water birds. Patches of dense low vegetation provide some refuge habitat, and fringing scattered trees provide habitat for woodland birds. Marri and Jarrah are absent to very low density. Due to the degraded condition of this habitat, fauna species present are limited to those with resilience and habitat generality that persist in highly disturbed or artificial wetlands. Species such waterbirds such as Ducks and Egrets. **Significant fauna species**: Negligible to Low habitat for Black Cockatoos.	2.97 1.97%	
Cleared area	These areas include areas of road and other infrastructure with no vegetation and also completely degraded cleared land along road verges often with dense ground cover of colonising broad-leaf annual weed and naturalised grasses, and occasional planted or native tree or shrub. The density of native species is negligible. Cleared areas cover most of the survey area and there is minimal habitat value for native species. Bird species that utilise disturbed areas are limited and include feral doves and pigeons, Australia Magpie, and Magpie Lark. **Significant fauna species**: No notable habitat value for Black Cockatoos.	91.67 60.68%	

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

5.1 Surveys and studies

A number of surveys and studies have been undertaken to address additional information needed to conduct a comprehensive impact assessment for the Proposed Action. A summary of surveys and studies relevant to MNES are detailed in Table 5.1 below.

Table 5.1: Studies and surveys relevant to the Proposed Action

Survey / Report	Details
Kwinana Freeway widening - Biological Survey (GHD, 2025a) (Appendix 2)	Scope: GHD was commissioned by Main Roads to undertake a Detailed and Targeted Flora and Vegetation Survey, Floristic Community Type Assessment (FCT), Basic Fauna Survey, including a Targeted Short-Range Endemic (SRE) survey for signs of burrows of the trapdoor spider (*Idiosoma sigillatum*) and Targeted Black Cockatoo Habitat Assessment of the survey area (survey area). Survey area: The survey area was located along the alignment of the Kwinana Freeway, beginning at the Roe Highway intersection and consists of three sections: • Kwinana Freeway from the intersection of Roe Highway south to Mortimer Road. • Kwinana Freeway, Mundijong intersection west • Kwinana Freeway, Safety Bay Road intersection west Combined, the survey area covered 285.44 hectares (ha) and was approximately 22 km in length in a north south direction. Report date: August 2025
Roe Highway widening – Targeted Flora, Vegetation and Wetland Assessment (GHD, 2025b)	Scope: GHD was commissioned by Main Roads to undertake a Detailed and Targeted, Flora and Vegetation Survey, including a Floristic Community Type Assessment (FCT) of the Roe Highway Design Envelope (DE) and offsets areas. Survey area: The survey area is located along the alignment of Roe Highway The survey area consists of two sections: • DE along the alignment of Roe Highway from the Kwinana Freeway interchange to the Tonkin Highway interchange (302.42 ha) • Offset areas located adjacent to the DE at the Kwinana Freeway-Roe Highway interchange and east of Karel Avenue (six areas with a total of 27.80ha) The two sections combined are referred to as the survey area, and this covers 330.22 hectares (ha) and is approximately 19 km in length in a general east west direction. Only the most western end of the survey area intersecting the

Survey / Report	Details
	PAA, with much of this overlapping with the contextual area for GHD (2025a). Report date: unpublished
Roe Highway widening – Basic Fauna and SRE Survey (GHD, 2025c)	Scope: GHD was commissioned by Main Roads to undertake a Basic fauna survey and targeted Swan Coastal Plain Shield-back Trapdoor Spider survey. Survey area: This is the same survey area as GHD (2025b), with only the most western end of the survey area intersecting the PAA, with much of this overlapping with the contextual area for GHD (2025a). Report date: unpublished
Roe Highway widening – Targeted Black Cockatoo Survey (GHD, 2025d)	Scope: GHD was commissioned by Main Roads to undertake a targeting black cockatoo habitat focussing on breeding, foraging and roosting habitat. Survey area: This is the same survey area as GHD (2025b), with only the most western end of the survey area intersecting the PAA, with much of this overlapping with the contextual area for GHD (2025a). Report date: unpublished

5.2 Consideration of Matters within the PAA

Desktop searches of the EPBC Act PMST (DCCEEW, 2025), DBCA Threatened and Priority Ecological Communities (TEC/PEC) database (DBCA 2024a), DBCA Threatened, Specially Protected, and Priority Fauna (TPFA) database (DBCA 2024b), DBCA Threatened and Priority Flora List (TPFL) database (DBCA 2023a), Western Australian Herbarium (WA Herb) database (WA Herbarium 2023) and results of surveys listed in Table 5.1 identified TECs and threatened flora and fauna that may occur in the PAA. Through detailed and targeted survey efforts, the likelihood of occurrence for these TECs and species was considered.

Table 5 2 provides a summary of the GHD (2025a) likelihood of occurrence assessment for MNES identified from the PMST, GHD (2025a) or DBCA data. Species and communities identified in the PMST report that were not assessed in GHD (2025a, 2025b, c) and their likelihood of occurrence have been assessed within this document based on the known habitats and survey effort described within GHD (2025a, b, c d). Criteria used to assign likelihood of occurrence follow that reported by GHD (2025a). Additional context for the likelihood assessment with specific consideration to Threatened orchid species and Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain TEC (Organic Mounds TEC) is detailed in Sections 5.2.1

and 5.2.2 respectively.

The communities and species considered known or likely to occur within the PAA are:

- Listed ecological communities:
  - Banksia Woodlands of the Swan Coastal Plain (Banksia TEC) – Endangered
  - Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain (Tuart TEC) – Critically Endangered
- Listed fauna species
  - Carnaby's Cockatoo (*Zanda latirostris*) – Endangered
  - FRTBC (FRTBC) (*Calyptorhynchus banksii naso*) – Vulnerable

Table 5.2: MNES likelihood of occurrence assessment

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
Threatened Ecological Communities			
Banksia ilicifolia woodlands (SCP22) A component of the Banksia Woodlands of the Swan Coastal Plain ecological community EPBC listed TEC	Endangered	Not present in the PAA. All previously recorded occurrences of this community occur to the east of the PAA, the nearest being 700 m east of the PAA south of Anketell Road in line with the extensive remnant vegetation that occurs between Anketell Road and Thomas Road.	GHD (2025a) GHD (2025b)
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Known. Surveys have confirmed the presence of this community within the PAA. Numerous occurrences (or their buffers) of this community intersect the PAA.	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b)
Clay Pans of the Swan Coastal Plain	Critically Endangered	Not present in the PAA. 'Dense shrublands on clay flats SCP09' occurs 4.3 km east of the PAA.	GHD (2025a) GHD (2025b)
Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) / Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Not present in the PAA. One occurrence of this community occurs 0.4 km to the east of the PAA.	GHD (2025a)
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Not present in the PAA. All occurrences of this community are to the east - southeast of the PAA. The nearest occurrence is more than 4 km away.	GHD (2025a) GHD (2025b)
Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. (1994))	Critically Endangered	Not present in the PAA. Nearest record of this community is approximately 5 km southeast of the PAA.	GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
A component of the Clay Pans of the Swan Coastal Plain EPBC listed TEC.			
Empodisma peatlands of southwestern Australia	Endangered	Not present in the PAA. Identified by PMST only, no known occurrence within study area.	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b)
Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)	Endangered	Not present in the PAA. The nearest record of this community is approximately 780 m east of the PAA, south of Anketell Road in line with the extensive remnant vegetation that occurs between Anketell Road and Thomas Road.	GHD (2025a) GHD (2025b)
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion / *Melaleuca huegelii - Melaleuca systena* shrublands on limestone ridges (floristic community type 26a as originally described in Gibson et al. (1994))	Critically Endangered	Not present in the PAA. The PAA is generally considered outside the known range of this vegetation type, which occurs closer to the coast (in association with limestone ridges). The nearest potential historic record is approximately 2.9 km west of the PAA.	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b)
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19a as originally described in in Gibson et al. (1994))	Endangered	Not present in the PAA. Nearest occurrences of this community are approximately 8 km south of the PAA (Safety Bay Road).	GHD (2025a) GHD (2025b)
Southern *Eucalyptus gomphocephala-Agonis flexuosa* woodlands (SCP25)	Endangered / Critically Endangered	Not present in the PAA. Nearest record of this community is approximately 4.7 km southwest of the PAA (Mundijong Road).	GHD (2025a)
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Not present in the PAA. Identified by PMST only, no known occurrence within study area.	GHD (2025a) GHD (2025b)
Tuart TEC	Critically Endangered	Known. Surveys have confirmed the presence of this community within the PAA. Two occurrences (or their buffers) of this community intersect the survey area.	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b)
Woodlands over sedgelands in	Endangered	Not present in the PAA.	GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).(SCP19b)		Nearest record of this community occurs approximately 1.9 km west of the PAA.	
Flora			
Dwarf Bee-orchid	Vulnerable	Unlikely. Identified by PMST only, no known occurrence within PAA. Historically there may have been suitable habitat within PAA, however floodplain and wetland areas within the PAA represent highlight modified systems which are associated with road drainage and dominance by invasive species or *Typha* spp/*Pteridium esculentum* and are not considered to provide suitable habitat for this species.	PMST (DCCEEW, 2025) GHD (2025a)
Dwarf Hammer-orchid	Vulnerable	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Habitat available but no records in study area. Records in the Perth area are from pre-1985. Suitable habitat within PAA, however unlikely given detailed survey completed within the species flowering period did not record individuals of this species.	PMST (DCCEEW, 2025) GHD (2025a)
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid	Endangered	Unlikely. Identified by PMST only, no known occurrence within PAA. Areas of potentially suitable habitat for this species were targeted during July (when the leaf is visible). No individuals recorded and areas of potentially suitable habitat were considered to be too disturbed to support this species.	PMST (DCCEEW, 2025) GHD (2025a)
Keighery's Eleocharis	Vulnerable	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Areas of suitable habitat within PAA, however unlikely due to survey efficacy and non-cryptic nature of the species.	PMST (DCCEEW, 2025) GHD (2025a)
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid	Endangered	Unlikely. Identified by PMST only, no known occurrence within PAA. Minimal suitable habitat occurs within PAA due to degradation of understorey and structure of woodlands present. The survey was undertaken during species flowering period which was confirmed by the species being recorded in nearby Roe Highway and	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		offsets survey areas. Transects were performed in areas of suitable habitat targeting this species and it was not recorded.	
Purdie's Donkey-orchid	Endangered	Unlikely. Identified by PMST only, no known occurrence within PAA. Species distribution is to the east of the PAA, indicating that the PAA falls outside the currently known distribution. No suitable habitat recorded within the PAA.	PMST (DCCEEW, 2025) GHD (2025a)
Selena's Synaphea	Critically Endangered	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Limited suitable habitat in PAA, survey completed during species flowering time and less likely on the basis of the detail of the survey.	PMST (DCCEEW, 2025) GHD (2025a)
Slender Andersonia	Endangered	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Only two records in Perth metro area are from 2009 and 1992. Areas of suitable habitat in PAA, however survey was completed during flowering period, therefore unlikely to have been overlooked based on survey effort.	PMST (DCCEEW, 2025) GHD (2025a)
Southern Tetraria	Vulnerable (listed as Tetraria australiensis)	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Areas of suitable habitat within PAA, however unlikely due to no records despite survey efficacy and non-cryptic nature of the species.	PMST (DCCEEW, 2025) GHD (2025a)
Summer Honeypot	Endangered	Highly unlikely. Identified by PMST only, no known occurrence within PAA. Only two records in Perth area are from 1972. Suitable habitat in PAA, however previous records > 5 km from PAA and no species recorded.	PMST (DCCEEW, 2025) GHD (2025a)
Tall Donkey Orchid	Vulnerable	Unlikely. Identified by PMST only, no known occurrence within PAA. Historically there may have been suitable habitat within PAA, however floodplain and wetland areas within the PAA represent highlight modified systems which are associated with road drainage and dominance by invasive species or *Typha* spp/*Pteridium esculentum* and are not considered to provide suitable habitat for this species.	PMST (DCCEEW, 2025) GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
Fauna			
Australasian Bittern	Endangered	Unlikely. The PAA lacks suitable habitat namely wetland with extensive emergent native vegetation.	PMST (DCCEEW, 2025) GHD (2025a)
Australian Fairy Tern	Vulnerable	Unlikely The PAA lacks suitable shallow wetland habitat. Modified wetland drainage sumps/ponds associated with the Kwinana Freeway is marginal and species' occurrence will be occasional to vagrant at most.	PMST (DCCEEW, 2025) GHD (2025a)
Australian Painted Snipe	Endangered	Unlikely This species known to occur regionally however the PAA is lacking suitable coastal shorelines. Occurrence may be limited to occasional fly-over.	PMST (DCCEEW, 2025) GHD (2025a)
Bar-tailed Godwit	Migratory	Unlikely. This species known to occur regionally however the PAA is lacking suitable coastal shorelines. Occurrence may be limited to occasional fly-over.	GHD (2025a)
Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo	Endangered (listed as Calyptorhynchus baudinii)	Unlikely. Not recorded during the survey however occurs regionally, with some suitable foraging habitat present within the PAA. The PAA is located on the western edge of current known foraging distribution and lies outside the known breeding range of this species. Baudin's Cockatoo should only be considered an occasional visitor in the context of temporary fly-over activity or rare foraging activity.	PMST (DCCEEW, 2025) GHD (2025a)
Black-tailed Godwit	Endangered, Migratory	Unlikely. This species known to occur regionally however the PAA is lacking suitable coastal shorelines. Occurrence may be limited to occasional fly-over.	GHD (2025a)
Broad billed Sandpiper	Migratory	Unlikely. The PAA lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting local wetlands and coastal areas along the Perth-Peel region.	GHD (2025a)
Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Endangered (listed as Calyptorhynchus latirostris)	Present Recorded during the field survey within PAA at several locations including birds sighted and extensive foraging evidence.	PMST (DCCEEW, 2025) GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
Common Greenshank, Greenshank	Endangered, Migratory	Unlikely. The PAA found to be lacking shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	PMST (DCCEEW, 2025) GHD (2025a)
Common Sandpiper	Migratory	Unlikely. This species known to occur locally from database records including The Spectacles wetland reserve located within 1 km west of the PAA. The PAA is lacking specific habitat requirements such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to occasional flyover during the seasonal occurrence of birds visiting local wetlands.	PMST (DCCEEW, 2025) GHD (2025a)
Crested Tern	Migratory	Unlikely. This species known to occur in local wetlands including several database records from Beeliar Regional Park wetlands and Thompsons Lake Nature Reserve areas located within 2 to 3 km of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Curlew Sandpiper	Critically Endangered, Migratory	Unlikely. This species known to occur locally from database records including Thompsons Lake located approximately 3 km west of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands. Sumps associated with road drainage may represent marginal foraging habitat.	PMST (DCCEEW, 2025) GHD (2025a)
Eastern Curlew, Far Eastern Curlew	Critically Endangered, Migratory	Unlikely. The PAA is lacking suitable coastal or estuarine shorelines. Occurrence may be limited to occasional fly-over.	PMST (DCCEEW, 2025) GHD (2025a)
Forest Red-tailed Black-Cockatoo, Karrak	Vulnerable	Present Recorded during the field survey within PAA at several locations including birds sighted and extensive foraging evidence.	PMST (DCCEEW, 2025) GHD (2025a)
Fork-tailed Swift	Migratory	Unlikely. Occurs locally on occasional basis however only aerial foraging or fly-over.	PMST (DCCEEW, 2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
			GHD (2025a)
Glossy Ibis	Migratory	Unlikely. The PAA lacks suitable shallow wetland habitat. Modified wetland drainage sumps/ponds associated with the Kwinana Freeway is marginal and species' occurrence will be occasional to vagrant at most.	GHD (2025a)
Great Knot	Critically Endangered	Unlikely. The PAA is lacking preferred coastal shoreline habitat. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Greater Sand Plover, Large Sand Plover	Vulnerable, Migratory	Unlikely. This species known to occur regionally however the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional vagrant at best.	PMST (DCCEEW, 2025) GHD (2025a)
Grey Plover	Migratory	Unlikely. This species known to occur locally from database records However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to seasonal flyover during bird's visitation of local wetlands.	GHD (2025a)
Grey Wagtail	Migratory	Unlikely. A vagrant visitor to southern Australia. Rarely recorded locally.	PMST (DCCEEW, 2025) GHD (2025a)
Lesser Sand Plover	Migratory	Unlikely. This species known to occur regionally however the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional vagrant at best.	GHD (2025a)
Little Ringed Plover	Migratory	Unlikely. This species known to occur locally from database records such as Yangebup Lake 2 km west of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Long-toed Stint	Migratory	Unlikely. The PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows	GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	
Malleefowl	Vulnerable	Unlikely The PAA lacks suitable habitat.	PMST (DCCEEW, 2025) GHD (2025a)
Marsh Sandpiper	Migratory	Unlikely. The PAA found to be lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Oriental Pratincole	Migratory	Unlikely. Occurs locally occasionally. Unlikely to occur but may hawk over the PAA on occasional or vagrant basis.	GHD (2025a)
Osprey	Migratory	Unlikely. This species known to occur locally from database records from local lakes including Thompsons Lake located approximately 3 km west of the PAA. However, the PAA lacks extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands.	GHD (2025a)
Pacific Golden Plover	Migratory	Unlikely. This species known to occur locally from database records including Thompsons Lake located approximately 3 km west of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands. Sumps associated with road drainage may represent marginal foraging habitat.	GHD (2025a)
Pectoral Sandpiper	Migratory	Unlikely. This species known to occur locally from database records such as Yangebup Lake – Beeliar Regional Park regionally located 2 km west of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to seasonal flyover during bird's visitation of local wetlands.	PMST (DCCEEW, 2025) GHD (2025a)
Red-necked Stint	Migratory	Unlikely.	GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		This species known to occur in local wetlands including several database records from Beeliar Regional Park wetlands and Thompsons Lake Nature Reserve areas located within 2 to 3 km of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	
Red-tailed Tropic Bird	Migratory	Unlikely. The PAA lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	GHD (2025a)
Red Knot, Knot	Vulnerable, Migratory	Unlikely. The PAA lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	PMST (DCCEEW, 2025) GHD (2025a)
Ruddy Turnstone	Migratory	Unlikely. The PAA lacks suitable habitat namely coastal or near-coastal tidal shoreline. Occurrence would be limited to occasional flyover during the seasonal occurrence of birds within the region.	GHD (2025a)
Ruff	Migratory	Unlikely. The PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Sanderling	Migratory	Unlikely. The PAA lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	GHD (2025a)
Sharp-tailed Sandpiper	Vulnerable, Migratory	Unlikely. This species known to occur locally from database records including Thomsons Lake located approximately 3 km west of the PAA. However, the PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands.	PMST (DCCEEW, 2025) GHD (2025a)
White-winged Tern	Migratory	Unlikely. This species known to occur including database record at Bibra Lake approximately 2km west of PAA regionally however the PAA is lacking extensive shallow wetlands,	GHD (2025a)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional fly-over or vagrant visitation.	
Wood Sandpiper	Migratory	Unlikely. The PAA found to be lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	GHD (2025a)
Mammals			
Chuditch, Western Quoll	Vulnerable	Unlikely. There is a recent database record from the PAA. This species is re-appearing in some areas of its former range in the wider Perth-Peel area due to feral predator control. However, the lack of extensive and connected suitable habitat on local scale obviates occurrence within PAA, although may occur as transient of vagrant visitation. Extensive camera trapping on Anketell Road and surrounding reserves did not find any evidence of Chuditch.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2024)
Numbat	Endangered	Highly Unlikely. There are historical regional records, although the PAA is beyond the current range for the species.	GHD (2025a)
Quokka	Vulnerable	Highly Unlikely. There are no local records and PAA is beyond the species' range.	GHD (2025a)
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit	Critically Endangered	Highly Unlikely. There are no local records and PAA is beyond the species' range.	PMST (DCCEEW, 2025) GHD (2025a)
Invertebrate			
Carter's Freshwater Mussel	Vulnerable	Unlikely. The PAA lacks suitable waterway habitat.	PMST (DCCEEW, 2025) GHD (2025a)
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	Vulnerable, Migratory	Highly unlikely. The PAA lacks suitable habitat.	PMST (DCCEEW, 2025) GHD (2025a)

5.2.1 Threatened orchids – further discussion to support likelihood assessment

Threatened orchid species were identified by the pre-survey likelihood of occurrence as likely or

possibly occurring within the survey area including *Caladenia huegelii*, *Diuris drummondii*, *Diuris micrantha*, *Diuris purdiei* and *Drakaea elastica*. Post-survey all were considered unlikely to occur due to the fragmentation and degradation of potential habitats that occur within the survey area and/or not finding any individuals despite sufficient survey effort during the optimal season for identification. Historic records within a 5 km buffer of the PAA are presented in Figure 9.

There is a record of *Caladenia huegelii* from 2006 within 30 m of the PAA near Beeliar Drive, therefore pre-survey this species was considered likely to occur. Searches undertaken within suitable habitat (such as Banksia woodland vegetation types) within the PAA during September 2024 did not find the species. However, it was recorded nearby within the Roe Highway verge and offset area during this respective survey (GHD, 2025b), so it was known that the seasonal timing was suitable to identify the species if present within the PAA. *Caladenia huegelii* occurs in areas of mixed Banksia – Jarrah woodland over dense shrubs such as *Stirlingia latifolia*, *Hypocalymma robustum*, *Hibbertia hypericoides*, *Xanthorrhoea preissii* and *Conostylis* spp. (DEC, 2009a). As areas of suitable habitat become more degraded, they are less likely to support the orchids associated *mycorrhizal fungus* or pollinating wasp (DEC, 2009a). Some areas of Banksia woodland, although disturbed were considered to provide suitable habitat, such as areas south of the Roe Highway interchange where the Banksia woodland was still somewhat structurally intact, however many of the areas which may have provided suitable habitat in the past, were considered to have become too degraded to support *Caladenia huegelii* due to loss of understorey and structural changes to canopy.

Drakaea elastica was considered likely to occur pre-survey due to presence of records in the vicinity of the PAA and potential areas of habitat specifically between south of Anketell Road to Thomas Road. A targeted survey conducted during July 2024, specifically targeted the habitat of this species when the leaf (identifying feature) is visible. It was found that the vegetation throughout this area consisted of narrow bands of remnant vegetation/potential habitat lying between the northbound Principal Shared Pathway (PSP) and firebreak along the boundary of land parcels east of Spectacles Road, and on the eastern side of Kwinana Freeway, there was a narrow band of vegetation occurring between the south bound lanes and firebreak and fenceline of adjacent blocks. Due to the edge effects on these narrow remnants and interface with planted vegetation, the areas potentially supporting this species were found to be significantly disturbed. *D. elastica* is known to be sensitive to disturbance as it requires sufficient canopy structure to prevent the desiccation of the orchid and associated mycorrhizal fungus, as well as the negative effect of weed invasion, as this species has a preference for bare sand habitats without competing species (DEC, 2009b). Based on the high levels of disturbance in areas of suitable habitat and survey effort, this species was considered unlikely to occur within the PAA post survey.

There are historic records of *Diuris drummondii* within 5 km of the PAA, with the closest records approximately 1.5 km east of the PAA (Jandakot, 1959) and 4 km west (Banganup Swamp, 1959) (WA Herbarium, 2025). Habitat includes low-lying depressions in peaty and sandy clay swamps, often in several centimetres of water (DEWHA, 2008). Wetland areas that occur within the PAA represent highly modified areas which are tied in with road drainage resulting in areas which would not provide suitable habitat for this species due to changes to hydrology and landform (such as deep standing water) and/or dominance by invasive species and *Typha* spp. and/or *Pteridium esculentum* (GHD, 2025a).

Diuris micrantha has been previously recorded within a winter wet swamp, approximately 330 m west of the PAA along Johnson Road, in an area of dense herbs such as *Wurmbea dioica* and *Tribonanthes* sp. and sedges bordered by *Melaleuca rhaphiophylla* (WA Herbarium, 2025). There is a continuation of these wetlands east of Johnson Road and intersecting the PAA. There is mixed planted shrubland immediately adjacent to the northbound freeway lanes, the footprint of the northbound PSP and then west of the PSP there is remnant vegetation of which a section of approximately 19 m wide intersects the PAA. This area was not considered to provide suitable habitat for *D. micrantha* due to presence of dense *Pteridium esculentum* (approximately 90% cover) (GHD, 2025a).

Previous records of *Diuris purdiei* occur to the east of the PAA, with the nearest approximately 5.6 km east. Previous records occur in a north to south corridor to the east of the PAA indicating that the PAA falls outside the currently known distribution of the species. *Diuris purdiei* grows on sand to sandy clay soils in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent *Melaleuca preissiana, Corymbia calophylla, Eucalyptus marginata* and *Nuytsia floribunda* (DEWHA, 2008). No suitable habitat for this species was identified within the PAA.

5.2.2 Organic Mounds TEC– further discussion to support likelihood assessment

The community is the assemblage of plants, animals and other organisms associated with a type of peatland that is found on the SCP in southwest WA. It is an assemblage of plants and invertebrates living on mounds of peat that have accumulated in areas of continuous groundwater discharge at the junction of the Guildford Clays and the Bassendean Sands on the SCP. The peat and surrounds provide a stable, permanently moist series of microhabitats (DCCEEW, 2023).

There is no vegetation or habitat that represents this community within the PAA.

The Organic Mounds TEC has been identified in 11 locations from Wellard to Muchea (DCCEEW 2023) with a geographical distribution of approximately 80 km. The total estimated area of these 11 locations is 26.5 ha. An additional 2.47 ha was identified from DBCA data for the CSQ2 occurrence, bringing the total estimated area to 28.97 ha across the SCP.

To provide local context, the buffered DBCA TEC/PEC database (DBCA 2024a) was queried for a 10 km buffer of the PAA. This identified four known occurrences:

- DuckpondSpring01, 0.7 ha (approximately 3.5 km east-southeast of the PAA)
- Wandi01, 2.6 ha (approximately 375 m east of the PAA)
- Wellard01, 2.7 ha (approximately 2.2 km east-southeast the PAA)
- CSQ2, 2.47 ha (within approximately 10 m east of the PAA)

The Interim Recovery Plan for the Organic Mounds TEC identifies the following habitat critical to the survival of the community, and important occurrences:

- The area of occupancy of known occurrences
- Areas of similar habitat within 200 metres of known occurrences
- Remnant vegetation that surrounds or links occurrences
- The local catchment for the surface and groundwater that maintain the habitat of the

community.

Although occurrence CSQ2 occurs in close proximity to the southernmost extent of the PAA, the Proposed Action will not clear vegetation or habitat that represents this community, with the vegetation in the PAA being predominantly mixed shrubland roadside revegetation. The freeway does occur within the surface water catchment for this occurrence, with the Proposed Action maintaining the current stormwater management, via capture and infiltration within basins/swales in land designated for 'roads'.

Construction groundwater abstraction will not occur within 800 m of occurrence Wandi01 or CSQ2 for the Proposed Action, with the PAA also being down gradient for groundwater flow. Given the scale and nature of the works proposed, no impacts to the Organic Mounds TEC from abstraction associated with the Proposed Action are expected. An assessment by Stream Environment and Water (2025) calculated potential aquifer drawdown using the Theis equation, which in Bassendean Sand was 42 cm drawdown at 400m radius, dropping to 16 cm at 600m and below 6 cm at 800 m radius. The 800 m buffer is proposed to ensure a negligible impact occurs from the Proposed Action.

Major threats to the Organic Mounds TEC include land clearing, declining groundwater levels and quality, weed invasion, fire that burns the peat layer, grazing and trampling by native or introduced herbivores, and declining rainfall (DBCA, 2023b). The Proposed Action is not likely to exacerbate any of these threats, with infiltration of stormwater within basins/swales, active weed management, improved access for fire response and no likelihood of increased herbivore activity.

5.3 Threatened Ecological Communities

5.3.1 Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the SCP TEC

A description of the Tuart TEC, in relation to the Proposed Action is presented in Table 5.3.

Table 5.3: Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain TEC

Aspect	Description
Ecology, abundance, distribution and habitat preferences	Ecology The Tuart TEC occurs on the SCP, along the Spearwood or Quindalup dunes. The primary defining feature is the presence of the Eucalyptus gomphocephala (Tuart) in the uppermost canopy, although this may occur with various other tree species. It can occur in a variety of forms; most commonly open forest, woodland and open woodland. There may be a substantial sub-canopy, dominated by *Agonis flexuosa*. The understorey is often relatively open, including many non-woody species from the Asteraceae, Cyperaceae, Restionaceae and Orchidaceae families (DEE, 2016a; 2019). Abundance Utilising current native vegetation extent data (DPIRD 2023) and data from the Atlas of Tuart Woodlands on the Swan Coastal Plain (DBCA, 2018), it is estimated that there is approximately 20,833 ha remaining of Tuart Woodlands across the SCP. Distribution The Tuart TEC occurs on the SCP in WA, from Jurien, approximately 200 km north of Perth, to the Sabina River, near Busselton, 225 km south of Perth (DEE, 2016a; 2019). Occurrence within 10 km of the PAA is shown in Figure 13. Critical Habitat The Tuart TEC Conservation Advice (DEE, 2016a; 2019) states that the following areas are critical to the survival of the Tuart TEC: • Areas within secure conservation reserves • Large patches that are not yet reserved • Areas maintaining ecological connectivity between significant patches. Threats Key threats to the community (DEE, 2016a; 2019) include: • Clearing and fragmentation of vegetation associated with: – Agriculture and grazing – Logging and timber removal – Urban development and infrastructure – Mining and Quarrying • Invasive flora and fauna: – Weeds – Invasive vertebrate animals – Invasive invertebrate animals • Tree dieback and pathogens • Altered fire regimes • Climate change • Water extraction and other hydrological change • Loss of fauna supporting key ecological processes.

<table>
<tr><td></td><td>Description and extent within the PAA
The Tuart TEC mapped by GHD (2025a, 2025b) have an extent of 3.04 ha in the PAA.
<table>
<tr><th rowspan="2">Keighery scale vegetation condition</th><th colspan="3">Vegetation Type</th><th rowspan="2">Area (ha)</th></tr>
<tr><th>EgBspp</th><th>Isolated Banksia species</th><th>Mixed Shrubland</th></tr>
<tr><td>Very good</td><td>0.87</td><td></td><td></td><td>0.87</td></tr>
<tr><td>Degraded</td><td>1.38</td><td></td><td></td><td>1.38</td></tr>
<tr><td>Completely Degraded</td><td></td><td>0.66</td><td>0.13</td><td>0.79</td></tr>
<tr><td>Total all conditions</td><td>2.25</td><td>0.66</td><td>0.13</td><td>3.04</td></tr>
</table></td></tr>
<tr><td>Quality and importance of known or potential habitat within the proposed action area and surrounds</td><td>The quality and importance of the Tuart TEC is considered low given the size and quality of the vegetation proposed to be cleared, that the vegetation does not provide connectivity between significant patches due to the existing Kwinana Freeway and road network. All the Tuart trees within the Tuart TEC that will be impacted by the proposal are small (less than 500mm DBH), with the majority within roadside vegetation of Degraded or Completely Degraded condition and the remainder being roadside vegetation that occurs within the 30 m buffer of Tuart canopy. Additionally, the Tuart TEC within the PAA only meets the condition and biotic thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA.</td></tr>
<tr><td>Extent within the PAA and Contextual Area</td><td>There is 3.04 ha of Tuart TEC in the PAA and 192.10 ha within the survey contextual area, which is a 500m buffer of the PAA. 201.82 ha of Tuart TEC occurs within a 1 km buffer of the PAA. Figure 12 provides mapping of Tuart TEC within the PAA.</td></tr>
<tr><td>Adequacy of any surveys undertaken</td><td>The field surveys (GHD, 2025a, b) were conducted during late winter to early spring (July to November 2024). This is within the recommended survey timing for flora and vegetation surveys within the South-West botanical province (EPA, 2016). Mapping and assessment criteria for the Tuart TEC have been applied to adequately analyse and map the occurrence of this community for the purposes of this assessment.</td></tr>
<tr><td>Methods, data analysis and scientific literature used to identify and assess the environmental values</td><td>The significance of the Tuart Woodlands of the SCP TEC occurrences within and adjacent to the PAA was assessed based on data collected during field surveys and consideration of the Conservation Advice (DEE, 2016a; 2019). The flora and vegetation survey was undertaken in accordance with the EPA Technical Advice (EPA, 2016).</td></tr>
</table>

5.3.2 Banksia Woodlands of the Swan Coastal Plain TEC

A description of the Banksia Woodlands TEC, in relation to the Proposed Action is presented in Table 5.4.

Table 5.4: Banksia Woodlands of the Swan Coastal Plain TEC

Aspect	Description
Ecology, abundance, distribution and habitat preferences	Ecology Banksia TEC typically occurs on well drained, low nutrient soils in sands of dune landforms, in particular deep Bassendean and Spearwood sands, or occasionally on Quindalup sands. It is also common on sandy colluvium and aeolian (wind-blown) sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau. A key diagnostic feature of this TEC is a prominent tree layer of Banksia, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. The community is characterised by a high endemism and considerable localised variation in species composition across its range (DEE, 2016b). Abundance The current extent of the Banksia TEC as of 2015 is estimated to be >335,000 ha covering within the subregions of Dandaragan, Perth and Jarrah Forests (DEE, 2016b). Broadly mapped vegetation complexes indicate there is approximately 190,260.18 ha of native vegetation across the SCP strongly associated with the Banksia Woodlands ecological community (DPIRD, 2023; GoWA, 2019). Distribution The Banksia TEC is restricted to the SCP IBRA bioregion and immediately adjacent areas, including the Dandaragan Plateau, from Jurien Bay in the north, to Dunsborough in the south, and northwest on the Whicher and Darling escarpments. Occurrence within 10 km of the PAA is shown in Figure 15. Critical Habitat The Banksia TEC Conservation Advice (DEE, 2016b) states the following areas are critical to the survival of the Banksia Woodlands TEC (DEE, 2016b): • All patches that meet the key diagnostic characteristics and condition thresholds for the ecological community, plus buffer zones • Areas that do not meet the minimum condition threshold but are: – Large patches that are not yet reserved – Areas maintaining ecological connectivity between patches • Certain vegetation components (sub-communities) of the Banksia Woodlands ecological community. Threats Key threats to the Banksia Woodlands of the SCP include (DEE, 2016b): • Clearing and fragmentation. This includes: – clearing for urban developments; – associated urban degradation/disturbance such as rubbish dumping, uncontrolled vehicle access, wildflower and seed harvesting; – clearing for agriculture and horticulture; and – mining for basic raw materials, mineral sands and silica sands, that involve vegetation clearing and hydrological impacts • Dieback diseases (especially those caused by *Phytophthora* species)

<table>
<tr><th>Aspect</th><th>Description</th></tr>
<tr><td></td><td>

Invasive species
Fire regime change
Hydrological degradation (groundwater abstraction, eutrophication, soil acidification)
Climate change (increasing temperatures, declining rainfall, changing rainfall timing)
Grazing (including overabundance of kangaroos particularly in peri-urban reserves)
Decline in pollinating and seed dispersing fauna
Loss of keystone Banksia species and fragmenting of nectar/pollen nutritional networks.

<u>Description and extent of this TEC vegetation within the PAA</u>
The Banksia TEC mapped by GHD (2025a, 2025b) have an extent of 7.24 ha in the PAA.
<table>
<tr><th rowspan="2">Keighery scale vegetation condition</th><th colspan="3">Vegetation Type</th><th rowspan="2">Area (ha)</th></tr>
<tr><th>BmBa</th><th>EgBspp.</th><th>EmBspp.</th></tr>
<tr><td>Very good</td><td>0.14</td><td>1.33</td><td></td><td>1.47</td></tr>
<tr><td>Good</td><td>0.30</td><td>0.57</td><td>0.08</td><td>0.95</td></tr>
<tr><td>Degraded</td><td>0.79</td><td>2.85</td><td>1.02</td><td>4.67</td></tr>
<tr><td>Completely degraded</td><td>0.15</td><td></td><td></td><td>0.15</td></tr>
<tr><td>Total all conditions</td><td>1.38</td><td>4.75</td><td>1.10</td><td>7.24</td></tr>
</table>
</td></tr>
<tr><td>Quality and importance of known or potential habitat within the proposed action area and surrounds</td><td>Although the vegetation within the Proposed Action does not meet the key diagnostic characteristics and condition thresholds, when considered as part of a larger patch associated with adjoining vegetation, it represents Banksia TEC. Proposal likely to impact on mostly degraded vegetation on the edge of five Banksia TEC patches.</td></tr>
<tr><td>Extent within the PAA and Contextual Area</td><td>There is 7.24 ha of Banksia TEC in the PAA and 5,008.61 ha within the survey contextual area, which is a 500m buffer of the PAA. 10,875.08 ha of Banksia TEC occurs within a 1 km buffer of the PAA. Figure 14 provides mapping of Banksia Woodlands TEC within the survey contextual area.</td></tr>
<tr><td>Adequacy of any surveys undertaken</td><td>The field surveys (GHD 2025a, GHD 2025b) were conducted during late winter to early spring (July to November 2024). This is within the recommended survey timing for flora and vegetation surveys within the South-West botanical province (EPA, 2016). Mapping and assessment criteria for the Banksia TEC have been applied to adequately analyse and map the occurrence of this community for the purposes of this assessment.</td></tr>
<tr><td>Methods, data analysis and scientific literature used to identify and assess the</td><td>The significance of the Banksia TEC occurrences within and adjacent to the PAA was assessed based on data collected during field surveys and consideration of the Conservation Advice (DEE 2016b). The flora and vegetation survey was undertaken in accordance with the EPA Technical Advice (EPA 2016).</td></tr>
</table>

Aspect	Description
environmental values	

5.4 Threatened Fauna

5.4.1 Black Cockatoos

A description of both Carnaby's Cockatoo and FRTBC, in relation to the Proposed Action is presented in Table 5.5.

Table 5.5: Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo

Aspect	Description
Ecology, abundance, distribution and habitat preferences	Ecology Carnaby's Cockatoo is 53-58 cm in length and is mostly black, with white cheek patches, large white panels on the tail and a curved beak. Carnaby's Cockatoo are a very mobile species with movements throughout the year determined by nesting and feeding. From early Summer through Autumn to Winter the species live in higher rainfall coastal or near coastal areas in large flocks. July is the beginning of the move back out to Wheatbelt in search of suitable nesting hollows. Up to 12 km is a reasonable distance for the species to fly from the hollow in search of food and they are assisted in their navigation between sites by corridors or patches of vegetation (DPaW, 2013). The FRTBC is 55 - 60 cm in length and are mostly glossy black with a pair of black central tail feathers, a crest, robust beak and bright red, orange and yellow barring in the tail. The male is distinguished by broad red tail panels that are only visible when alighting. The female is distinguished by yellow or whitish spots on the feathers of the head and upper wing (DEWHA, 2009). The movements of FRTBC are irregular and they can now be found on the SCP at any time of year in search of food. The species leave roosts at sunrise and feed in small family groups of up to 10 birds, usually within 4 km of the roost. The young of the species are fed by the parents for three to four months after fledging (DEC, 2008). Abundance The total population of Carnaby's Cockatoo has been estimated between 11,000 and 60,000 individuals and is considered to exist as one large, interconnected population (DPaW, 2013). FRTBC occurs in one population of approximately 15,000 individuals (DEWHA, 2009). Distribution Carnaby's Cockatoo distribution extends into the Wheatbelt north to Kalbarri and east to Esperance (DPaW 2013). FRTBC generally occur within forested areas southeast of Perth to Albany, however in recent years their distribution has expanded on to the SCP north to around Mindarie (DWEHA, 2009). Habitat Preferences Black Cockatoos are known to utilise a range of habitats and plant species for foraging (including introduced species such as pines, **Pinus* spp.), although Marri and Jarrah woodlands are particularly important to FRTBC. Proteaceous plant species (i.e. shrublands dominated by *Banksia, Hakea* and *Grevillea* spp.) are also utilised by Carnaby's Cockatoo (DAWE, 2022). Black Cockatoo breeding habitat, as defined in the Commonwealth referral guidelines (DAWE, 2022) contains known, suitable or potential nesting trees:

<table>
<tr><th>Aspect</th><th>Description</th></tr>
<tr><td></td><td>

Known Nesting Trees: Trees which contains a hollow where black cockatoo breeding has been recorded, or which demonstrates evidence of breeding.
Suitable nesting trees: Trees with suitable nesting hollows present, although no evidence of use.
Suitable nest hollow: Any hollow with dimensions suitable for use for nesting by black cockatoos. Characteristics of hollows used by each species is available in the SPRAT database. Suitable nest hollows are only found in live trees with a DBH of at least 500 mm.
Potential nesting trees: Trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH.

<u>Threats</u>
Primary threats to Black Cockatoos as described in DAWE (2022) are:

Habitat loss and habitat degradation (loss of foraging habitat, breeding hollows, habitat connectivity, habitat quality)
Interactions with humans (vehicle strikes, agriculture protection measures, disturbance from noise/light, poaching)

DEC (2008) states that the feral Honeybee can form long-term hives in tree hollows and can kill nesting females and chicks in the nest by stinging. After illegal shooting, feral Honeybees are the most significant current threat to the ability of Black Cockatoos to survive and breed (DEC, 2008).

<u>Breeding Parameters</u>
Carnaby's Cockatoo nest in hollows in live or dead trees of Salmon Gum, Wandoo, Tuart, Jarrah, Flooded Gum, York Gum, Powderbark, Karri and Marri with a hollow depth ranging from 0.5 to over 2 m (Saunders, 2014). FRTBC nest in hollows in live or dead trees of Karri, Bullich, Swan River Black Blackbutt, Tuart and Jarrah with a hollow depth ranging from 1 -5 m (Johnstone, 2011).
The breeding timing of the two species is as follows (DAWE, 2022):

Carnaby's Cockatoo: localised breeding may occur from July to December on the SCP
FRTBC: breeding on the SCP may occur in some locations containing suitable breeding tree species, including the Perth metropolitan area. FRTBC may breed at any time of the year, with peaks in April to June and August to October

<u>Species presence and habitat within the PAA</u>
There is 16.24 ha of Carnaby's Cockatoo foraging habitat in the PAA (Figure 16) (GHD, 2025a; b).

<table>
<tr><th>Bamford Impact Quality Score</th><th>Area (ha)</th></tr>
<tr><td>6 (Moderate)</td><td>14.97</td></tr>
<tr><td>5 (Moderate)</td><td>1.27</td></tr>
<tr><td>Total</td><td>16.24</td></tr>
</table>

There is 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality FRTBC foraging habitat in the PAA (Figure 18)(GHD, 2025a; b).
</td></tr>
</table>

<table>
<tr><th>Aspect</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Bamford Impact Quality Score</th><th>Area (ha)</th></tr>
<tr><td>7 (Moderate – High)</td><td>0.92</td></tr>
<tr><td>4 (Low – Moderate)</td><td>8.43</td></tr>
<tr><td>2 (Low)</td><td>6.89</td></tr>
<tr><td>Total</td><td>16.24</td></tr>
</table>

Twelve suitable DBH trees occur within the PAA, all without hollows, see Figure 20.</td></tr>
<tr><td>Extent of habitat across distribution</td><td>The Proposed Action is located within the mapped distribution of Carnaby's Cockatoo and FRTBC (DAWE, 2022).
The Proposed Action will contribute to the loss of black cockatoo habitat on the SCP. This habitat includes black cockatoo potential breeding habitat (suitable DBH trees without hollows) and foraging habitat for Carnaby's Cockatoo and FRTBC.
It is estimated there is approximately 499,563.41 ha of Carnaby's Cockatoo foraging habitat and 120,468.05 ha of FRTBC foraging habitat across the SCP. Suitable foraging habitat available for Black Cockatoos within the local contextual area of the PAA is shown in Figure 17 and Figure 19.
Black Cockatoo confirmed and unconfirmed roosting sites in the vicinity of the PAA are presented in Figure 21.</td></tr>
<tr><td>Adequacy of any surveys undertaken</td><td>The field surveys (GHD 2025a, GHD 2025b) were conducted during late winter to early spring (July to November 2024). This is within the recommended survey timing for flora and vegetation surveys within the South-West botanical province (EPA, 2016). The Black Cockatoo field surveys were undertaken by suitably qualified and experienced personnel, with appropriate seasonal times and no site access limitations. Targeted Black Cockatoo surveys identified, described and mapped breeding, foraging and roosting habitat as well as presence or evidence of black cockatoos. The survey area covers 285.44 ha and includes the entirety of the Kwinana Freeway Widening PAA. The report also covers a Contextual area (500 m buffer around the survey area) and a Study area (5 km buffer around the survey area).</td></tr>
<tr><td>Methods, data analysis and scientific literature used to identify and assess the environmental values</td><td>The significance of potential foraging and breeding habitat was assessed based on data collected from within and surrounding the PAA during field surveys, consideration of EPBC Act referral guidelines (DAWE, 2022), the Carnaby's Cockatoo Recovery Plan (DPaW, 2013) and Forest Red tailed Black Cockatoo Recovery Plan (DEC, 2008).</td></tr>
</table>

6 ASSESSMENT OF IMPACTS

6.1 Direct impacts

This section addresses the Proposed Action's potential direct and indirect impacts on MNES that are likely to be present within and adjacent to the PAA. The potential impacts on each MNES are assessed in accordance with the document Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE, 2013). Recovery plans, conservation advice and other relevant guidance considered applicable to specific MNES. Table 6.1 below summarises the Proposed Action's potential impacts. With appropriate management, mitigation and monitoring measures (Section 8), no indirect impacts on MNES are expected.

Table 6.1 Summary of direct impacts

MNES	Direct Impact
Tuart TEC	Loss of 3.04 ha (0.87 ha Very Good, 1.38 ha Degraded and 0.79 ha Completely Degraded)
Banksia TEC	Loss of 7.24 ha (1.47 ha Very Good, 0.95 ha Good, 4.49 ha Degraded and 0.33 ha Completely Degraded)
Black Cockatoo Species	Loss of 16.24 ha of Moderate quality Carnaby's Cockatoo foraging habitat Loss of 0.92 ha of Moderate – High, 8.43 ha of Low - Moderate and 6.89 ha of Low quality FRTBC foraging habitat Loss of 12 suitable DBH trees, all without hollows

6.2 Indirect impacts

Indirect impacts that could impact on MNES are summarised in Table 6.2. How these relate to the context of the Proposed Action are discussed below.

Table 6.2 Summary of indirect impacts

Indirect impacts	Tuart TEC	Banksia TEC	Black Cockatoo habitat
Loss of patch (threshold not met)	Unlikely	Unlikely	
Fragmentation and edge effect	Unlikely	Unlikely	Unlikely
Weeds	Unlikely	Unlikely	Unlikely
Dieback	Unlikely	Unlikely	Unlikely
Fire regimes	Unlikely	Unlikely	Unlikely
Vehicle strike			Unlikely
Movement barriers			
Abiotic (hydrology, salinity, soils)	Unlikely	Unlikely	Unlikely
Noise, light, vibration and dust			Unlikely

6.2.1 Loss of patch viability (threshold no longer met)

The TECs within the PAA have minimum size – quality thresholds that determine if the patch is considered representative of the TEC. The Proposed Action is linear and intersects and partially clears some patches. An assessment was completed for each TEC patch to determine if the patch extent remaining still meets the thresholds.

The loss of patch viability has been considered for Tuart and Banksia TEC (sections 6.3.1.1 and 6.3.2.1).

6.2.2 Fragmentation and edge effects

The Proposed Action proposes to upgrade the existing Kwinana Freeway. Clearing will be limited to road widening at the edge of the existing road, as well as the construction of Principle Shared Paths and noise walls within the road reserve. Almost the entire PAA has been previously impacted by the existing freeway and land uses to the east and west, having been historically cleared for agriculture, urban and commercial development.

Given the majority of the works relates to the widening of an existing freeway, the Proposed Action is not expected to result in increased fragmentation and edge effects causing impacts to MNES.

6.2.3 Introduction and/or spread of weeds

The PAA contains common weeds and two WonS species.

Main Roads routinely manage weeds and has established mitigation and monitoring measures detailed in Section 8.

All construction works that involve earthworks has the potential to spread weeds into adjacent native vegetation. However , given the high level of weed infestation currently within the PAA and surrounds, and mitigation measures to be implemented, the Proposed Action is not expected to result in the introduction or spread of weeds that could results in an increased risk of impacts to MNES.

6.2.4 Introduced and/or spread of *Phytophthora cinnamomi* Dieback

Phytophthora cinnamomi dieback caused by the plant pathogen, *Phytophthora cinnamomi* kills susceptible plant species including Banksia and Jarrah.

The Proposed Action has a limited potential to spread of *Phytophthora* dieback through the movement of vehicles and equipment during construction and because of relatively minor fill and cut requirements. Vehicle and soil movement will be controlled to minimise the potential of dieback spread occurring.

The Proposed Action will incorporate construction dieback hygiene measures to protect uninfested protectable vegetation. The Proposed Action will control dieback spread to protectable areas along the PAA boundary by:

- control of vehicle / equipment access to protectable areas
- equipment and vehicles washing/segregation
- control of soil movement.

These controls with be monitored and enforced.

Soil harvested from infested or unidentified areas will not be reused in protectable areas.

Whilst a dieback survey has been commissioned to inform this approach, as the majority of the PAA has been highly disturbed and is in Degraded or Completely Degraded condition, it is expected the dieback mapping will be limited and as such standard hygiene management measures will be applied.

The majority of the PAA has been highly disturbed. It is noted the largest area that contains Very Good condition vegetation is on a hillside near the Roe Highway interchange, with drainage running away from the road reserve boundary, towards the road.

The Proposed Action is not expected to spread *Phytophthora cinnamomi* through sediment in stormwater runoff as stormwater will be captured and infiltrated within basins/swales in the road reserve.

The Proposed Action is not expected to result an increased risk of *Phytophthora* dieback causing impacts to MNES.

6.2.5 Increased risk of fire

Fire has the potential to affect MNES values including TECs and fauna habitat.

The Proposed Action's construction activities produce fire ignition sources from hot works such as grinding or welding, however with the implementation of standard management measures, the Proposal's risks are considered low.

The Proposal will not change operational risk of fire due to the existing Kwinana Freeway. As the Proposed Action is within the Perth metropolitan area, emergency fire service response to fire would be rapid and early containment is likely.

The Proposed Action is not expected to result an increased risk of fire causing impacts to MNES.

6.2.6 Increased risk of vehicle strike

A study into the road trauma hot spots for Black Cockatoo (Coyle, 2021), identified that the freeway south of the Roe Highway interchange has a very low hotspot intensity for both Carnaby's Cockatoo and FRTBC – vehicle collisions.

As the Proposed Action relates to the widening of the existing freeway, it is not considered that the Proposal will have any effect on the risk of vehicle strike to Black Cockatoo.

Johnstone and Kirby (2009) notes Carnaby's Cockatoo are most commonly killed via vehicle strikes when drinking from roadside puddles. Given the presence of emergency lanes and the need to avoid water pooling on the road surface, there is little availability of water near the carriageways for Black Cockatoos to drink.

The location of the foraging habitat within the Proposal is adjacent to a major Freeway, which is not a preferred location for bird use. The risk of vehicle strike is likely to be reduced through the removal of habitat in close proximity to the road.

The existing placement of roadside revegetation, which has created Black Cockatoo foraging habitat is not consistent with current guidance or Main Roads standards. Therefore, to minimise the likelihood of vehicle strike to Black Cockatoos, no foraging species will be intentionally replanted within 10 metres of the edge of the road, resulting in a greater separation distance to what is currently present.

6.2.7 Movement barriers

Although it is approximately 20 km in length, the Proposed Action relates to the relatively minor widening of an existing freeway. The existing Kwinana Freeway is a barrier to ground dwelling fauna movement only, with the Proposal unlikely to increase or change this impact.

6.2.8 Abiotic aspects

Acid Sulphate Soils and soil contamination

Construction activities including excavation have the potential to expose acid sulfate soils (ASS).

The implementation of standard management measures when undertaking excavation and piling will adequately manage potential ASS related impacts from occurring. Accordingly ASS impacts are not expected to affect MNES values including TECs or fauna habitat.

Earthworks will be largely contained to areas previously disturbed by previous freeway construction activities. If contaminated material is identified, its management will be actioned using an unexpected finds protocol, adhering to requirements in accordance with the *Contaminated Sites Act 2006*.

Water quality/contamination

The existing Kwinana Freeway and interchanges have modified surface water flows. The Proposed Action is unlikely to alter these surface water flows previously modified to accommodate stormwater. Vegetation clearing within the PAA will not be of sufficient scale to cause substantial hydrological changes in the local area.

To maintain existing water quality, the Proposed Action will implement standard management measures to control contamination, erosion, sedimentation and drainage.

Dewatering

The depth to groundwater is approximately 5-30m below ground level across the PAA (DWER 2023).

Temporary and targeted dewatering may be required to install some road structures such as bridges infrastructure over the rail south of Roe Highway and utility corridors that intersect the Kwinana Freeway. Potential environmental impacts from construction dewatering will be assessed and appropriate controls will be applied, including conditions required for groundwater abstraction licences.

Department of Water and Environmental Regulation (DWER) will determine the level of hydrogeological assessment required, including any modelling and assessment of impacts on groundwater dependent ecosystems during the assessment of a groundwater abstraction licence application as per Operational policy 5.12 (DWER, 2009) under the *Rights in Water and Irrigation Act 1914* (RIWI Act). With the RIWI Act requirements, any required dewatering activities will likely only have a minor temporary impact to MNES at worst, which will be reversed once dewatering is concluded with no long term impact remaining.

Construction water

The Proposed Action will require construction water, with the source of this yet to be determined. If groundwater abstraction is required as a source for construction water, potential environmental impacts will be assessed and appropriate controls will be applied, including conditions required for

abstraction licences.

DWER will determine the level of hydrogeological assessment required, including any modelling and assessment of impacts on groundwater dependent ecosystems during the assessment of a groundwater abstraction licence application as per Operational policy 5.12 (DWER, 2009) under the RIWI Act.

An assessment by Stream Environment and Water (2025) calculated potential aquifer drawdown using the Theis equation, which in Bassendean Sand was 42 cm drawdown at 400m radius, dropping to 16 cm at 600m and below 6 cm at 800 m radius. Construction groundwater abstraction will not occur within 800 m of the Organic Mounds TEC occurrence Wandi01 or CSQ2 to ensure a negligible impact occurs from the Proposed Action.

No MNES will be impacted by the temporary taking of water for construction water.

6.2.9 Noise, light, vibration and dust

The potential impact to Black Cockatoos is considered negligible. No active breeding was recorded within or adjacent to the PAA and no known roosting habitat was recorded within the PAA.

Main Roads will implement standard management measures such as water sprinkling on exposed grounds, restricting vehicles access and controlling speeds to supress dust generation.

The Proposed Action to an upgrade the existing Kwinana Freeway is not expected to impact any of the MNES values present within the PAA.

6.3 Assessment of Impacts on MNES

This section provides an assessment of the significance of the impacts of the Proposed Action on specific protected matters, assessed against the Significant Impact Guidelines 1.1 (DoE, 2013).

6.3.1 Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the SCP TEC

6.3.1.1 Tuart TEC Patch assessment

The Proposal will impact up to 3.04 ha of Tuart TEC, with 2.17 ha mapped as Degraded to Completely Degraded. All the Tuart trees within the Tuart TEC that will be impacted by the proposal are small (less than 500mm DBH), with the majority within roadside vegetation of degraded condition and the remainder of the TEC vegetation being roadside vegetation that occurs within the 30 m buffer of Tuart canopy. Additionally, the Tuart TEC within the PAA only meets the condition and biotic thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA, that occurs within Class A reserve linked to The Spectacles and a Main Road environmental offset site.

Clearing will occur on the edges of three patches that intersect the PAA. An assessment was completed to determine whether the remaining vegetation extent within each patch still meets the size/quality thresholds to remain a viable patch.

As shown in Table 6.3, all three patches will be reduced in size but still meet the size and condition thresholds to remain Tuart TEC patches.

Table 6.3: Clearing impacts to Tuart Woodlands and Forests of the SCP TEC patches mapped within the PAA

Patch ID	Size of patch overall (ha)	Condition rating within PAA (ha)		Extent within PAA (ha)	Extent within PAA (%)	Comments
RoeTT01	4.94	Very Good	0.87	1.66	33.60	Clearing northern portion of patch. Patch size reduced to <5 ha. Remaining part pf patch assessed by GHD (2025b) and is in very good condition and meets biotic thresholds. Remains Tuart TEC patch.
		Completely Degraded	0.79			
TT01	11.08	Degraded	0.68	0.68	6.13	Clearing on western edge of patch. Patch will meet size threshold (>5 ha) post clearing. Remains Tuart TEC patch.
TT02	8.12	Degraded	0.70	0.70	8.62	Clearing on eastern edge of patch. Patch will meet size threshold (>5 ha) post clearing. Remains Tuart TEC patch.

6.3.1.2 Assessment of significance

Table 6.4 provides an assessment of the potential impact of the Proposed Action to the Tuart TEC using the Critically Endangered and Endangered ecological communities significant impact criteria (DoE, 2013).

No large (DBH greater than 500mm) Tuart trees within the boundary of the Tuart TEC are present within the PAA. Furthermore, the extent of the patches in the PAA are vegetation adjacent to the exiting road in mostly Degraded or Completely Degraded condition or occurs within the 30 m buffer of Tuart canopy.

Given the above, and the fact the Tuart TEC within the PAA only meets the condition and biotic thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA, it is considered that that Proposed Action is unlikely to have a significant impact on the Tuart TEC.

Table 6.4: Assessment of significant impact criteria for Tuart Woodlands and Forests of the SCP TEC

Criteria	Assessment
Reduce the extent of an ecological community	The Proposed Action will result in the clearing of up to 3.04 ha. As the vegetation impacted is roadside vegetation with no large Tuarts impacted, the impacted patches will remain viable and continue to represent Tuart TEC patches (Figure 12). The landscape where the Tuart TEC community occurs has been heavily cleared, with approximately 80-86 % of the estimated original extent cleared (DEE, 2019). The

Criteria	Assessment
	current extent of the Tuart TEC as of 2015 is estimated to be >17,000 ha across its range (DEE, 2019). Regionally it is estimated there is 20,833 ha of Tuart Woodlands across the SCP. The Proposed Action will impact 0.01% of the total area of occupancy of this TEC. At a local context the Proposed Action occurs within the range of the TEC with areas of potential TEC lying to the north, south and west of the PAA. The Proposed Action will impact 0.01% of the 25,057 ha of remnant vegetation associated with the TEC identified within 10 km of the PAA. The proposed clearing only occurs within the Primary regional roads reserve specified the Western Australian MRS, with the remainder of the patches occurring within Class A reserve and an environmental offset site, which remain protected from additional impacts. The Proposed Action will only result in a minor reduction in the overall extent of the Tuart TEC, with no reduction in the spatial distribution. **Unlikely to be significant.**
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The PAA is located adjacent and parallel to existing cleared corridors and will not disrupt linkages between the TEC and adjacent green corridors. The Proposed Action will not fragment patches of Tuart TEC. Each patch impacted by the Proposed Action has been previously impacted by the existing road network and urban development. The clearing of Tuart TEC will occur on the edge of each patch, so as not to bisect a patch. As shown in Table 6.3, all Tuart TEC patches impacted will be reduced in size but still meet the size and condition thresholds to remain Tuart TEC patches. Clearing for the Proposal's is not expected to adverse alter the viability of these patches or reduce the connectivity between them due to existing fragmentation. **Unlikely to be significant.**
Adversely affect habitat critical to the survival of an ecological community	The Proposed Action is unlikely to affect habitat critical to the survival of the Tuart TEC, given the vegetation proposed to be cleared is not within a conservation reserve, are mostly degraded in nature, do not contain large Tuarts and do not provide connectivity between significant patches due to the existing Kwinana Freeway and road network. The Proposed Action will reduce the extent of Patch RoeTT01 by 33.60% (1.66 ha), Patch TT01 by 6.13% (0.68 ha), and Patch TT02 by 8.62% (0.70 ha). However, two of remaining patches (TT01 and TT02) impacted by the Proposed Action are associated with conservation reserves, with the third (Roe TT01) occurring within an offset area adjacent to the PAA (Figure 12). The patch located at the Roe Highway interchange (RoeTT01) contains three small Tuart individuals, with no large Tuarts present. The condition of the vegetation within this patch has been mapped as Very Good (0.87 ha) to Completely Degraded (0.79 ha). For the small sections of Tuart TEC patches TT01 (0.68 ha) and TT 02 (0.70 ha) that intersect the PAA, no large Tuarts occur. The condition of the road verge vegetation within these two patches is considered to be Degraded. Given only small Tuarts within the Tuart TEC are likely to be impacted by the Proposal and that the buffer vegetation being impacted is mostly Degraded or Completely Degraded and mostly consists of roadside vegetation, it is considered the Proposed Action is unlikely to adversely affect habitat critical to the survival of an ecological community. **Unlikely to be significant.**

Criteria	Assessment
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Clearing for the Proposed Action is not expected to be of sufficient scale to cause substantial hydrological changes in the local area. Drainage design will consider the existing freeway and local drainage network. The Proposed Action drainage strategy is to use permeable base pits via infiltration basins and swales where possible to infiltrate surface water runoff and minimise runoff outside of the PAA. Infiltration of surface water runoff within the PAA will maintain the existing hydrological regimes. The Proposed Action may result in short-term changes to groundwater levels and groundwater flow where temporary dewatering may be required during construction. Dewatering, if required, may cause temporary and localised groundwater drawdown and is not expected to cause significant or long term, irreversible impacts to TEC patches adjacent to the PAA. DWER will determine the level of hydrogeological assessment required, including any modelling and assessment of impacts on groundwater dependent ecosystems during the assessment of a groundwater abstraction licence application as per Operational policy 5.12 (DWER 2009) under the RIWI Act. Where appropriate, the Proposed Action will incorporate harvesting and reuse of topsoil within the PAA to ensure that local soil resources are maintained and support buffers of native vegetation within the road reserve, to enhance protection of adjacent TEC patches. The Proposed Action will use native species on local topsoil for landscaping, restrict the use of fertilisers to the establishment phase of landscaping on a case-by-case basis, and incorporate treatment of stormwater during infiltration. Accordingly, the Proposed Action is not expected to result in a substantial change in nutrient cycles that could impact TEC patches adjacent to the PAA. Accordingly, the Proposed Action is not expected to substantially modify or destroy abiotic factors that could impact adjacent TEC patches. **Unlikely to be significant.**
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	The Proposed Action will not cause a substantial change to the species composition of the Tuart TEC adjacent to the PAA. Weeds will be managed through standard routine road maintenance activities and planting of native landscaping within the road reserve (where possible) will provide a buffer to adjacent TEC patches. Standard Dieback hygiene measures will be implemented to ensure that Dieback is not introduced or spread as a result of implementation of the Proposed Action. No burning will be undertaken on the road reserve and no flora/fauna harvesting will occur following completion of clearing activities for the Proposed Action. Implementation of the Proposed Action is not expected to cause substantial changes in the species composition of the Tuart TEC patches adjacent to the PAA . This has not occurred as a result of the existing freeway, which has similar impacts to the Proposed Action. Similarly, no decline or loss of functionally important species is expected to occur. **Unlikely to be significant.**
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to	The Proposed Action is not expected to result in a substantial reduction in the quality or integrity of Tuart TEC patches retained adjacent to the PAA. The Proposed Action involves the clearing of up to 3.04 ha of Tuart TEC (Figure 12). Although the Proposed Action will reduce the extent of the three Patches by up to 3.04 ha within the PAA, these patches will remain viable and in similar or better condition than the portion within the PAA. The Proposed Action is not expected to result in the introduction or spread of weeds that will significantly impact Tuart TEC surrounding the PAA. Weeds will be managed through standard routine road maintenance activities and planting native species on local topsoil for landscaping within the road reserve (where possible). The Proposed Action will restrict the use of fertilisers to the establishment phase of landscaping on a case-by-case basis, and incorporate treatment of stormwater during infiltration.

Criteria	Assessment
become established, or • Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	Ongoing road maintenance will be undertaken to prevent spread of weeds into adjacent Tuart TEC patches. Accordingly, the Proposed Action is not expected to result in a substantial change in nutrient cycles that could impact TEC patches within or adjacent to the PAA. **Unlikely to be significant.**
Interfere with the recovery of an ecological community	Currently there is no recovery plan in place for the Tuart TEC. The conservation advice instead outlines priority research and conservation actions (DEE, 2019). Priority protection and restoration actions outlined in the conservation advice report includes the protection of the Tuart TEC from further loss of extent and condition particularly in high conservation value areas, the restoration of the TEC within the species' original range and the communication with and support of researchers and other personnel considered important to the recovery of the species (DEE, 2019). The Proposed Action will not interfere with restoration and communication efforts implemented to aid the recovery of the TEC. Planning and design considerations for the Proposed Action align with relevant protection and recovery measures in the Approved Conservation Advice, including: • Preventing invasion by weeds, introduced animals, dieback and other diseases, detrimental fire impacts and grazing damage • Re-vegetation and regeneration (landscaping). Given the proposed planning and design considerations; and implementation of standard construction and operation measures, the Proposed Action is not expected to interfere with the recovery of the Tuart TEC. **Unlikely to be significant.**
Conclusion	Based on the above assessment against the *Significant Impact Guidelines 1.1* (DoE 2013), the Proposed Action is unlikely to result in a significant impact to Tuart TEC, given no large Tuart trees within the TEC will be impacted, the degraded nature of the majority of the Tuart TEC within the PAA, that the TEC vegetation to be impact is located on the edge of the TEC and that, of the 3.04 ha of TEC being impacted, all but 0.9 ha is in Degraded or worse condition. Indirect impacts will be avoided through standard construction management practices when implementing the Proposed Action, to prevent significant impacts outside the PAA.

6.3.2 Banksia Woodlands of the Swan Coastal Plain TEC

6.3.2.1 Banksia TEC patch assessment

Construction of the Proposal is likely to result in the direct loss of up to 7.24 ha of the Banksia TEC, of which 1.47 ha was mapped as being in Very Good condition, and 0.95 ha was mapped as being in Good condition with 4.82 ha mapped as being Degraded or worse condition. Banksia TEC within the PAA is only considered to meet the size and condition thresholds to be considered a patch due to the quality and quantity of the adjacent vegetation outside the PAA.

Clearing will occur on the edges of five patches that intersect the PAA. An assessment was completed to determine whether the remaining vegetation extent within each patch still meets the size/quality thresholds to remain a viable patch.

As shown in Table 6.5 and Figure 14 , patches BT02, BT03, BT04, BT05, and BT06 will reduced in size but remain greater than 2 ha with vegetation in Good or better condition to remain a Banksia TEC patch.

Table 6.5: Clearing impacts to Banksia Woodlands of the SCP TEC patches mapped within the PAA

Patch ID	Size of patch overall (ha)	Condition rating within PAA (ha)		Extent within PAA (ha)	Extent within PAA (%)	Comments
BT02	14.27	Very Good	0.86	1.64	11.49	Clearing on edge of patch. Patch will meet size threshold and condition thresholds (>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
		Good	0.57			
		Degraded	0.21			
BT03	17.76	Very Good	0.12	1.37	7.71	Clearing on edge of patch. Patch will meet size threshold and condition thresholds (>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
		Good	0.30			
		Degraded	0.80			
		Completely Degraded	0.15			
BT04	62.59	Very Good	0.49	1.79	2.86	Clearing of mostly degraded vegetation on edge of patch. Patch will meet size threshold and condition thresholds (>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
		Degraded	1.30			
BT05	7.15	Good	0.08	1.11	15.52	Clearing of mostly degraded vegetation on edge of patch. Patch will meet size threshold and condition thresholds (>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
		Degraded	1.03			
BT06 and BT07	51.94	Degraded	1.15	1.33	2.56	Clearing of degraded vegetation on edge of patch. Patch will meet size threshold and condition thresholds (>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
		Completely Degraded	0.18			

6.3.2.2 Assessment of significance

Table 6.6 provides an assessment of the potential impact of the Proposed Action to the Banksia TEC using the Critically Endangered and Endangered ecological communities significant impact criteria (DoE, 2013).

The assessment concludes that the Proposed Action is not likely to have a significant impact on the Banksia TEC.

Table 6.6: Assessment of significant impact criteria for Banksia Woodlands of the SCP TEC

Criteria	Assessment
Reduce the extent of an ecological community	The Proposed Action will result in the clearing of up to 7.24 ha of Banksia TEC (Figure 14), including 0.33 ha in 'Completely degraded' condition, 4.49 ha in 'Degraded' condition, 0.95 ha in 'Good' condition, and 1.47 ha in 'Very Good' condition. The current extent of the Banksia TEC as of 2015 is estimated to be >335,000 ha covering within the subregions of Dandaragan, Perth and Jarrah Forests (DEE, 2016b). Regionally it is estimated there is 190,260.18 ha of native vegetation strongly and moderately associated with the Banksia TEC across the SCP. Locally it is estimated there is 81,987 ha of Banksia TEC within 10 km of the PAA. Of this, approximately 14,780 ha occurs in conservation reserves. The Proposed Action will impact up to 7.24 ha of Banksia TEC, which is approximately 0.002% and 0.003% of the potential remnant vegetation that represent the TEC overall and, on the SCP, respectively. At a local scale (within 10 km of the PAA) the Proposed Action will impact approximately 0.008% of identified Banksia TEC. Although the Proposed Action will reduce the extent of the Banksia TEC, this is unlikely to be significantly at a regional or local scale. **Unlikely to be significant.**
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The Proposed Action will involve clearing on the edges of multiple Banksia TEC patches. As shown in Table 6.3, Patches BT02, BT03, BT04, BT05, BT06, and BT07 will be reduced in size but still meet the size and condition thresholds to remain Banksia TEC patches. The Proposed Action will increase the distance between TEC patches intersected by the PAA along the Kwinana Freeway. However, the Proposed Action will not fragment or increase fragmentation of the Banksia TEC patches, as presented in Figure 14. **Unlikely to be significant.**
Adversely affect habitat critical to the survival of an ecological community	Based on the information provided in the Approved Conservation Advice (DEE, 2016b), all patches of Banksia TEC within the PAA and adjacent areas are considered to meet the critical habitat definition. However, it is noted that the majority of the Banksia TEC vegetation within the PAA is Degraded (or worse) and is located at the edge of the patch. All patches impacted will continue to be large (>5 ha) following the implementation of the Proposal. Although the Proposed Action may adversely affect habitat critical to the survival of the Banksia TEC, based on the Approved Conservation Advice (DEE, 2016b), the effect is not considered significant. **May be significant.**
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including	The existing Kwinana Freeway and surrounding land uses (residential and commercial use) has already modified surface water flows and construction of the Proposed Action is unlikely to significantly alter these previously modified surface water flows. The Proposed Action will design and upgrade existing drainage to maintain existing surface water management and infiltration within the PAA, so as not to impact local or regional hydrology to the extent it adversely impacts the receiving environment,

Criteria	Assessment
reduction of groundwater levels, or substantial alteration of surface water drainage patterns	including Banksia TEC. The Proposed Action will not substantially modify or destroy abiotic factors necessary for the survival of the Banksia TEC, including hydrology, nutrients and soil resources. The Proposed Action will incorporate infiltration basins and/or swales to capture, treat and infiltrate surface water runoff. The Proposed Action will minimise runoff outside the PAA that could impact adjacent TEC patches by upgrading existing basins and swales. The infiltration of surface water runoff within the PAA will maintain the existing hydrological regime, predominantly within the Spearwood System (characterised by sand dunes and plains), and the Quindalup South System (characterised by coastal dunes and yellow sands). The Proposed Action includes construction of bridge piers, abutment footings and drainage structures. Based on historical records contained within the Perth Groundwater Map, depth to groundwater across the PAA ranges from approximately 5 m to 30 m (DWER, 2023). Dewatering may be required to install some road structures such as bridges, however this will be temporary and localised and is not expected to adversely impact the TEC patches adjacent to the PAA. DWER will determine the level of hydrogeological assessment required, including any modelling and assessment of impacts on groundwater dependent ecosystems during the assessment of a groundwater abstraction licence application as per Operational policy 5.12 (DWER 2009) under the RIWI Act. The clearing of native vegetation within the PAA will not be of sufficient scale to cause substantial hydrological changes in the local area. The Proposed Action will use native species on local topsoil for landscaping, restrict the use of fertilisers to the establishment phase of landscaping on a case-by-case basis, and incorporate treatment of stormwater during infiltration. Accordingly, the Proposed Action is not expected to result in a substantial change in nutrient cycles that could impact TEC patches within or adjacent to the PAA. The Proposed Action will incorporate harvesting and reuse of topsoil within the PAA to ensure that local soil resources are maintained and support buffers of native vegetation within the road reserve, to enhance protection of adjacent TEC patches. Accordingly, the Proposed Action is not expected to substantially modify or destroy soil resources that could impact adjacent TEC patches. **Unlikely to be significant.**
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	The Proposed Action has the potential to cause edge effects on TEC patches remaining. This may include loss of understorey diversity through weed invasion and loss of species that are vulnerable to dieback and/or groundwater dependent. Weeds will be managed through standard routine road maintenance activities and planting of native landscaping within the road reserve (where possible) will provide a buffer to adjacent TEC patches. Standard Dieback hygiene measures will be implemented to ensure that Dieback is not introduced or spread as a result of implementation of the Proposed Action. No burning will be undertaken on the road reserve and no flora/fauna harvesting will occur following completion of clearing activities for the Proposed Action. Substantial changes in the species composition of the banksia TEC patches adjacent to the PAA are not expected to result from implementation of the Proposed Action. This has not occurred as a result of the existing freeway, which has similar impacts to the Proposed Action. Similarly, no decline or loss of functionally important species is expected to occur. **Unlikely to be significant.**
Cause a substantial reduction in the quality or integrity of an occurrence of an	The Proposed Action is not expected to result in a substantial reduction in the quality or integrity of Banksia TEC patches retained adjacent to the PAA. The Proposed Action involves the clearing of up to 7.24 ha of Banksia TEC (Figure 14). Although the Proposed Action will reduce the extent of the five patches by up to 7.24 ha within the PAA, these

Criteria	Assessment
ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established, or • Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	patches will remain viable and in similar or better condition than the portion within the PAA. The Proposed Action is not expected to result in the introduction or spread of weeds that will significantly impact Banksia TEC surrounding the PAA. Weeds will be managed through standard routine road maintenance activities and planting native species on local topsoil for landscaping within the road reserve (where possible). The Proposed Action will restrict the use of fertilisers to the establishment phase of landscaping on a case-by-case basis, and incorporate treatment of stormwater during infiltration. Ongoing road maintenance will be undertaken to prevent spread of weeds into adjacent Banksia TEC patches. Accordingly, the Proposed Action is not expected to result in a substantial change in nutrient cycles that could impact TEC patches within or adjacent to the PAA. **Unlikely to be significant.**
Interfere with the recovery of an ecological community	Currently there is no recovery plan in place for the Banksia TEC. The conservation advice instead outlines priority research and conservation actions (DEE 2016). Planning and design of the Proposed Action will align with relevant protection and recovery measures in the conservation advice, including: • Preventing impacts to native vegetation, hydrology and soil structure from construction. This will be through clearing controls, revegetation / landscaping with native species, stormwater drainage and topsoil management • Mapping of existing weed and Phytophthora infestations, preconstruction treatment of weeds and implementation of standard hygiene management measures • Establishing native vegetation using local native species within the road reserve where possible to provide a buffer to adjacent TEC patches Given the planning, design, construction measures and implementation of standard management measures, the Proposed Action is not expected to interfere with the recovery of the Banksia TEC. **Unlikely to be significant.**
Conclusion	Based on the above assessment against the *Significant Impact Guidelines 1.1* (DoE 2013), given the majority of the Banksia TEC to be impacted by the Proposed Action is degraded, on the edge of the respective patch, clearing for the Proposal is unlikely to result in a significant impact to Banksia TEC. Indirect impacts will be avoided through standard construction management practices when implementing the Proposed Action, to prevent significant impacts outside the PAA.

6.3.3 Black Cockatoos

6.3.3.1 Overview of impacts

The Proposed Action will cause impacts to two threatened Black Cockatoo species:

- Carnaby's Cockatoo (*Zanda latirostris*) – Endangered
- FRTBC (*Calyptorhynchus banksii naso*) – Vulnerable.

The impacts from the Proposed Action include the following:

- Clearing of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo (Figure 16)
- Clearing of up to 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate, and 6.89 ha of Low quality foraging habitat for FRTBC (Figure 18)
- Loss of up to 12 Black Cockatoo suitable DBH trees, of which no trees contained hollows (Figure 21). Although 12 suitable DBH trees will be impacted, the Proposed Action is unlikely to impact Black Cockatoo breeding given Black Cockatoos are not known to breed in the immediate local area.

During the survey, all suitable DBH trees were assessed in accordance with the Main Roads Western Australia breeding tree assessment method. As a result, all suitable trees were categorised as Tree Category 7, the lowest category where they meet the 500mm DBH criteria but lack hollows based on a ground-based assessment (GHD 2025a).

Table 6.7: Location of DBH Trees

Species	Number in remnant native vegetation	Number in roadside revegetation
Marri	2	6
River Red Gum		2
Flooded Gum		1
Tuart		1

6.3.3.2 Assessment of significance

Table 6.8 presents an assessment of the potential impacts of the Proposed Action on Black Cockatoos against the significant impact criteria for endangered and vulnerable species in the *Significant Impact Guidelines 1.1* (DoE, 2013).

The criteria in the significant impact guidelines refer to 'populations' and 'important populations'. The 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area (DoE, 2013). An 'important population' is defined as population that is necessary for the species' long-term survival and recovery (DoE, 2013). 'Populations' and 'important populations' have not been defined for Black Cockatoos, due to the mobile and widely-distributed nature of these species, and the variation in flock compositions (for example, between breeding and non-breeding seasons). For Black Cockatoos, it is more appropriate to consider significance in terms of impacts on habitat and individuals rather than a population (DAWE, 2022).

The DAWE (2022) guidelines list referral thresholds, which if exceeded by a Proposed Action, indicate the action will have or likely have a significant impact on Black Cockatoos. Therefore, an assessment against the DAWE (2022) referral thresholds is additionally provided in Table 6.9.

As presented in Table 6.8 and Table 6.9, the Proposed Action is likely to trigger referral, however not likely to result in significant impacts to the two species of Black Cockatoos (Carnaby's Cockatoo and FRTBC), due to the direct impact of clearing less than 1 ha of Moderate – High quality foraging

habitat (0.92 ha for FRTBC). Furthermore, a large proportion of the planted Black Cockatoo foraging habitat within the PAA is not aligned with DCCEEW revegetation standards that requires no foraging species to be planted within 10 m of roads to reduce bird – vehicle strikes. Accordingly, following the upgrades, separation distance between traffic and foraging habitat of at least 10 m will be established. .

Indirect impacts will be avoided through standard construction management practices when implementing the Proposed Action, so as to prevent significant impacts within and outside the PAA. The landscaping and roadside vegetation species selection will be designed as to avoid unintended impacts to Black Cockatoos during operation through the introduction of foraging species in close proximity to roads.

Table 6.8: Assessment against Significant Impact Guidelines 1.1 for Black Cockatoos

Criteria	Assessment
Lead to a long-term decrease in the size of a population (or important population, for FRTBC)	The Proposed Action is not expected to lead to a long-term decrease in the size of a Black Cockatoo population, given the lack of roosting habitat, no known breeding activity and relative extent of foraging habitat within the PAA, when compared to the local and regional extent of foraging habitat. The Proposed Action will not result in clearing of known roosting trees, the closest roosting site is approximately 20 m southeast of the northern section of the of the PAA near Roe Highway. No Black Cockatoo breeding evidence or trees with hollows for breeding were recorded within the PAA (GHD 2025a). The nearest confirmed and unconfirmed breeding area for Carnaby's Cockatoo is approximately 11.8 km and 2.2 km from the PAA, respectively (GoWA, 2023). The Proposed Action requires the clearing of 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC. Approximately 15,968 ha of potential Black Cockatoo foraging habitat within 12 km of the PAA. Of the 15,968 ha of potential Black Cockatoo foraging habitat mapped within 12 km of the PAA, 8,679 ha (54.35%) lies within reserved lands. An assessment of available Black Cockatoo foraging habitat within 12 km of the Proposal indicates the proposed clearing represents a 0.10% reduction in foraging habitat for Carnaby's Cockatoo and FRTBC, respectively. The Department of Parks and Wildlife (now DBCA) mapped potential Black Cockatoo habitat on the SCP as part of the Strategic Assessment of Perth and Peel Regions (SAPPR) (DPC 2015). The mapping for SAAPR identified Black Cockatoo habitat over the SCP as follows (DPC 2015): • The Carnaby's Cockatoo foraging habitat in the PAA represents approximately 0.003% of potential foraging habitat within the SCP, estimated at 528,893 ha as part of the Strategic Assessment of Perth and Peel Regions (SAPPR) (DPC 2015). • The FRTBC foraging habitat in the PAA represents approximately 0.008% of potential foraging habitat within the SCP, estimated at 205,647 ha (DPC 2015). FRTBC have their core (and extensive) foraging habitat in the Jarrah Forest bioregion rather than the SCP. Black Cockatoos are highly mobile species and are expected to forage outside the PAA amongst foraging resources in the vicinity (15,968 ha within 12 km) and are not dependent on a particular patch of foraging habitat within the PAA. Furthermore, the Proposed Action will not result in the clearing of important roosting or breeding habitat. The Proposed Action will incorporate construction management requirements to maintain the integrity of Black Cockatoo habitat in the adjacent remnant vegetation. Construction management will include clearing and access controls, vehicle movement restrictions, preventing indirect habitat degradation via edge effects, weeds, dieback and

Criteria	Assessment
	rubbish, light and noise measures and revegetation requirements. Landscaping within the road reserve will use local native species in accordance with Main Roads Specification 304 (Revegetation and Landscaping) and Main Roads Environmental Guideline Revegetation Planning and Techniques and Vegetation Places within the Road Reserve, which will avoid the inappropriate placement of Black Cockatoo foraging species in proximity to the road. **Unlikely to be significant.**
Reduce the area of occupancy of the species	The Proposed Action requires the clearing of 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC, which represents 0.10% of local habitat within 12 km of the PAA; and 0.003% and 0.008% of regional habitat within the Perth and Peel Regions, respectively. There is 15,968 ha of potential Black Cockatoo foraging habitat located within 12 km of the Proposed Action. Of the 15,968 ha of Black Cockatoo habitat mapped within 12 km of the PAA, approximately 8,679 ha (54.35%) lies within reserved lands. Black Cockatoos are highly mobile species and are expected to forage outside the PAA amongst foraging resources in the vicinity. Black Cockatoos and are not dependent on a particular patch of foraging habitat within the PAA. Furthermore, clearing will occur over linear patches adjacent to existing cleared and disturbed areas along Kwinana Freeway. The Proposed Action will not create a sufficient gap in habitat to limit movement or alter occupancy in the local or reginal area. On this basis the Proposed Action is unlikely to significantly reduce the area of occupancy of this species, which will continue to utilise the immediate area. **Unlikely to be significant.**
Fragment an existing population (or important population, for FRTBC) into two or more populations	The Proposed Action is not expected to fragment populations of Black Cockatoos, as clearing will occur over linear patches adjacent to existing cleared and disturbed areas along Kwinana Freeway. Black Cockatoos are highly mobile species and are expected to forage outside the PAA amongst foraging resources in the vicinity (15,968 ha within 12 km) and are not dependent on a particular patch of foraging habitat within the PAA. Furthermore, the PAA does not contain known roosting or breeding habitat nor does the Proposed Action fragment important breeding habitat from foraging resources. **Unlikely to be significant.**
Adversely affect habitat critical to the survival of a species	Habitat critical to survival for Carnaby's Cockatoo (DPaW, 2013) includes in the non-breeding season, the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources. Habitat critical for the survival of populations of FRTBC comprises all Marri, Karri and Jarrah forests, woodlands and remnants in the south-west of Western Australia receiving more than 600 mm of annual average rainfall (DEC, 2008). Tree size plays a key role in fruit and seed production. Mawson (1995) found that the largest 2 % of marri trees in jarrah-marri forest sites studied accounted for an estimated 85 % of fruit and seed production. Smaller marri trees flower sparingly and set few seeds. The avoidance and minimisation measures undertaken for the Proposal has resulted in all but twelve large trees (trees with a DBH above 500 mm) being avoided within the 20 km corridor, of which only eight are Marri. Of these, six are planted trees within the freeway road edge, which was common practice when the freeway was built 20+ years ago. Removal of these trees will be consistent with DCCEEW requirements to not have revegetated foraging habitat within 10 m of the traffic lane. Accordingly, the Proposal will not impact High quality foraging habitat. Areas of the Banksia Woodland habitat, and smaller areas of Jarrah/Banksia woodland habitat, represent potential foraging habitat for Carnaby's Cockatoo in particular within the PAA (GHD, 2025a). The PAA comprises suitable foraging habitat and will result in the

Criteria	Assessment
	removal of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo. The Proposed Action will remove up to 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC. No water bodies are present within the PAA, however numerous water bodies (both natural and anthropogenic) are present adjacent the PAA. While the PAA does not comprise known or active breeding nor roosting habitat; it does contain vegetation that provides food resources. However, the presence of large blocks of intact foraging habitat to the west and east of the PAA, the lack of High quality foraging habitat, and acknowledging the location of the habitat within the PAA is not preferred and is actively avoided through contemporary revegetation requirements, it is not likely to be habitat critical to the survival of Carnaby's Cockatoo or FRTBC. **Unlikely to be significant.**
Disrupt the breeding cycle of a population (or important population, for FRTBC)	The Proposed Action is not expected to disrupt the breeding cycle of a population of Black Cockatoos as no known breeding of Black Cockatoos occurs in the PAA. The Proposed Action will not result in clearing of any known breeding tree or hollow, nor any known important roosting tree. The Proposed Action occurs approximately 2.2 km from the closest unconfirmed breeding area for Carnaby's Cockatoo and 11.8 km from the closest confirmed breeding area for Carnaby's Cockatoo (GoWA, 2023). **Unlikely to be significant.**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Proposed Action is not expected to impact the availability or quality of habitat to the extent that Black Cockatoos are likely to decline, as: • The Proposed Action will not result in the clearing of important roosting or breeding habitat • The Proposed Action is surrounded by 15,968 ha of potential foraging habitat within 12 km, with approximately 54.35% of habitat reserved in DBCA managed lands • The Proposed Action will result in clearing of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo, which represents approximately 0.10% local habitat (within 12 km of the PAA) and 0.003% of regional habitat within the SCP • The Proposed Action will result in clearing of up to 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC, which represents approximately 0.10% local habitat (within 12 km of the PAA) and 0.008% of regional habitat within the SCP • The Proposed Action will include clearing and access controls, vehicle movement restrictions, preventing indirect habitat degradation via edge effects, weeds, dieback and rubbish, light and noise measures and revegetation requirements. The Proposed Action will incorporate harvesting and reuse of topsoil within the PAA to ensure that local soil resources are maintained and support buffers of native vegetation within the road reserve. Furthermore, the Proposed Action will use native species on local topsoil for landscaping, restrict the use of fertilisers to the establishment phase and a case-by-case basis, and incorporate treatment of stormwater during infiltration. **Unlikely to be significant.**
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or	The Proposed Action is not expected to introduce or spread invasive species into Black Cockatoo habitat. Existing biosecurity measures and protocols within the freight industry will also minimise the risk of invasive species introduction in the PAA from vehicle traffic. The PAA has existing weed infestation associated with urban development. The Proposed Action is not expected to result in the introduction or spread of weeds that will result in significant impacts to Black Cockatoo habitat outside the PAA. This is due to construction management including weed and hygiene management, and landscaping with native species on local harvested topsoil. Weed management will be undertaken along road

Criteria	Assessment
critically endangered species habitat	verges and in road drainage basins/swales to prevent the spread of weeds into adjacent habitat. The Proposed Action is not expected to introduce or facilitate the movement of any predator species (e.g., foxes, feral cats or rabbits). Construction management will include waste and rubbish controls to prevent attracting animals to construction areas. Domestic and feral cats may be vagrant visitors to the area; however, the Proposed Action will not create a destination or encourage predator species into surrounding areas of native vegetation. **Unlikely to be significant.**
Introduce disease that may cause the species to decline	The Proposed Action is not expected to introduce or spread disease that could cause Black Cockatoo populations to decline. The disease status of Black Cockatoos in the wild remains unknown, although infectious diseases such as beak and feather disease, avian polyomavirus and chlamydophilosis may pose a threat, as they are significant in other captive and free-living psittacine species. The Proposed Action does not involve any actions which could potentially introduce infectious diseases within Black Cockatoo populations which could cause the species to decline. The Proposed Action will include dieback hygiene during construction to protect adjacent Black Cockatoo habitat. Where appropriate, the Proposed Action will establish protectable areas along sections of the PAA boundary and incorporate access controls, equipment and vehicle washing/segregation, soil movement controls, and monitoring during construction. The Proposed Action is not expected to spread dieback through sediment in stormwater runoff, as stormwater will be captured and infiltrated within basins/swales in the road reserve and will not discharge into Black Cockatoo habitat adjacent to the Proposed Action. **Unlikely to be significant.**
Interfere with the recovery of the species	The Proposed Action is unlikely to significantly interfere with the recovery of the Black Cockatoos. Carnaby's Cockatoo recovery, as defined by the Recovery Plan (DPaW, 2013), is dependent upon stopping the further decline in the distribution and abundance of Carnaby's Cockatoo by protecting the species throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range. FRTBC recovery, as defined by the Recovery Plan (DEC, 2008), is dependent on stopping further decline in the breeding populations of FRTBC and to ensure their persistence throughout their current range in the south-west of Western Australia. The Proposed Action is consistent with the Black Cockatoo recovery, as it does not involve clearing of known breeding or roosting habitat and it minimises clearing of foraging habitat through Proposed Action placement and use of an existing road and protects adjacent patches of Black Cockatoo habitat from indirect impacts through construction management requirements and Main Roads' specifications. **Unlikely to be significant.**
Conclusion	Based on the above assessment against the *Significant Impact Guidelines 1.1* (DoE 2013), the Proposed Action is unlikely to have a significant impact to Carnaby's Cockatoo or FRTBC, as it will not impact High quality foraging habitat or known breeding or roosting habitat, with impacted habitat not located consistent with current roadside vegetation requirements, Indirect impacts will be avoided through standard construction management practices when implementing the Proposed Action, to prevent significant impacts outside the PAA.

Table 6.9: Assessment against the referral thresholds for Black Cockatoos

Attribute	Referral threshold	Assessment
Breeding	Any loss of / impact upon known, suitable or potential nesting trees, and the habitat around these trees, is highly likely to require a referral to the minister. Loss of any potential nesting habitat is likely to require a referral to the minister.	The PAA is located approximately 2.2 km from the closest unconfirmed breeding area for Carnaby's Cockatoo and 11.8 km from the closest confirmed breeding area for Carnaby's Cockatoo (GoWA, 2023). No Black Cockatoo breeding evidence or trees with hollows for breeding were recorded within the PAA (GHD 2025a), noting that Carnaby's Cockatoo or FRTBC are not known to breed in the area. **Unlikely to trigger referral.**
Quality of native foraging habitat	Loss of greater than or equal to 1 ha of foraging habitat scoring 5-10 using the foraging quality scoring tool is likely to require referral to the minister.	The Proposed Action comprises strips of clearing over linear patches adjacent to existing cleared and disturbed areas of the Kwinana Freeway and associated connecting roads, with patches of Black Cockatoo habitat remaining on either side of the PAA. The Proposed Action will result in clearing of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 0.92 ha of Moderate – High quality foraging habitat for FRTBC. Habitat critical for the survival of populations of FRTBC comprises all Marri, Karri and Jarrah forests, woodlands and remnants in the south-west of Western Australia receiving more than 600 mm of annual average rainfall (DEC, 2008). Tree size plays a key role in fruit and seed production. Mawson (1995) found that the largest 2 % of marri trees in jarrah-marri forest sites studied accounted for an estimated 85 % of fruit and seed production. Smaller marri trees flower sparingly and set few seeds. The avoidance and minimisation measures undertaken for the Proposal has resulted in all but twelve large trees (trees with a DBH above 500 mm) being avoided within the 20 km corridor, of which only eight are Marri. Of these, six are planted trees within the freeway road edge, which was common practice when the freeway was built 20+ years ago. Removal of these trees will be consistent with DCCEEW requirements to not have revegetated foraging habitat within 10 m of the traffic lane. Accordingly, the removal of these planted trees may have an indirect benefit to Black Cockatoos by further reducing the likelihood of vehicle – bird strike. Areas of the Banksia Woodland habitat, and smaller areas of Jarrah/Banksia woodland habitat, represent potential foraging habitat for Carnaby's Cockatoo in particular within the PAA (GHD, 2025a). The PAA comprises suitable foraging habitat and will result in the removal of up to 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo. Although the Proposal requires the clearing of foraging habitat for Carnaby's Cockatoo and FRTBC in the PAA, this habitat is lineal in nature, immediately adjacent to a freeway, almost entirely degraded and is not considered High quality foraging. **Likely to trigger referral.**

Attribute	Referral threshold	Assessment
Lower-quality native foraging habitat	Loss of greater than or equal to 10 ha of foraging habitat scoring 0-4 using the foraging quality scoring tool is likely to require referral to the minister.	The Proposed Action will result in clearing of up to 8.43 ha of Low – Moderate and 6.89 ha of Low quality habitat for FRTBC. The Proposed Action design and construction will aim to avoid and minimise impacts to Black Cockatoo foraging habitat within and adjacent to the PAA, in a consistent manner to that mentioned above for High-quality foraging habitat. **Likely to trigger referral.**
Exotic foraging habitat	Loss of greater than or equal to 1 ha of predominantly exotic habitat (e.g. Cape Lilac trees and pine trees) known to be utilised by black cockatoos is likely to require a referral to the minister.	The foraging habitat present in the PAA consists of predominantly native remnant vegetation and planted revegetation. **Unlikely to trigger referral.**
Night roosting habitat	Removal of any part of a known night roosting site is likely to require referral to the minister.	The Proposed Action will not result in the clearing of any known night roosting trees. The PAA does not contain a known night roosting habitat and no evidence of roosting was recorded (GHD, 2025a,b). **Unlikely to trigger referral.**
Conclusion		Based on the above assessment against the Referral thresholds (DAWE 2022), the Proposed Action is likely to trigger referral for potential impacts to Black Cockatoos, by clearing up to: • 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo • 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC.

7 RISK ASSESSMENT

A risk assessment has been undertaken of the potential impacts identified for the Proposed Action construction and operational phases. The risk assessment adopts likelihood and consequence criteria and a risk matrix, presented in Table 7.1, Table 7.2 and Table 7.3.

The risk assessment results, incorporating a summary of mitigation measures to generate a residual risk outcome for each identified risk is included in Appendix 3. The risk assessment indicates the Proposed Action poses a low residual risk to MNES, except for the impacts summarised in Table 7.4, which were medium.

Table 7.1: Likelihood criteria

Likelihood	Criteria
Highly likely	Is expected to occur during the construction/operation period
Likely	Will probably occur during the construction/operation period
Possible	Might occur during the construction/operation period
Unlikely	Could occur during construction/operation but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 7.2: Consequence criteria

Likelihood	Criteria
Minor	Minor environmental impact that can be reversed
Moderate	Isolated but substantial environmental impact that could be reversed with intensive efforts
High	Substantial environmental impact that could be reversed with intensive efforts
Major	Major loss of environmental value and real danger of continuing
Critical	Severe widespread loss of environmental value and irrecoverable environmental damage

Table 7.3: Risk ranking matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 7.4: Risk assessment of the Proposed Action to MNES

Impact	Cause	Residual Risk Rating
Direct impact causing loss of up to: • 3.04 ha of Tuart TEC • 7.24 ha of Banksia TEC • 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo • 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC • 12 Potential Black Cockatoo trees, without hollows.	Authorised clearing of vegetation and fauna habitat with the PAA.	Medium

8 AVOIDANCE AND MITIGATION MEASURES

8.1 Application of the mitigation hierarchy

The DCCEEW offsets policy (DSEWPAC, 2012) identifies mitigation and management actions should prioritise the avoidance of environmental effects over reduction measures. Mitigation of environmental impacts from this Proposal have been assessed through a hierarchy of avoid, minimise, reduce, rehabilitate and offset environmental impacts. This hierarchy is achieved primarily through changes in scope and design to avoid and minimise impacts; development and implementation of management measures to mitigate and manage environmental impacts during construction and operation. As the Proposal is for the widening and upgrade of an existing freeway, there are limited opportunities to avoid impacts.

8.2 Impact avoidance

Although the PAA is more than 150 ha and covers approximately 20 km, the Proposal has been designed in such a way as to only impact 3.20 ha of vegetation that is in Good or better condition. Furthermore, significant effort has been undertaken to avoid all large trees with only twelve trees with a DBH greater than 500mm potentially impacted.

The Proposed Action is being designed to avoid and/or mitigate impacts to MNES where possible. Measures considered and incorporated in the Proposed Action planning include:

- The PAA avoids additional bisection of patches of TEC.
- Infrastructure associated with the Proposed Action will be contained within the PAA, including road pavements, footpaths, noise walls, stormwater drainage and fencing, reducing impacts to MNES outside the PAA.
- Laydowns areas, stockpiles and access tracks will be constructed within existing cleared areas or within the permanent footprint of the works. No TECs or Black Cockatoo habitat will be cleared for temporary works outside the permanent footprint.
- The detailed design will seek to reduce earthworks (fill height/cut depth), which will reduce the Proposed Action disturbance footprint and potentially reduce clearing impacts to TECs and Black Cockatoo habitat.
- The use of barriers will be considered during the detailed design phase to protect high-quality vegetation, by reducing clearing requirements and potential MNES impacts. Use of steepened batters and retaining will be considered as part of detailed design.
- Clearing and MNES impacts will be minimised during the detailed design process, by implementing measures such as the use of kerbing where appropriate to alleviate the need for table drains, that require a larger clearing footprint.
- Drainage design will maintain existing flow lines/watercourses to avoid impacting retained vegetation and MNES within and adjacent to the PAA..

Further opportunities to reduce the impacts to communities and species may be possible during detailed design and construction works for the Proposed Action, where construction methodology allows.

The applicability of the avoidance and mitigation measures with respect to MNES impacts are

presented in Table 8.1 and Table 8.2, respectively.

Table 8.1: Avoidance of potential impacts to MNES

Avoidance measure	Tuart TEC and Banksia TEC	Black Cockatoos
The design solution follows the existing Kwinana Freeway alignment, predominantly within the disturbed road corridor to avoid and reduce impacts on vegetation. The positioning of the road infrastructure within the DE will be informed by various constraints (including environment and social constraints). Existing and future environmental data will be used to determine the environmental values and enable the design to be modified and refined, where practical to avoid and minimise impacts to MNES, whilst complying with Main Roads standards for the safety of road users, reduced congestion, and ease of access.	X	X
Drainage basins will be located in disturbed/cleared areas where possible to avoid impacts on environmental values.	X	X
Construction groundwater abstraction will be assessed and approved via a groundwater abstraction licence application as per Operational policy 5.12 (DWER, 2009) under the RIWI Act.	X	X
Drainage design will integrate Water Sensitive Urban Design principles.	X	
Drainage design will be implemented to maintain hydrological flow regimes and control stormwater run-off.	X	

Table 8.2: Mitigation of potential impacts to MNES

Mitigation measure	Tuart TEC and Banksia TEC	Black Cockatoos
Minimise		
Minimise clearing impacts on MNES where practicable through the detailed design process.	X	X
Standard management controls will be implemented that include management objectives, performance criteria, actions and monitoring to minimise risks to the surrounding environment, including: • Vegetation clearing limits • Chemical and hydrocarbon storage • Waste management • Spill management • Contaminated material handling and management • Sediment and erosion controls • Soil management • Dewatering controls	X	X
Rehabilitate		
Landscaping will be undertaken to revegetate the PAA in accordance with Main Roads Specification 304 (Revegetation and Landscaping) and Main Roads Environmental Guideline Revegetation Planning and Techniques. These requirements will be specified in the contractor commercial documentation (SWTCs).	X	X

8.3 Performance standards

SMART performance standards are measurable (numerical) values which can be applied to a Proposed Action, rather than qualitative management/monitoring actions. Table 8.3 presents the SMART performance standards that relate to the measurable impacts of the Proposed Action. These SMART performance standards complement the management actions and performance targets; monitoring actions and corrective actions as identified in Table 8.4.

The threshold criteria and completion criteria are considered to be achievable, with the risk potential of not achieving the proposed SMART performance standards captures by the risk assessment presented in Table 7.4.

As the proposed SMART performance standards for threshold criteria and completion criteria relate to physical measures, which can be readily controlled via standard construction management processed, it is therefore considered the proposed SMART performance standards have a low level of uncertainty, with additional margins for safety not required.

The SMART performance standards proposed do not require detailed statistical analysis to determine if the threshold criteria and completion criteria have been met, nor require statistical power to detect change (for example, climatic or seasonal variability), or control of reference sites for comparative purposes).

Table 8.3 SMART performance standards

Threshold criteria	Performance indicators	Corrective actions	Corrective Action Responsibility	Completion criteria
Clearing of 3.04 ha of Tuart TEC	Area (ha) of Tuart TEC cleared	Clearing will cease immediately if trigger is met. Clearing will not recommence until no-go areas have been reviewed and confirmed to be in place correctly and Main Roads Superintendent provides approval to recommence Environmental incident will be recorded and the cause investigated. The incident will be reported to DCCEWW along with the cause identified from the investigation. Incorrectly cleared areas will be assessed for potential remediation in consultation with DCCEEW.	Construction Contractor Environmental Representative Main Roads Superintendent	No more than 3.04 ha of Tuart TEC cleared
Clearing of 7.24 ha of Banksia TEC	Area (ha) of Banksia TEC cleared			No more than 7.24 ha of Banksia TEC cleared
Clearing of 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo	Area (ha) of Carnaby's foraging habitat cleared			No more than 16.24 ha of Moderate quality Carnaby's Cockatoo foraging habitat cleared
Clearing of 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC	Area (ha) of FRTBC foraging habitat cleared			No more than 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC cleared
Clearing of 12 potential Black Cockatoo breeding trees, without hollows	Number of trees with a suitable DBH cleared			No more than 12 potential Black Cockatoo breeding trees, without hollows cleared
No clearing of MNES ecological communities or habitat outside of the PAA	Area (ha or count) of MNES cleared outside the PAA			No MNES ecological communities or habitat cleared outside of the PAA

8.4 Management measures

Management measures for the Proposed Action will be implemented for the following aspects:

- Clearing and access controls
- Weed and dieback management
- Fauna management
- Sediment and erosion control
- Drainage management
- Soil management
- Dewatering management.

Pre construction and construction procedures have been developed to ensure MNES are adequately outlined in the field, protected and managed to minimise impacts. These are detailed in Table 8.4 along with performance and completion criteria as well as monitoring and reporting arrangements.

Table 8.4 Management measures to mitigate impacts to MNES

Management Objective/Desired Outcomes	Management Measures	Performance Target/Completion Criteria	Monitoring/Reporting Activity	Potential Risk/Threat
Manage MNES clearing within the PAA and prevent unauthorised clearing of MNES ecological communities or habitat outside of the PAA. **Achieve SMART performance standards** (Table 8.3, Section 8)	Vegetation to be retained will be clearly marked with flagging onsite. All clearing areas will be marked with different flagging and approved by the Main Roads Superintendent prior to clearing commencing	• Drawings showing environmental no-go areas are provided to the Construction Contractor Representative • All vegetation to be retained will be marked with flagging onsite • All areas to be cleared will be marked with different flagging on site	• Record of provision of drawings showing environmental no-go areas • Incident reporting • Monthly site inspections • Site inspections by Construction Contractor Environmental Management Representative prior to and following clearing to confirm no-go areas are appropriately flagged/fenced, and that clearing remains within limits	Clearing more than: • 3.04 ha of Tuart TEC • 7.24 ha of Banksia TEC • 16.24 ha of Moderate quality foraging habitat for Carnaby's Cockatoo • than 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC • 12 potential breeding trees for Black Cockatoo, without hollows
	Additional areas required for construction such as laydown areas, stockpile areas and vehicle turn around, will be located in areas cleared for permanent works or areas that do not contain Banksia TEC, Tuart TEC, or Black Cockatoo habitat. Clearing of Tuart TEC, Banksia TEC and Black Cockatoo habitat will be avoided for any temporary construction activities.	Areas for ancillary services located in cleared areas or in areas that do not contain or lie adjacent Banksia TEC, Tuart TEC, or Black Cockatoo habitat.	• Construction site plan showing ancillary areas not located on land containing Banksia TEC, Tuart TEC, Black Cockatoo habitat, threatened flora and fauna habitat • Monthly site inspections	
Prevent edge impacts into adjacent Banksia TEC, Tuart TEC, Black Cockatoo habitat and other MNES values adjacent to the PAA	Weed and disease management • During construction, Declared Pests and WoNS within the PAA will be treated according to their Control Codes and advice from the Department of Primary Industries and Regional Development (DPIRD) • Topsoil contained Declared Pests or WoNS will be treated, buried on site under at least 300mm of fill or disposed offsite • Dieback management (if required) will be carried out in accordance with DBCA's Phytophthora Dieback Management Manual 2020. • Heavy plant and machinery entering the work site will be inspected and confirmed to be clean (free of vegetation and soil material) • Clearing activities will occur during the dry months, as far as practicable, to reduce the risk of spreading *Phytophthora* dieback • Topsoil from infected or potentially infected dieback areas will be segregated and not used in uninfected areas Fire Management • Refuelling will not occur adjacent to EPBC Act listed TECs or Black Cockatoo habitat • Department of Fire and Emergency Services (DFES) and LGA restrictions on fire and machinery movements will be adhered to • Non-essential work is to be stopped or postponed in the even that a Total Fire Ban with Catastrophic fire danger rating or Emergency Warning is issued for the area • Hot work permits will be mandatory before commencing any hot work	• No new WoNS or Declared Pests identified in the PAA or vegetation adjacent to the PAA, attributable to the Proposed Action • Topsoil records show topsoil containing WoNS or Declared Pests was treated or appropriately disposed • Topsoil from infected or potentially infected dieback areas reused or disposed of appropriately • No fires in areas adjacent to the PAA attributable to the Proposed Action • No excessive dust nuisance events recorded	Pre-construction • Baseline weed and dieback mapping During Construction • Monthly inspections to confirm compliance • Maintain maps and records of existing WoNS or Declared Pests and newly identified weeds through periodic inspections • Develop and implement a dieback hygiene program (if required) • Routine spot checks of vehicles and equipment compliance with cleaning • Compliance with Main Roads guidelines for noise and vibration during construction of the Proposed Action • Compliance with hot work permits Post-Construction • Weed and dieback survey	Decline in the extent or condition of TECs, Black Cockatoo habitat, and other MNES values adjacent to the PAA due to weed or dieback disease intrusion, dust or bushfire caused by the Proposed Action

Management Objective/Desired Outcomes	Management Measures	Performance Target/Completion Criteria	Monitoring/Reporting Activity	Potential Risk/Threat
	• Identify potential ignition sources and/or activities with the potential to lead to fire Noise, vibration and light • Standard construction noise and vibration management will be implemented as per Main Roads guidelines • Vehicles on site will be switched off and not left idling when not in use Dust • Use of water carts as required to wet down dust generation surfaces such as earthwork areas • Ground disturbance and/or clearing of vegetation will be restricted during high winds if dust cannot be adequately controlled			
Prevent impacts to Organic Mound TEC occurrences adjacent to the PAA.	• If groundwater abstraction is required for construction water, a hydrogeological assessment will be undertaken to the level of detail required by DWER for the assessment of the groundwater abstraction licence • Construction groundwater abstraction will not occur within 800 m of the Organic Mounds TEC occurrence Wandi01 or CSQ2 to ensure a negligible impact occur.	• No visible signs of impact to Organic Mound TEC occurrences adjacent to the PAA, due to potential construction dewatering	• Visual inspections of Organic Mound TEC • Groundwater level monitoring during abstraction required by DWER groundwater abstraction licence,	Decline in the condition of Organic Mound TEC occurrences adjacent to the PAA due altered groundwater flows or quality by the Proposed Action
Prevent additional impacts above and beyond the existing road in relation to surface water runoff from road surfaces causing erosion, sedimentation and/or contamination	• Drainage design will be implemented to maintain hydrological flow regimes and control stormwater run-off comparable with existing Kwinana Freeway • Stormwater drainage will be captured and infiltrated via basins/swales in the road reserve • Implement suitable soil stabilisation and sediment control prior to commencement of ground disturbing works near Organic Mound TEC and maintain these are appropriate for the duration of the construction works • Fuel and chemicals in bunded areas located away from drainage lines and areas where spills could flow into EPBC Act listed TEC or Black Cockatoo habitat outside of the PAA • General construction waste material appropriately managed and disposed of off-site at an appropriately facility	• No erosion, sedimentation and/or contamination flow from the PAA • Spills/leaks cleaned up	• Visual inspections of Organic Mound TEC and associated soil stabilisation and sediment controls and stormwater drainage structures (particularly during rainfall events) to ensure they remain effective during construction. This is to be undertaken fortnightly during winter or following a significant storm event • Monthly inspections to ensure appropriate spill response equipment remains available in the vicinity of The Spectacles • Recording of spills/leaks	Decline in the extent or condition of nearby Organic Mounds TEC
Accidental spills or leaks of potentially contaminating liquids is appropriately managed to contain and minimise the risk to MNES	• Site personnel to be inducted on environmental responsibilities, including storage of hydrocarbons and chemicals, bunding requirements, refuelling requirements and incident response measures in the event of a spill. • Spill management procedures to be developed prior to construction • Hazardous materials used during construction will be stored in compliance with the relevant Australian Standards and Regulations • On-site refuelling of machinery and plant to occur on designated areas, subject to appropriate spill controls and at least 50m away from drainage lines/areas • Schedule or major maintenance of vehicles and plant to be undertaken offsite	• No uncontrolled pollution incidents	• Site induction records • Record of storage and spill management procedures • Monthly inspections of hazardous materials and waste storage and handling areas to identify spills/leaks and discharges. In addition, check that storage, handling and signage is appropriate • Records of fuel storage	Contamination to the environment, which may adversely impact MNES adjacent to the PAA

Management Objective/Desired Outcomes	Management Measures	Performance Target/Completion Criteria	Monitoring/Reporting Activity	Potential Risk/Threat
	• Provision of spill response kits at refuelling locations and any locations where hydrocarbons or chemicals are stored			
Avoid injury or mortality to Black Cockatoos	• Fauna observers will be present during the clearing of Black Cockatoo habitat • Any vegetation within 10m of the tree identified as being used by Black Cockatoo for nesting will not be cleared until a suitably qualified person has verified the hollow is no longer in use • Landscaping shall not include Black Cockatoo foraging habitat within 10m of the road • A list of contact information for local wildlife rescue organisations and carers will be maintained on site to contact in the event of a fauna injury • Construction vehicle speeds will be limited to <40km p/hr throughout the construction site, which will reduce the risk of Black Cockatoo strikes	• Black Cockatoo will not be injured during vegetation clearing in the PAA • Contact details of local wildlife rescue organisations and carers always maintained on site • Landscaping designs exclude foraging or breeding plant species within 10m of the road • No incidents of speeding within the construction site boundary	• Any death or injury of Black Cockatoos as part of the Proposed Action to be recorded and investigated to determine any potential future avoidance measures • Landscape design drawings showing location of revegetation and summarising plant species mix	Direct impacts to Black Cockatoos (injury or morality)

8.5 Effectiveness of avoidance and mitigation measures

Main Roads has a strong track record of developing and implementing best practice in environmental management and implementation of management measures. The measures proposed herein have been successfully implemented on past projects subject to EPBC conditions and management measures, including the following projects for which Compliance Reports have been issued in the past year.

1. Bunbury Outer Ring Road Project – Southern Section (EPBC 2019/8543)
2. Bunbury Outer Ring Road Project – Northern and Central Sections (EPBC 2019/8471)
3. Bussell Highway Duplication Hutton to Sabina (EPBC 2020/8800)
4. Mitchell Freeway Extension and Wanneroo Road Upgrade, WA (EPBC 2018/8367)
5. Great Northern Highway, Muchea to Wubin Upgrade Stage 2-Walebing to Wubin (EPBC 2016/7761)
6. Perth-Darwin National Highway alignment (Swan Valley Section), WA (EPBC 2013/7042)
7. Pinjarra-Williams & Williams-Narrogin Hwy Maintenance Zone Establishment Project, WA (EPBC 2016/7698)
8. Toodyay Road Widening and Upgrade Project (EPBC 2016/7665)
9. Roe Highway and Great Eastern Highway Bypass Grade Separation Interchange (EPBC 2020/8784

Main Roads is a State agency with an assured record of responsible environmental management and environmental management systems. Main Roads is not subject to any past or present proceedings under Commonwealth or State law for protection of the environment or conservation and sustainable use of natural resources. Main Roads' track record indicates a history of effective implementation and monitoring of management measures to ensure effectiveness. Main Roads has also demonstrated effective implementation of corrective actions when effectiveness does not meet completion criteria.

9 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Section 3A of the EPBC Act defines the principles of ecologically sustainable development. Table 9.1 outlines how each of the five principles has been applied to the Proposed Action.

Table 9.1: EPBC Act Principles of Ecologically Sustainable Development

No.	Principle	Consideration of Principle in the Proposal
a)	Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations	A holistic decision making process has been established for the Proposed Action, with the aim to provide an integrated and transparent approach. A comprehensive decision-making tool was used to assisting in making a range significant decisions, through consideration of the triple bottom line (local economic, environmental and social). This tool allows some flexibility in the weightings allocated to each sustainability aspect, whilst maintaining a holistic balance. Where the tool has been used to inform and document significant design decisions, the inputs, selection criteria and outcomes have been documented in the design reports.
b)	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation	Comprehensive desktop and field studies were conducted to assess the baseline conditions and impact of the Proposed Action. Information gathered during these studies was used to inform this Proposed Action and has reduced the uncertainty surrounding the prediction of impacts for the assessment. Main Roads has ensured where possible, the Proposed Action design avoids serious or irreversible damage to the environment. Impacts to MNES have been identified and described. Mitigation and management measures have been proposed to ensure they are environmentally acceptable.
c)	The principle of intergenerational equity That the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The Proposed Action will ensure the health, diversity and productivity of the environment is maintained through retaining as much habitat as possible. The Proposed Action will contribute to improve transport efficiency and safety, contributing to the well-being of the surrounding community.
d)	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making	The Proposed Action will ensure the conservation of biological diversity and ecological integrity is maintained through retaining as much habitat as possible. Impacts on flora, vegetation and terrestrial fauna have been assessed and mitigation and management measures proposed. Additionally, during rehabilitation and revegetation works, planting will predominantly utilise local native species, with efforts taken to enable this revegetation to be resilient within three years after the construction works are completed. Further refinement of the design will aim to minimise impacts on MNES where practicable.
e)	Improved valuation, pricing and incentive mechanisms should be promoted	Main Roads acknowledges the need for improved valuation, pricing and incentive mechanisms and endeavours to pursue these principles when appropriate. For example, environmental factors will greatly determine the location of road corridors, with the Proposed Action having a strong focus

No.	Principle	Consideration of Principle in the Proposal
		on reducing its direct and indirect clearing footprint. Impacts on flora, vegetation and terrestrial fauna have been assessed and mitigation and management measures proposed. Main Roads accepts that the cost of the Proposed Action must include environmental impact mitigation, management and maintenance activities. These requirements will be incorporated into the overall Proposed Action costs.

10 ECONOMIC AND SOCIAL MATTERS

10.1 Projected Economic Costs and Benefits and Basis for Estimation

10.1.1 Costs and Benefits

10.1.1.1 Costs

The state and federal governments have committed a combined total of $700 million of initial funding toward construction of the Kwinana Freeway upgrades. In addition to this, further funding will be required over the life of the project for additional works and ongoing maintenance costs.

10.1.1.2 Benefits

The widening of the Kwinana Freeway will improve road safety and reduce congestion. The Kwinana Freeway typically accommodates around 100,000 vehicles daily, 10-15% of which are heavy freight vehicles. The Kwinana Freeway continues to be one of the busiest roads in Perth and currently experiences congestion during peak periods. Existing congestion causes frustration for motorists and hampers the efficient movement of freight. Kwinana Freeway was found to be among the 10 worst roads in Australia for delays by Infrastructure Australia, with the 2019 Australian Infrastructure Audit estimating congestion in Perth will cost $3.1 billion per annum in 2031. Widening the Freeway is essential to alleviate these bottlenecks, enhance traffic flow, and support future development.

With Perth's population forecasted to increase from 2.17 million to 3.5 million by 2050, it is important to ensure the transport infrastructure can support this growth and facilitate economic opportunities over time.

The upgrade will:

- Address rising traffic demands
- Improve accessibility and road safety
- Facilitate economic opportunities and development of the Kwinana Industrial Area and Latitude 32 Industrial Zone

10.2 Potential Employment Opportunities

The Proposed Action directly aligns with Main Roads strategic intent to "Keep WA Moving". The Proposed Action will result in a safer road, with improved driver comfort, fewer closures for maintenance and improved freight efficiency.

The Proposed Action has the potential to increase direct and indirect employment opportunities for the local area during the pre-construction and construction phases, and the requirement for ongoing maintenance.

10.3 Aboriginal Peoples Participation

Main Roads is committed to supporting and delivering a range of initiatives that lead to the improvement of economic, social and cultural outcomes for Aboriginal peoples through the participation and engagement of Aboriginal peoples and businesses across works and projects throughout WA.

This is achieved through maximising and promoting contracting opportunities for Aboriginal

businesses, providing training for identified Aboriginal businesses engaged on Main Roads' projects to develop their capacity and capabilities, and supporting training and career pathways for Aboriginal peoples to gain sustainable employment. Main Roads also strives to provide a culturally safe working environment by requiring Main Roads' staff and contractors participate in Cultural Awareness Training. Main Roads has successfully engaged Aboriginal businesses and peoples on projects throughout the state.

During the 2023-24 financial year, Main Roads awarded 98 contracts to Aboriginal suppliers, which was 15.34 % of all Main Roads' contracts awarded for this period. Main Roads was the top state government agency in WA by the number of contracts awarded and had the second highest spend by state government agencies in WA. For example, the new Wilman Wadandi Highway (Bunbury Outer Ring Road project), set ambitious Aboriginal employment targets which were significantly higher than the local Aboriginal working age population. These targets were achieved by partnering with local Aboriginal organisations very early in the planning stage, resulting in Aboriginal peoples working 11 % of the hours worked, as of October 2024. Additionally, the project exceeded their initial targets of awarding $30 million of contracts to Aboriginal owned businesses, and as of August 2024, had awarded contracts worth over $50 million to 46 Aboriginal-owned businesses and suppliers. These initiatives are underpinned by Main Roads' Aboriginal Engagement and Participation Framework and Aboriginal Engagement Participation Policy, both of which apply to all Main Roads' staff and others working on Main Roads' behalf.

The Proposed Action occurs within both the Whadjuk and Gnaala Karla Booja (GKB) Indigenous Land Use Agreement (ILUA) areas, made with the Whadjuk and GKB Traditional Owners under the South West Native Title Settlement.

Through the ILUA, the Main Roads Whadjuk and GKB Standard Heritage Agreements have come into effect, which is an agreement to ensure that proposed activities are carried out in a manner that protects Aboriginal Heritage Places and Objects to the greatest extent possible.

In alignment with Main Roads' Aboriginal Engagement Strategy, Main Roads will adopt a whole of project approach to Aboriginal participation for the Proposed Action and will include targets for Aboriginal employment, Aboriginal business procurement and training, cultural awareness training and mentorship opportunities for Aboriginal people. A Cultural Working Group is currently being established that allows for engagement and input into project design, opportunity identification for future engagement and procurement post design. Additional Aboriginal engagement will be undertaken as part of the standard heritage agreement and permit process.

10.4 Details of Public and Stakeholder Consultation Activities

10.4.1 Stakeholders

Stakeholders that have an interest in the planning and development phase of the Proposal are listed in Table 10.1. The stakeholders include all three levels of government, regulators, landowners, residents, business owners and operators, environmental groups, special interest groups, communities, and road users.

Table 10.1: Stakeholders

Stakeholder group	Stakeholder
State Government	Department of Planning, Lands and Heritage (DPLH) Western Australian Planning Commission (WAPC) Department of Biodiversity, Conservation and Attractions (DBCA) Department of Water and Environmental Regulation (DWER) Department of Transport, Public Transport Authority (PTA) Environmental Protection Authority Department of Fire and Emergency Services (DFES) Member for Kwinana Member for Cockburn
Traditional landowners	Westport's Noongar Advisory Group South West Land and Sea Council (SWALSC) Gnaala Karla Booja Regional Corporation Whadjuk Regional Corporation
Federal Government	DCCEEW
Local Government	City of Cockburn City of Kwinana City of Rockingham
Business	Services Authorities (Water Corp, ATCO, Western Power) Freight and logistics industry, including ARC Infrastructure (freight rail operator) Land Developers
Community/ interest/ environmental groups that use this section of the Kwinana Freeway	BirdLife Australia (member of Westport reference group) Conservation Council WA Friends of The Spectacles Greening Australia ((member of Westport reference group) Kaarakin Black Cockatoo Conservation Centre Perth NRM (member of Westport reference group) Urban Bushland Council (member of Westport reference group) Wildflower Society of WA

10.4.2 Stakeholder engagement process

The Westport Roads Integrated Project Team, on behalf of Main Roads, has developed an engagement strategy to facilitate input from the community and stakeholders for the Proposed Action. A summary of community consultation undertaken to inform the Proposed Action planning and development to date is provided in Table 10.2.

Table 10.2: Community Consultation Strategy Summary

Audience/Stakeholders	Engagement Medium	Timing
Cities of Kwinana, Cockburn and Rockingham	Technical Working Group to discuss issues for the scope, design and mitigation of the project	May 2025
Cities of Kwinana, Cockburn and Rockingham	Forum to share knowledge and identify known issues/concerns held by local interest groups / residents	June 2025
Freight and Road User Group	Technical Working Group with government and industry representation to discuss road user requirements that inform the project scope and design.	June 2025
All community and stakeholders	Project website as a primary source of information, includes a project overview brochure with map	June 2025
Email subscribers	Monthly project updates	June 2025
Residents and businesses in the Cities of Kwinana, Cockburn and Rockingham adjacent to the alignment (23,000)	Letterbox drop – to raise project awareness, promote the project website and email subscriptions for ongoing information / updates	June 2025
Residents and businesses in the Cities of Kwinana, Cockburn and Rockingham	Community Pop Up events at shopping centres to provide project information and answer questions	June 2025
All community and stakeholders	Community Survey on the Kwinana Freeway project website, via My Say Transport.	June 2025
All community and stakeholders	Social media advertising via Main Roads Facebook page	June 2025
All community and stakeholders	Third party communications – Social media advertising shared with the Cities of Kwinana, Cockburn and Rockingham for distribution to local social / digital networks	June 2025

A Community and Stakeholder Engagement (CSE) Plan has been developed to inform the early planning of the Proposed Action. Stakeholder and community engagement is a key input into the planning, development, design and, subject to approvals, construction of the proposed works.

Main Roads has established a governance framework including a Westport Roads and Rail Projects Board and Project Control Group to provide strategic guidance, technical input and decision making.

Main Roads will continue to engage with directly impacted property owners, key stakeholders and the wider community regarding the Proposed Action throughout the planning and development phase of the road planning process, subject to any statutory obligations including requirements arising from environmental approvals.

11 ENVIRONMENTAL RECORD OF THE PERSON PROPOSING TO TAKE THE ACTION

Main Roads is a State agency with an assured record of responsible environmental management and a certified Environmental Management System (EMS). Main Roads is not subject to any past or present proceedings under Commonwealth or State law for protection of the environment or conservation and sustainable use of natural resources. All work undertaken by Main Roads is completed in accordance with their Environmental Policy and Environmental Management System (EMS), which is certified with the requirements of ISO 14001:2015.

Environmental management systems comprising 'Activities, products and services associated with delivering Road Management (planning, building and maintaining) on Western Australia's State Road Network' (Certificate #MRWQ51-CCE04). Main Roads' environmental policy can be found at https://www.mainroads.wa.gov.au/OurRoads/Environment/Pages/environmentalmanagement.aspx#policy.

Main Roads EMS is independently certified and covers the processes and activities that have the potential to impact the environment, including mitigation and management measures proposed as part of the action. The EMS ensures compliance with Main Roads environment and heritage compliance obligations, providing the framework for driving environmental requirements through leadership, planning, support, operation, performance evaluation and improvement actions. The action, therefore, will be undertaken, monitored and measured in accordance with the Main Roads EMS.

Main Roads EMS covers processes and activities that have the potential to impact on the environment and ensures compliance with environment and heritage compliance obligations. The EMS responsibilities include appropriate resource allocation to ensure compliance costs are appropriately budgeted and assessed as part of the overall business case for the project. This ensures that the costs of proposed management measures is considered in the budget approvals and ensures compliance is appropriately funded and resourced.

Compliance with the Main Roads' EMS is regularly audited both internally and by independent third parties to ensure compliance and identify any changes which may improve the environmental outcomes. The regular auditing of the EMS is consistent with Main Roads' Environmental Policy to implement and maintain an effective EMS to ensure operations are managed in compliance with all environmental requirements

12 INTERNATIONAL OBLIGATIONS

Australia has played an important role in international cooperation to conserve migratory birds in the East Asian - Australasian Flyway, entering into bilateral migratory bird agreements with Japan in 1974, China in 1986 and most recently the Republic of Korea in 2007. Each of these agreements provides for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the exchange of information, and building cooperative relationships (DCCEEW 2022a). Birds listed on the annexes to these agreements are listed migratory species under the EPBC Act.

In relation to the above, the migratory status of relevant birds known to occur or hold potential to occur within the PAA have been considered in the GHD 2025a biological report. Core habitat for migratory shorebirds and water habitats, in the form of permanent or semi-permanent water and associated shorelines and fringing vegetation, is completely absent from the PAA.

Caladenia huegelii is listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), ratified by Australia in July 1976, under 'Orchidaceae'. Main Roads support the full range of domestic measures Australia has adopted for improved conservation and tighter restrictions on trade of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listed species. The Proposed Action does not involve international trade in flora and does not threaten wild populations of any listed plants and animals.

13 OTHER APPROVALS AND CONDITIONS

A summary of the approvals or conditions that apply or are likely to apply to the Proposed Action (in addition to an approval under the EPBC Act) are outlined below. Main Roads proposes to use existing state environmental approvals where available, with a Proposal specific native vegetation clearing permit application.

13.1 *Environmental Protection Act 1986*, Part IV

13.1.1 Ministerial Statement 663

Ministerial Statement 663 is for the Roe Highway Stage 7 Extension (South Street, Canning Vale to Kwinana Freeway, Leeming) was approved in 2004, with a s45C change to the broadscale map and offset package approved in 2005 and 2009. The Proposal extended Roe Highway from South Street in Canning Vale to connect to Kwinana Freeway in Leeming over a distance of approximately 4.5 km. The total footprint of the project area represents 62 hectares (ha), with 53.9 ha of the area to be cleared and the remaining 8.1 ha being existing degraded land.

Approximately 39.74 ha of native vegetation has been cleared under this approval, with 14.16 ha still available to be cleared.

13.1.2 Ministerial Statement 069

Ministerial Statement 069 (MS069) covers 14.5 km of Kwinana Freeway (Thomas Rd south to the Metropolitan Region Scheme Boundary), which was assessed by the WA EPA through a Public Environmental Review as part of an MRS amendment (Amendment No. 645/33). The Proposal was given conditional environmental approval by the WA Minister for the Environment in 1989.

MS069 is an amendment to the MRS for a controlled access highway reservation for Perth – Bunbury (Kwinana Freeway) route from Thomas Road, Kwinana to the MRS Boundary.

MS069 is applicable to the Proposed Action between Thomas Road and Mortimer Road.

13.2 *Environmental Protection Act 1986*, Part V Environmental Regulation – Clearing of Native Vegetation

Main Roads will obtain a clearing permit under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations) and Part V of the *Environmental Protection Act 1986*, for the native vegetation within the PAA that are not covered by MS663 and MS069.

13.3 Other approvals and regulation

Limited additional regulatory approvals will be required to develop and operate the Proposed Action (Table 13.1), other than obtaining a licence to take from the state Department of Water and Environmental Regulation, for the sourcing of groundwater under the *Rights in Water and Irrigation Act 1914*.

Table 13.1: Summary of other regulatory approvals required

Proposed activities	Type of approval	Regulatory agency	Legislation regulating the activity
Abstraction and discharge of water during construction.	Licence to take	DWER	Rights in Water and Irrigation Act 1914

13.4 Planning approvals

The alignment of the Proposed Action will be located within land currently zoned as Primary Regional Roads or Urban (Land Tenure designated 'Road') under the Metropolitan Region Scheme. No development (planning) approval is required for the construction works within these land zones.

14 APPLICATION OF RECOVERY PLANS AND THREAT ABATEMENT PLANS

The Proposed Action is not inconsistent with the relevant Recovery Plans and Conservation Advice relating to the MNES identified as occurring within the PAA, as shown below in Table 14.1.

Table 14.1: Assessment against Recovery Plans

Recovery / Abatement plan	Priority Actions	Assessment against plan
Banksia Woodlands of the Swan Coastal Plain TEC Threatened Species Scientific Committee 2016, Approved Conservation Advice (incorporating listing advice} for the Banksia Woodlands of the Swan Coastal Plain ecological community, Department of the Environment and Energy	The Conservation Advice recommends the following priority protection and restoration actions: 1. Prevent vegetation clearance and direct habitat damage, through: • Identify and map priority areas for protection/restoration • Prevent further clearance, fragmentation particularly for high conservation value, unmodified and old growth areas • Consider important landscape connections for reservation or other conservation tenure • Reduce cumulative impacts through liaison and planning with Local and State Government • Avoiding and mitigating impacts before offsetting, and match offsets to the same sub-community • Protect soil seed bank • Retain fauna habitat features and protect fauna during construction. 2. Prevent weeds, feral animals, dieback and other diseases, though: • Minimise soil disturbance • Avoid introduction and spread of weeds • Prevent introduction of feral and domestic animals • Monitor *P. cinnamomi* and manage early for local eradication • Appropriate weed and disease hygiene • Monitoring and treatment of weeds for new roads, for several years after construction • Avoid impacts on non-target species from control actions. 3. Manage groundwater abstraction. 4. Manage fire, through identifying appropriate fire regimes, weed control and implementing fire	The Proposed Action is not inconsistent with the recommendations of the Conservation Advice, through the following: • Survey and mapping of TEC extent and condition • Minimised clearance of TEC • Avoided and mitigated impacts to TEC (see Section 8) • Local harvesting and reuse of topsoil for revegetation within the road reserve • Revegetation to use local, native species to provide buffer to TEC • Weed and dieback surveys, treatment and hygiene to avoid the introduction and spread of weeds and dieback • Access controls and fencing to prevent unauthorised access that could introduce or spread weeds, dieback or fire • Ongoing monitoring and treatment of weeds in road reserves • The Proposed Action is not expected to alter the fire regime, hydrological regimes or introduce grazing pests or feral/domestic animals within Banksia TEC patches. Accordingly, the Proposed Action is not inconsistent

Recovery / Abatement plan	Priority Actions	Assessment against plan
	management. 5. Preventing grazing damage, through fencing and managing populations. 6. Revegetation, including: • Use local seeds for canopy/understorey and species resilient to climate change • Site specific restoration with appropriate FCT • Restore wildlife corridors and linkages • Habitat for conservation significant species, including Carnaby's Cockatoo • Adaptive management regimes • Weed management. 7. Communication and support, including a communication strategy, education programs, local participation, promotion of awareness with agencies and industries, and measures for new residential areas.	with the priority protection and restoration actions of the Approved Conservation Advice for Banksia TEC (2016).
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the SCP TEC Threatened Species Scientific Committee 2019, Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal	The Conservation Advice recommends the following priority protection and restoration actions: 1. Prevent vegetation clearance and direct habitat degradation • Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation • Ensure that planning supports increased resilience within the landscape • Avoid sudden or substantial modifications to hydrology quality and quantity (including groundwater depth and salinity) • All possible options for avoiding impacts should be exhausted before mitigation and offsets are considered. 2. Preventing invasion by weeds, introduced animals, 'Tuart decline', dieback and other diseases • Prevent weed invasion and disease spread by minimising soil disturbance	The Proposed Action is not inconsistent with the recommendations of the Conservation Advice, through the following: • Survey and mapping of TEC extent and condition • Minimised clearance of TEC • Avoided and mitigated impacts to TEC (see Section 8) • Local harvesting and reuse of topsoil for revegetation within the road reserve • Revegetation to use local, native species to provide buffer to TEC

Recovery / Abatement plan	Priority Actions	Assessment against plan
Plain ecological community, Department of the Environment and Energy	• Do not plant or enhance the spread or abundance of known, or potential, environmental weeds within or near the ecological community • Where prescribed burning is planned in a remnant, ensure that a full weed risk assessment has been undertaken prior to the burn and that follow up weed management is budgeted for and implemented in the first and subsequent growing seasons with appropriate monitoring to guide when and where to eliminate weeds. • Prevent further introduction of non-native and non-Western Australian native animals and contain domestic animals within residential areas • Use local plants from accredited nurseries • Use appropriate hygiene • Implement other preventative measures to avoid spread of disease such as Phytophthora dieback. 3. Manage fire, through identifying appropriate fire regimes, weed control and implementing fire management 4. Preventing grazing damage, through fencing and managing populations 5. Re-vegetation and regeneration • Identify sites where there are good opportunities for active restoration or natural regeneration • Aim to increase the overall extent that meets the description and condition thresholds for the ecological community. Aim to increase condition and appropriate landscape scale connectivity • Check sites being rehabilitated for presence of seeds of native species in the soil • Consider the landscape context of the source of the seed, as this may influence the suitability of the offspring plants for the restoration site • Consider historical records and photographs to inform species selection	• Weed and dieback surveys, treatment and hygiene to avoid the introduction and spread of weeds and dieback • Access controls and fencing to prevent unauthorised access that could introduce or spread weeds, dieback or fire • Ongoing monitoring and treatment of weeds in road reserves • The Proposed Action is not expected to alter the fire regime, hydrological regimes or introduce grazing pests or feral/domestic animals within Tuart TEC patches. Accordingly, the Proposed Action is not inconsistent with the priority protection and restoration actions of the Approved Conservation Advice for Tuart TEC (2019).

Recovery / Abatement plan	Priority Actions	Assessment against plan
	• Consider the current physical structure and age classes of vegetation present. • Consider particularly the needs of Tuart and other species of conservation concern or known to be of functional importance for the ecological community • Consider use of ash beds • Protect from seed predators and herbivores following seeding or planting • In conjunction with mapping patches of the ecological community, consider the landscape context and other areas of native vegetation to determine priority areas for restoration in each natural resource management region • Restore wildlife corridors and linkages (where appropriate). 6. Restore habitat features • If necessary, supplement, (but do not replace) habitat by placing hollow logs, large rocks or other habitat features in or near to, the ecological community. 7. Control invasive species and diseases • Map weed occurrence and prioritise management of weeds in high or very high quality patches or where threatened or regionally significant species (e.g. WA priority species) are known to occur • Implement effective control and management techniques for weeds currently affecting the ecological community. 8. Education, information and local regulation • Develop information products and signage to help local communities, industry representatives, planners and managers • Promote knowledge about local weeds, means to control these and appropriate alternative species to plant. • Involve Indigenous people early in the process of planning research and conservation actions	

Recovery / Abatement plan	Priority Actions	Assessment against plan
	• Develop education programs to discourage damaging activities • Refer to traditional owners with experience in fire management and ecological responses • Liaise with local fire management authorities and agencies and engage their support in fire management of the ecological community • Encourage local participation in recovery efforts, removing threats and actively restoring existing patches, as well as supplementing these • Promote awareness and protection of the ecological community with relevant agencies and industries. 9. Incentives and support • Acknowledge, celebrate and support the efforts of land managers who undertake stewardship to protect and restore the ecological community • Support opportunities for traditional owners or other members of the Indigenous community to manage the ecological community • Implement formal conservation agreements (for example, covenants) for sites containing the highest condition examples of ecological community • Develop coordinated incentive projects to encourage conservation and stewardship on private land, and link with other programs and activities, especially those managed by regional Catchment Councils and other Natural Resource Management groups.	
Carnaby's Cockatoo Department of Parks and Wildlife 2013, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan, Department of Parks and Wildlife, Perth,	The objective of this Recovery Plan is to stop further decline in the distribution and abundance of Carnaby's Cockatoo by protecting the birds throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range, ensuring that the reproductive capacity of the species remains stable or increases. The recovery actions within the plan include: • Protect and manage breeding habitat and associated feeding habitat • Protect and manage of non-breeding habitat	The Proposed Action is not inconsistent with the recommendations of the Recovery Plan, through the following: • The Proposed Action will not involve clearing of any suitable breeding or roosting trees • The Proposed Action has been subject to a targeted survey to identify Carnaby's Cockatoo

Recovery / Abatement plan	Priority Actions	Assessment against plan
Western Australia.	• Undertake regular monitoring • Conduct research to inform management • Manage other impacts • Engage with the broader community • Undertake information and communication activities. The Recovery Plan specifies activities that will adversely affect Carnaby's Cockatoo should be avoided, and then minimised or mitigated if avoidance cannot be achieved.	habitat; and consideration of Carnaby's Cockatoo habitat mapping by DBCA • The Proposed Action has been planned and designed to minimise clearing of potential breeding and foraging habitat for Carnaby's Cockatoo • The Proposed Action incorporates design and management measures to protect Black Cockatoo habitat in adjacent native vegetation • Planning and design of the Proposed Action has involved consultation with relevant stakeholders. Accordingly, the Proposed Action is not inconsistent with the Carnaby's Cockatoo Recovery Plan (2013).
FRTBC Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan (Western Australian Department of Environment and Conservation, 2008)	The objective of this Recovery Plan is to stop further decline in the breeding populations of Baudin's Cockatoo and FRTBC and to ensure their persistence throughout their current range in the south-west of Western Australia. Priority actions within the plan include (listed in highest to lowest priority): • Seek the funding required to implement future recovery actions • Determine and promote non-lethal means of mitigating fruit damage by Baudin's Cockatoo in orchards • Eliminate illegal shooting • Develop and implement strategies to allow for the use of noise emitting devices in orchards • Determine and implement ways to remove feral Honeybees from nesting hollows	The Proposed Action is not inconsistent with the recommendations of the Recovery Plan, through the following: • The Proposed Action is not related to mining, orchards or forest management, nor is the Proposed Action expected to increase the prevalence of feral honeybees or risk of illegal shooting • As a component of urban development, the Proposed Action has been subject to survey to identify Black Cockatoo habitat (including consideration of Black Cockatoo habitat mapping by DBCA and breeding records from WA museum)

Recovery / Abatement plan	Priority Actions	Assessment against plan
	• Identify factors affecting the number of breeding attempts and breeding success and manage nest hollows to increase recruitment • Determine and implement ways to minimise the effects of mining and urban development on habitat loss • Determine and implement ways to manage forests for the conservation of Forest Black Cockatoos • Identify and manage important sites and protect from threatening processes • Map feeding and breeding habitat critical to survival and important populations, and prepare management guidelines for these habitats • Monitor population numbers and distribution • Determine the patterns and significance of movement. • With respect to urban development, the following recovery actions are specified: • Fauna survey to identify presence of Commonwealth listed • threatened fauna species and referral of any proposed impacts to DEE • Wherever possible, retention of habitats known to be used for feeding, breeding and roosting by Forest Black Cockatoos • Obtain advice from State Government and Western Australian Museum on protection of remaining habitat.	• The Proposed Action will not involve clearing of any suitable breeding or roosting trees • The DE has been planned and designed to minimise clearing of FRBTC foraging habitat. Accordingly, the Proposed Action is not inconsistent with the Forest Black Cockatoo Recovery Plan (Chapman 2008).
FRTBC Threatened Species Scientific Committee 2009, Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed	The Conservation Advice recommends the following priority recovery and threat abatement actions to support the recovery of the FRTBC: • Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary • Determine and implement ways to minimise the effects of mining on habitat loss	The Proposed Action is not inconsistent with the recommendations of the Recovery Plan, through the following: • Monitoring of the effectiveness of management actions and whether there is a need to adapt them

Recovery / Abatement plan	Priority Actions	Assessment against plan
Black Cockatoo), Department of the Environment, Water, Heritage and the Arts	• Determine and implement ways to manage forests for the conservation of the subspecies • Develop and implement a management plan for the control and reduction of non-managed European Honeybees in the region • Develop and implement a communication strategy to stop illegal shooting of FRTBCs and improve compliance with the relevant legislation.	• The Proposed Action is not related to mining, orchards or forest management, nor is the Proposed Action expected to increase the prevalence of feral honeybees or risk of illegal shooting • As a component of urban development, the Proposed Action has been subject to survey to identify Black Cockatoo habitat (including consideration of Black Cockatoo habitat mapping by DBCA and breeding records from WA museum) • The Proposed Action will not involve clearing of any suitable breeding or roosting trees • The DE has been planned and designed to minimise clearing of FRBTC foraging habitat. Accordingly, the Proposed Action is not inconsistent with the Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) (DEWHA 2009).
Dieback Threat Abatement Plan for Disease in Natural Ecosystems Caused by *Phytophthora cinnamomic* (Department of the Environment 2014).	The goal of this Threat Abatement Plan is to minimise the impacts of dieback on MNES under the EPBC Act and priority biodiversity assets identified by the actions of this plan. The plan has three objectives: • Identify and prioritise for protection biodiversity assets that are, or may be, impacted by dieback. • Protect priority biodiversity assets through reducing the spread and mitigating the impacts of dieback.	The Proposed Action is not inconsistent with the goal or objectives of the Threat Abatement Plan. A dieback survey is being completed to inform management requirements during construction. The Threat Abatement Plan identifies road construction as a high risk activity requiring dieback education, restricting access to infected locations, and enforcing hygiene procedures to minimise the spread of dieback in the landscape.

Recovery / Abatement plan	Priority Actions	Assessment against plan
	• Communication and training.	The Proposed Action will incorporate Dieback hygiene during construction to protect adjacent vegetation that may be uninfested and vulnerable. The Proposed Action will establish protectable areas along sections of the DE boundary and incorporate access controls, equipment and vehicle washing/segregation, soil movement controls, and monitoring during construction (see Section 8). Soil harvested from infested or unidentified areas will not be reused in protectable areas, and equipment and vehicles working in infested areas will not be able to access protectable areas unless cleaned and inspected. Soil harvested from infested areas will only be reused in infested areas or else will be disposed of at a licensed landfill. The Proposed Action is not expected to spread Dieback through sediment in stormwater runoff, as stormwater will be captured and infiltrated within basins/swales in the road reserve.
Introduced species (Cats) Threat Abatement Plan for Predation by Feral Cats (Department of the Environment, 2015).	Threat abatement plan has the following objectives: • Effectively control feral cats in different landscapes • Improve effectiveness of existing control options for feral cats • Develop or maintain alternative strategies for threatened species recovery • Increase public support for feral cat management and promote responsible cat ownership	The Threat Abatement Plan is not directly relevant to the Proposed Action; however, the Proposed Action is not inconsistent with the Plan. The Proposed Action will not increase the prevalence of feral cats in the area, as it will encourage through traffic and not provide a destination or increase public access to surrounding vegetation. The Proposed Action will not increase food sources that may attract cats. The PAA is not considered to be existing breeding

Recovery / Abatement plan	Priority Actions	Assessment against plan
		habitat for Black Cockatoos, therefore predation of chicks from nesting hollows is unlikely to occur.
Introduced species (Rabbits) Threat Abatement Plan for competition and land degradation by rabbits (Department of the Environment and Energy 2016c)	Threat abatement plan has the following objectives: • Strategically manage rabbits at the landscape scale and suppress rabbit populations to densities below threshold levels in identified priority areas • Improve knowledge and understanding of the impact of rabbits and their interactions with other species and ecological processes • Improve the effectiveness of rabbit control programs.	The Threat Abatement Plan is not directly relevant to the Proposed Action; however, the Proposed Action is not inconsistent with the Plan. The Proposed Action will not increase the prevalence of rabbits in the area, as it will encourage through traffic and not provide a destination or increase public access to surrounding vegetation.
Introduced species (Fox) Threat Abatement Plan for Predation by the European Red Fox (Department of the Environment, Water, Heritage and the Arts 2008b).	Threat abatement plan has the following objectives: • Prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands' • Promote the maintenance and recovery of native species and ecological communities that are affected by fox predation • Improve knowledge and understanding of fox impacts and interactions with other species and other ecological processes Improve the effectiveness, target specificity, integration and humaneness of control options for foxes	The Threat Abatement Plan is not directly relevant to the Proposed Action; however, the Proposed Action is not inconsistent with the Plan. The Proposed Action will not increase the prevalence of the Red Fox in the area, as it will encourage through traffic and not provide a destination or increase public access to surrounding vegetation. The Proposed Action will not increase food sources that may attract the Red Fox. The PAA is not considered to be existing breeding habitat for Black Cockatoos, therefore predation of chicks from nesting hollows is unlikely to occur.

15 INFORMATION SOURCES

The reliability and uncertainties in the technical studies undertaken in preparation of the Proposed Action have been outlined in Table 15.1.

Table 15.1: Reliability and uncertainties in technical studies used in preparing the PD

Reference Source	Reliability	Uncertainties
GHD (2025a) Kwinana Freeway widening - Biological Survey. Unpublished report by GHD Pty Ltd for Main Roads Western Australia. (Rev 0 - July 2025)	Information is reliable. This survey was undertaken in accordance with EPA, Commonwealth and other appropriate guidance.	There are no uncertainties that impact the assessment determination in this referral supporting document.
GHD (2025b) Roe Highway widening – Targeted Flora, Vegetation and Wetland Assessment. Unpublished report by GHD Pty Ltd for Main Roads Western Australia. (Unpublished)	Information is reliable. This survey was undertaken in accordance with EPA, Commonwealth and other appropriate guidance.	There are no uncertainties that impact the assessment determination in this referral supporting document.
GHD (2025c) Roe Highway widening – Basic Fauna and SRE Survey. Unpublished report by GHD Pty Ltd for Main Roads Western Australia. (Unpublished)	Information is reliable. This survey was undertaken in accordance with EPA, Commonwealth and other appropriate guidance.	There are no uncertainties that impact the assessment determination in this referral supporting document.
GHD (2025d) Roe Highway widening – Targeted Black Cockatoo Survey . Unpublished report by GHD Pty Ltd for Main Roads Western Australia. (Unpublished)	Information is reliable. This survey was undertaken in accordance with EPA, Commonwealth and other appropriate guidance.	There are no uncertainties that impact the assessment determination in this referral supporting document.

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17 APPENDICIES

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Appendix 1	Figures
Appendix 2	MRWA Kwinana Freeway widening - Biological Survey (GHD 2025)
Appendix 3	Risk Assessment

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Figure 2: Land Use

Figure 3: Reserves and Conservation Areas

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Figure 10: Fauna habitat within the PAA

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Figure 17: Carnaby's Cockatoo foraging habitat within 12 km of the PAA

Figure 18: Forest Red-tailed Black Cockatoo foraging habitat within the PAA

Figure 19: Forest Red-tailed Black Cockatoo foraging habitat within 12km of the PAA

Figure 20: Suitable DBH Trees within PAA

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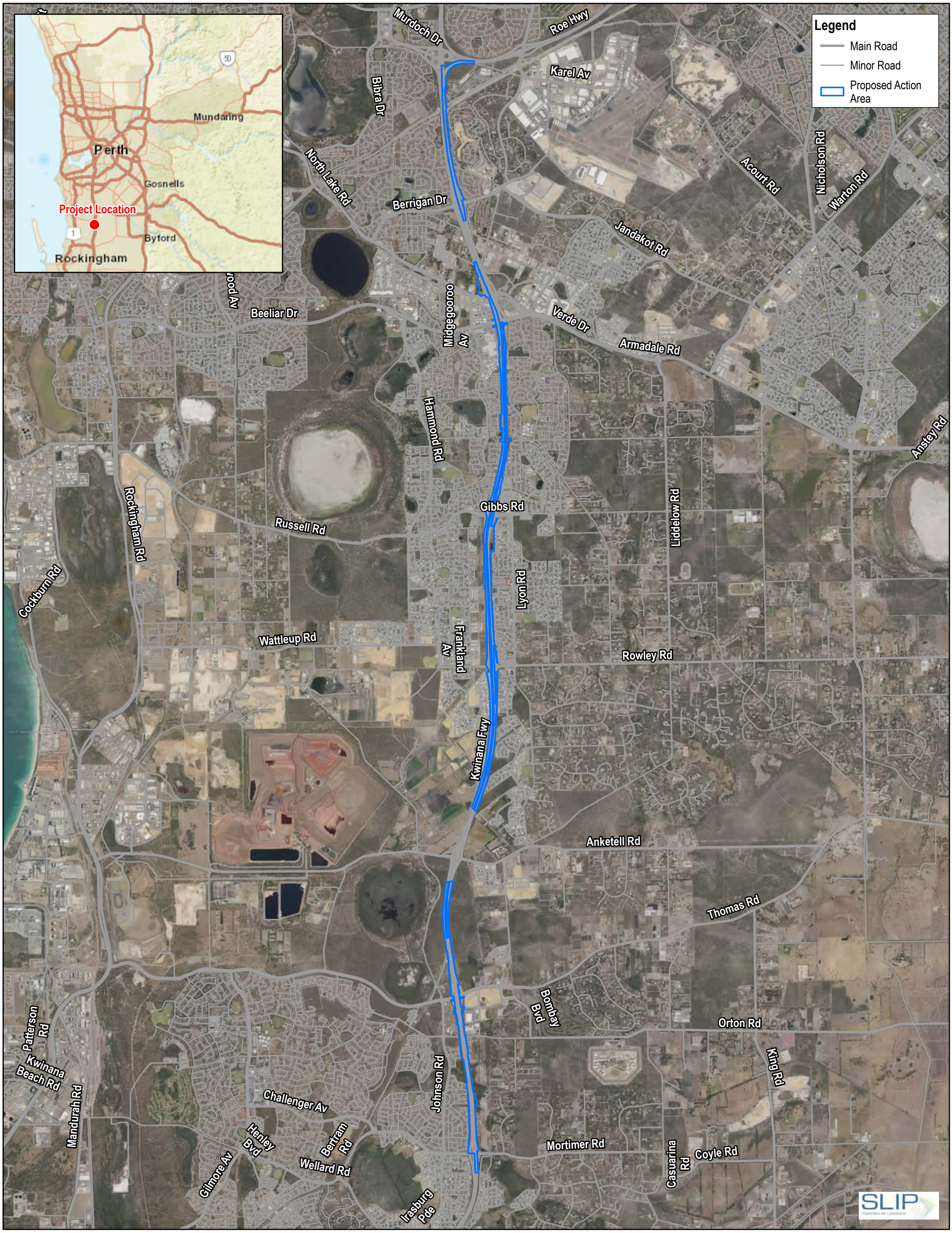

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Proposed Action Area (PAA)

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 1

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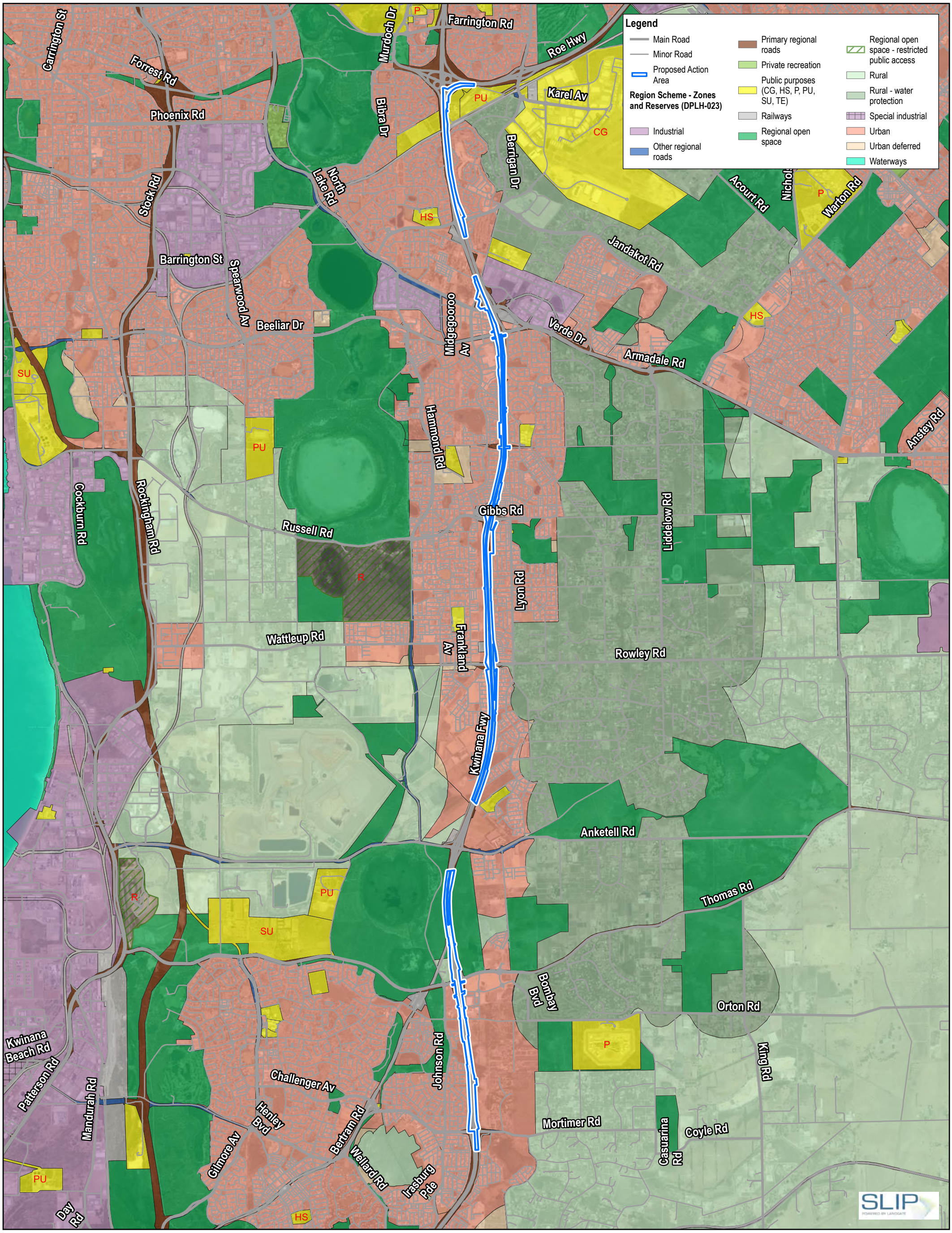

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Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Land Use

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 2

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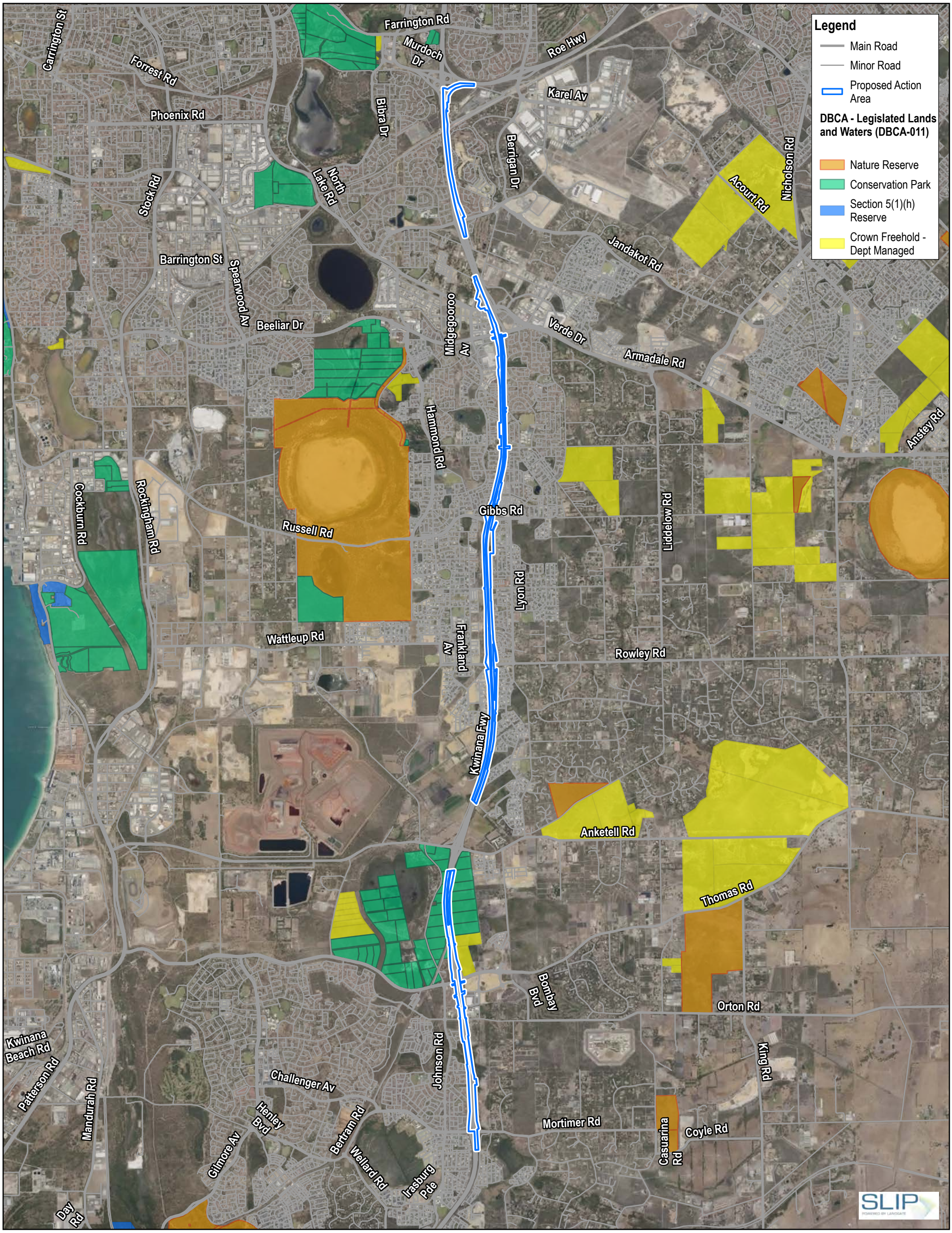

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Kilometers

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Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Reserves and Conservation Areas

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 3

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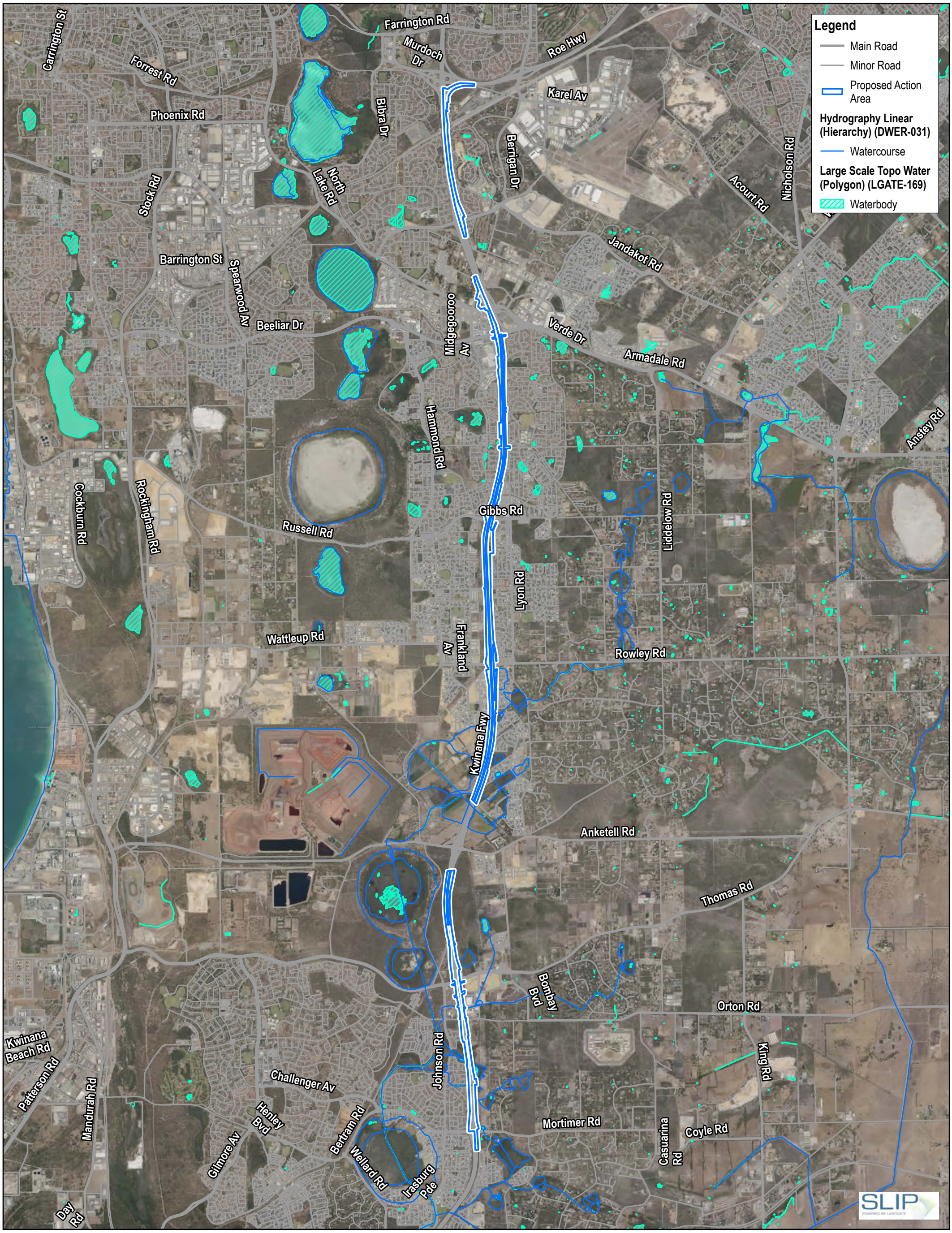

Paper Size ISO A3

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Hydrology

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 4

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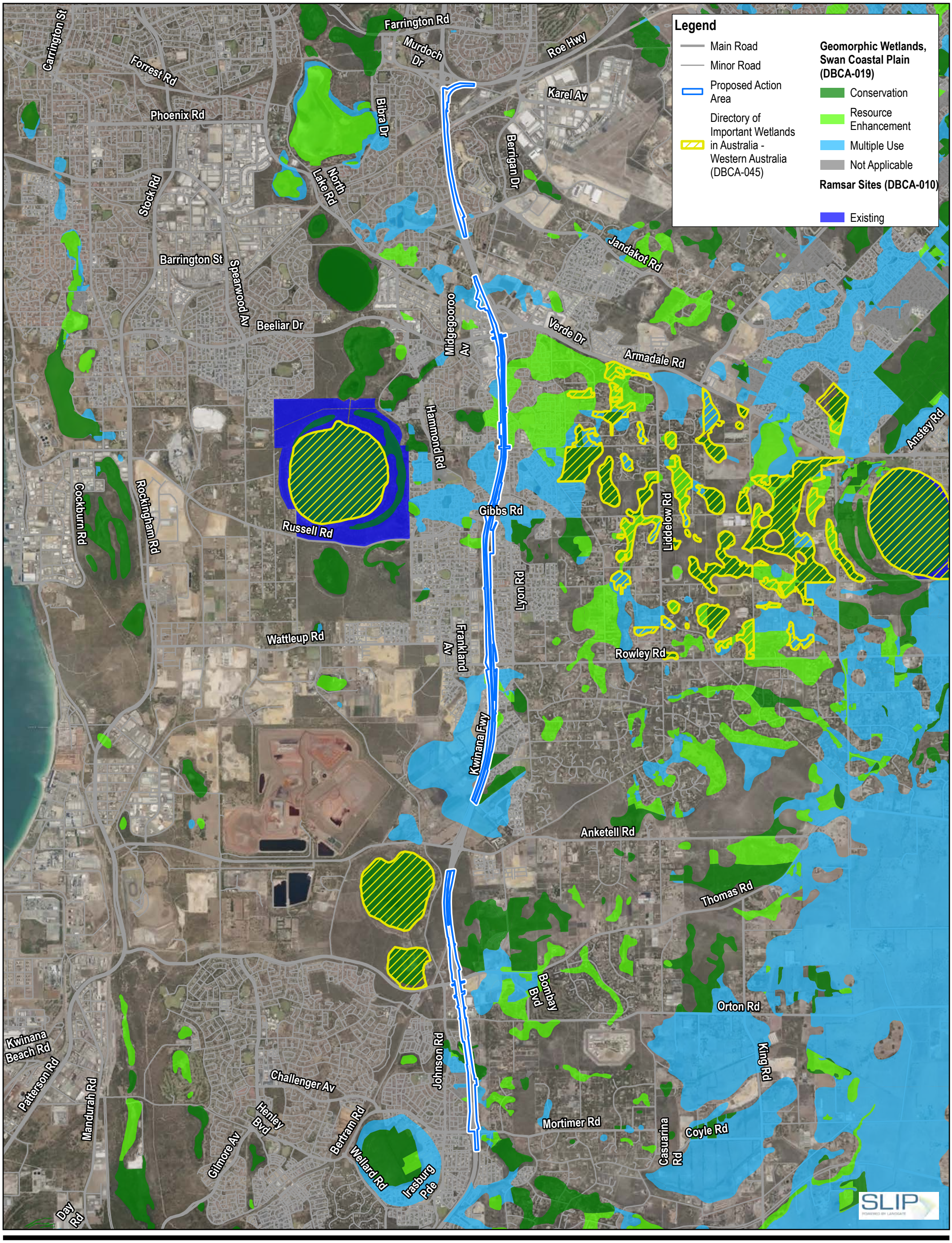

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Kilometers

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Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

Wetlands

FIGURE 5

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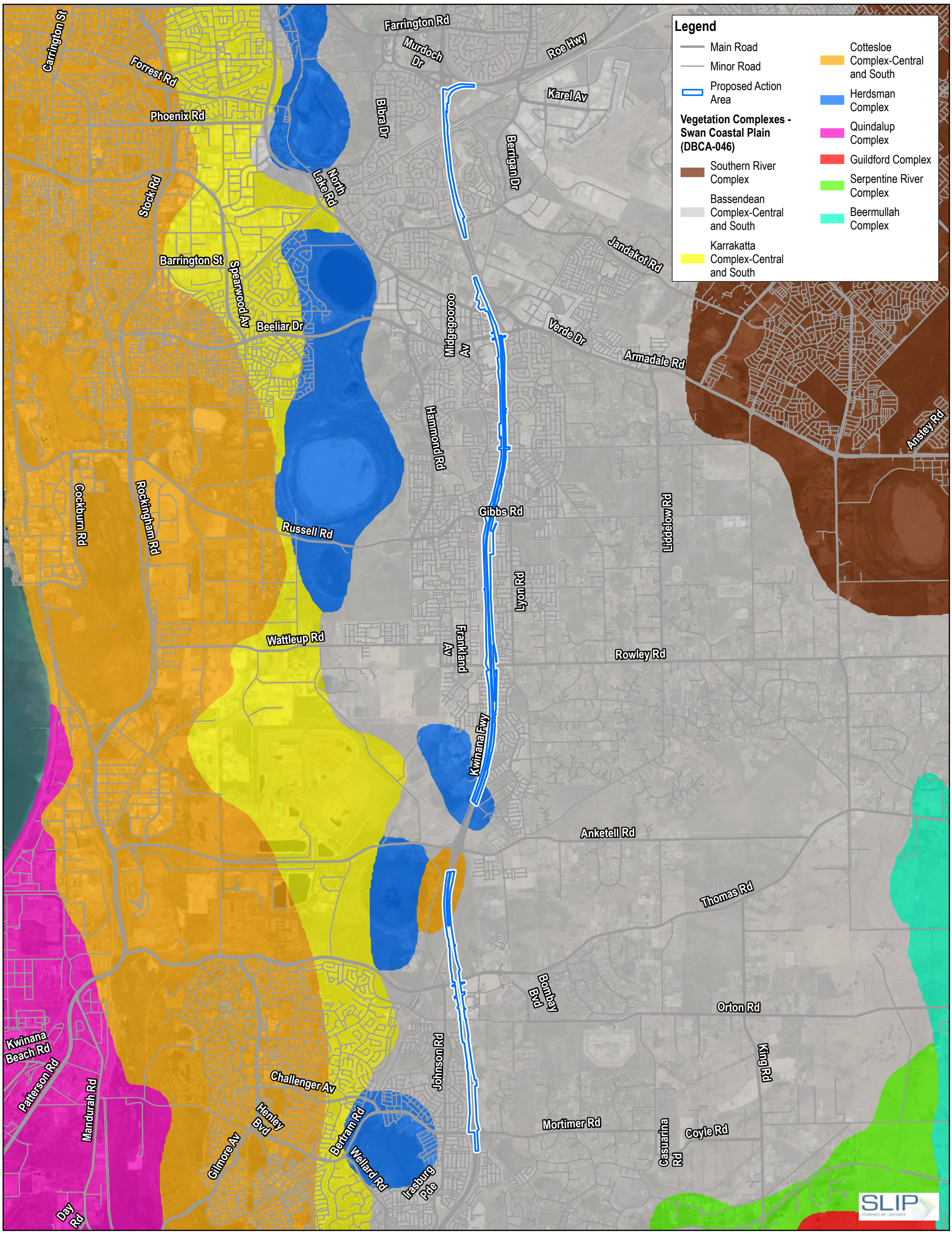

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Kilometers

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

Vegetation Complexes Within the PAA

FIGURE 6

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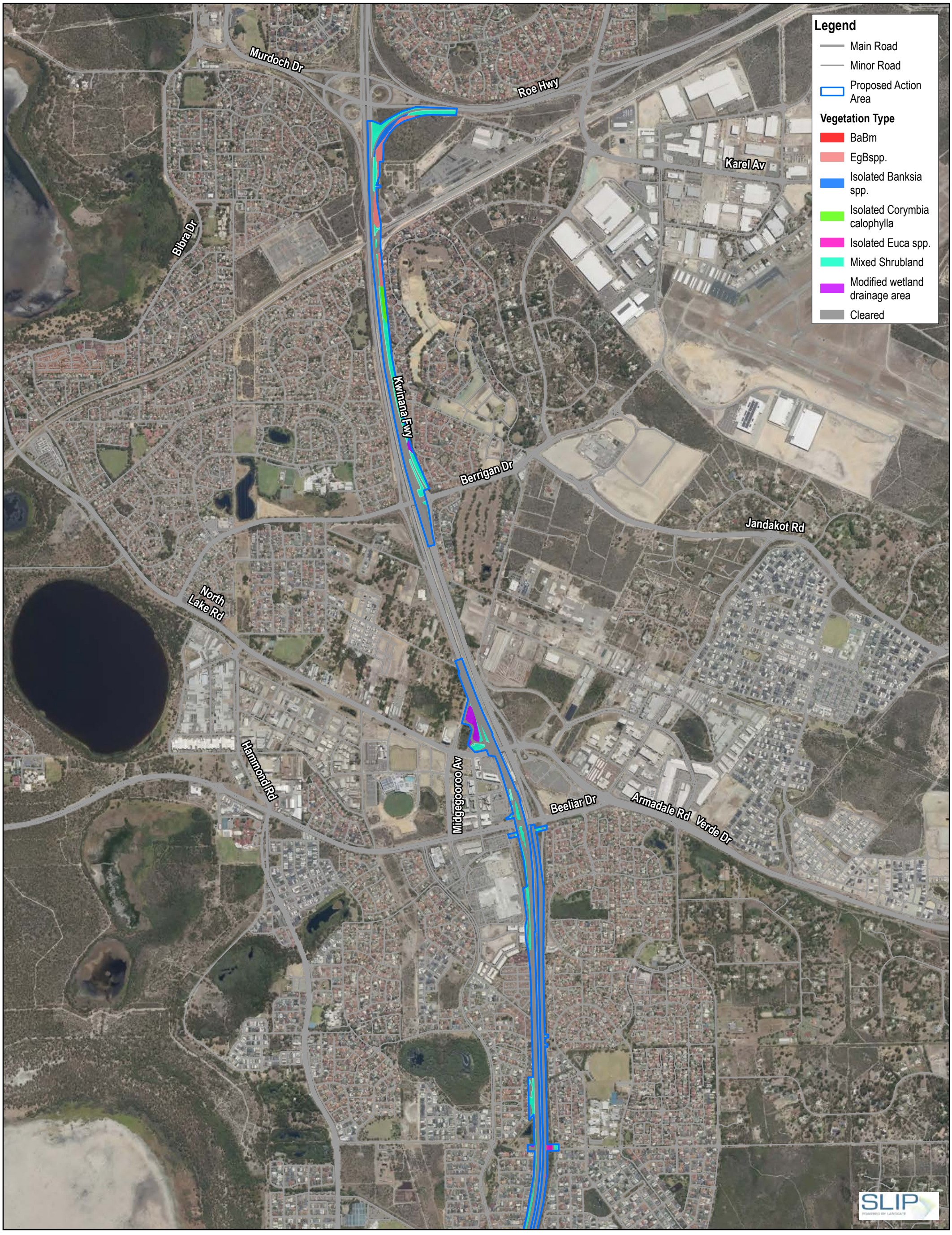

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Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No.	**12657323**
Revision No.	**1**
Date	**18/08/2025**

Vegetation Type within the PAA

FIGURE 7

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_007_VegetationTypes_Rev1
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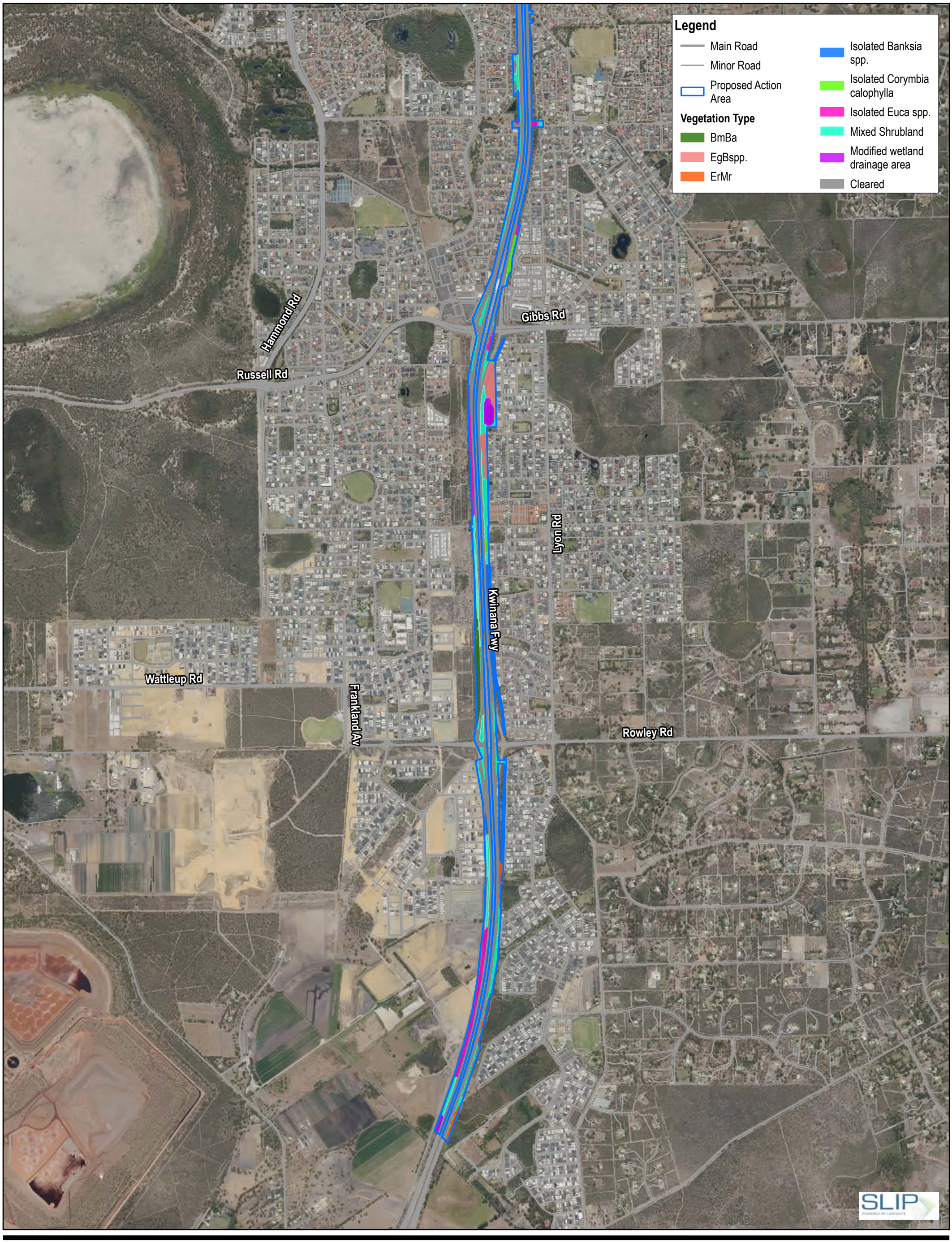

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

Vegetation Type within the PAA

FIGURE 7

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_007_VegetationTypes_Rev1
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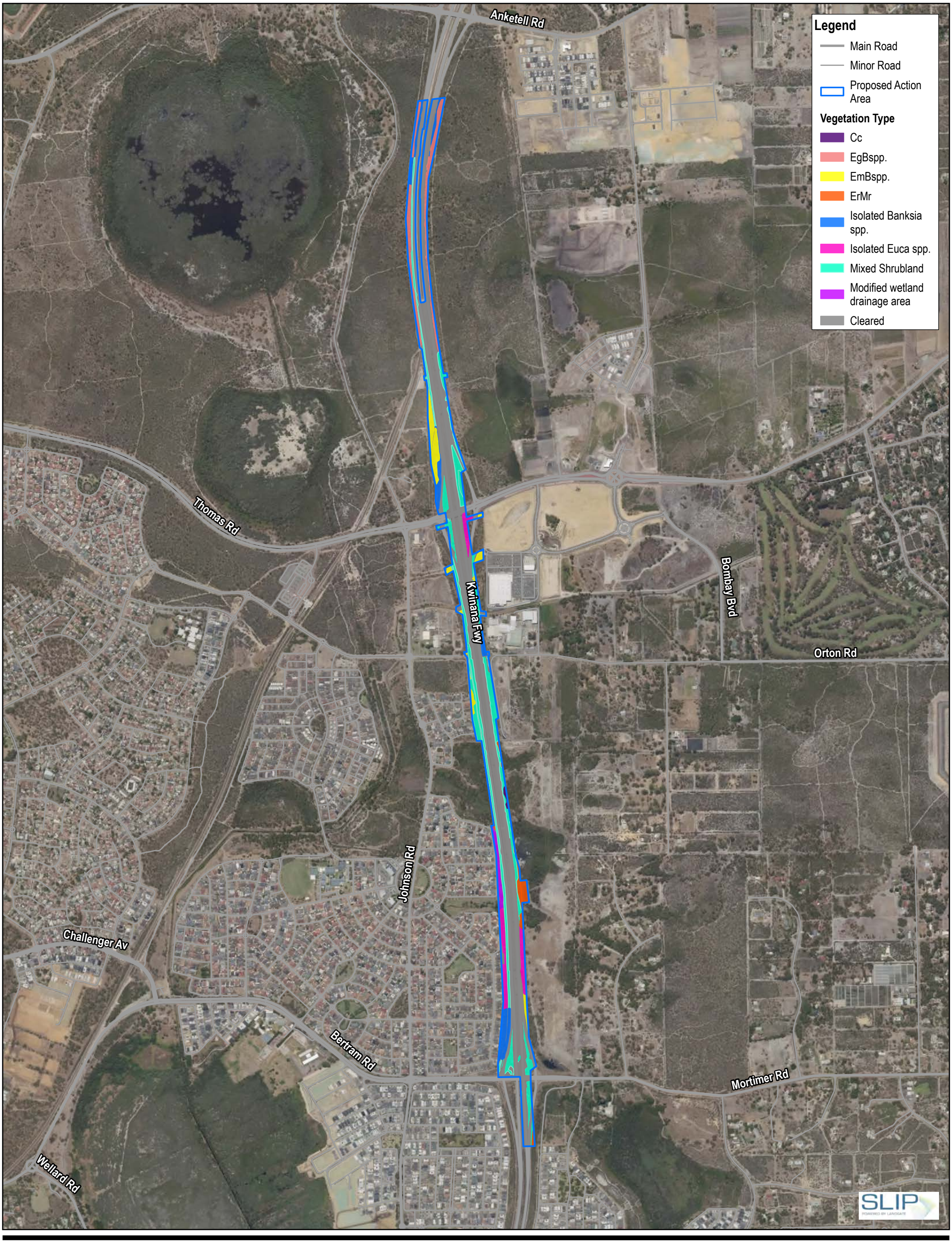

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

Vegetation Type within the PAA

FIGURE 7

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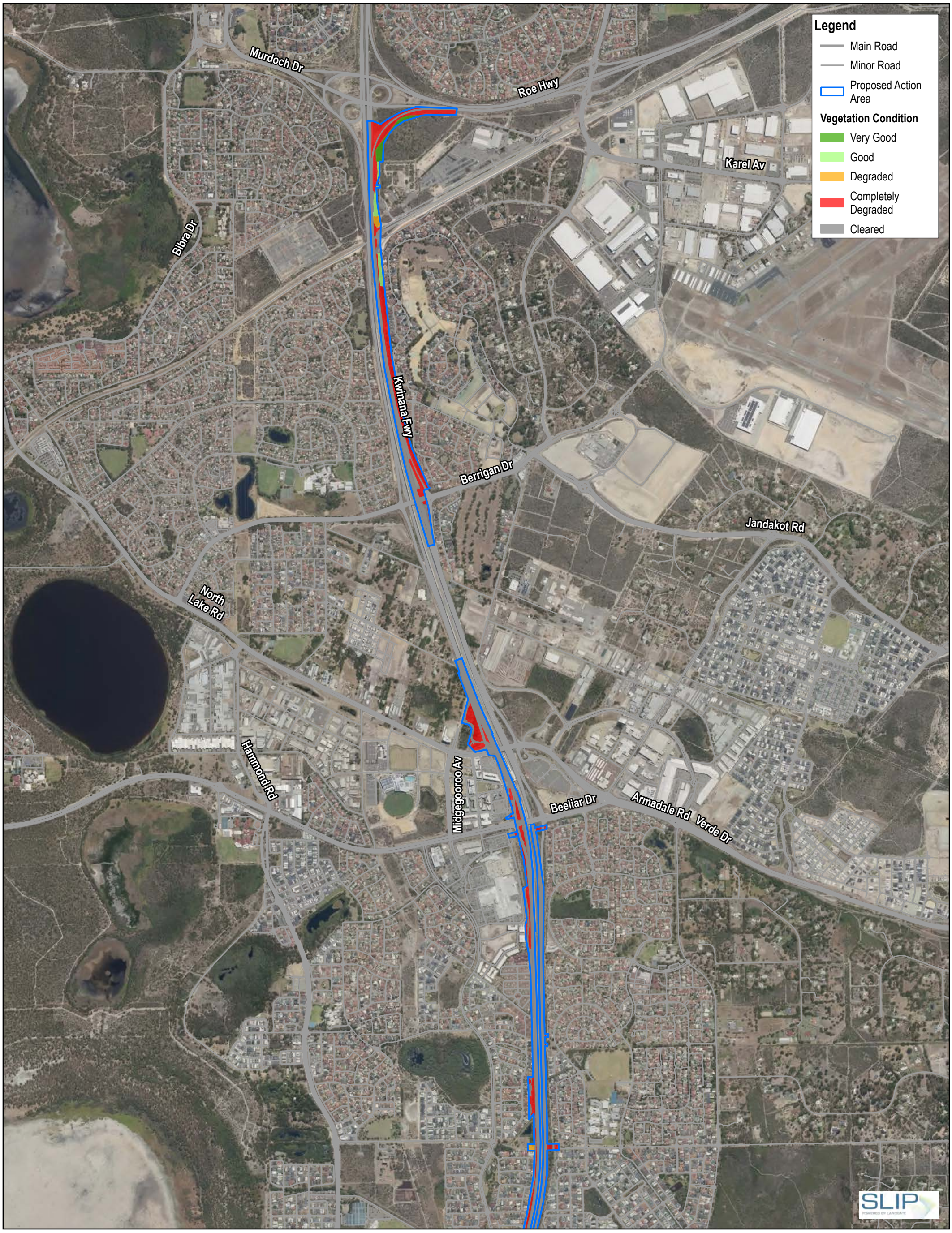

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Meters

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Map Projection: Transverse Mercator
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Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No.	**12657323**
Revision No.	**0**
Date	**13/08/2025**

FIGURE 8

Vegetation Condition within the PAA

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_008_VegetationCondition_Rev0
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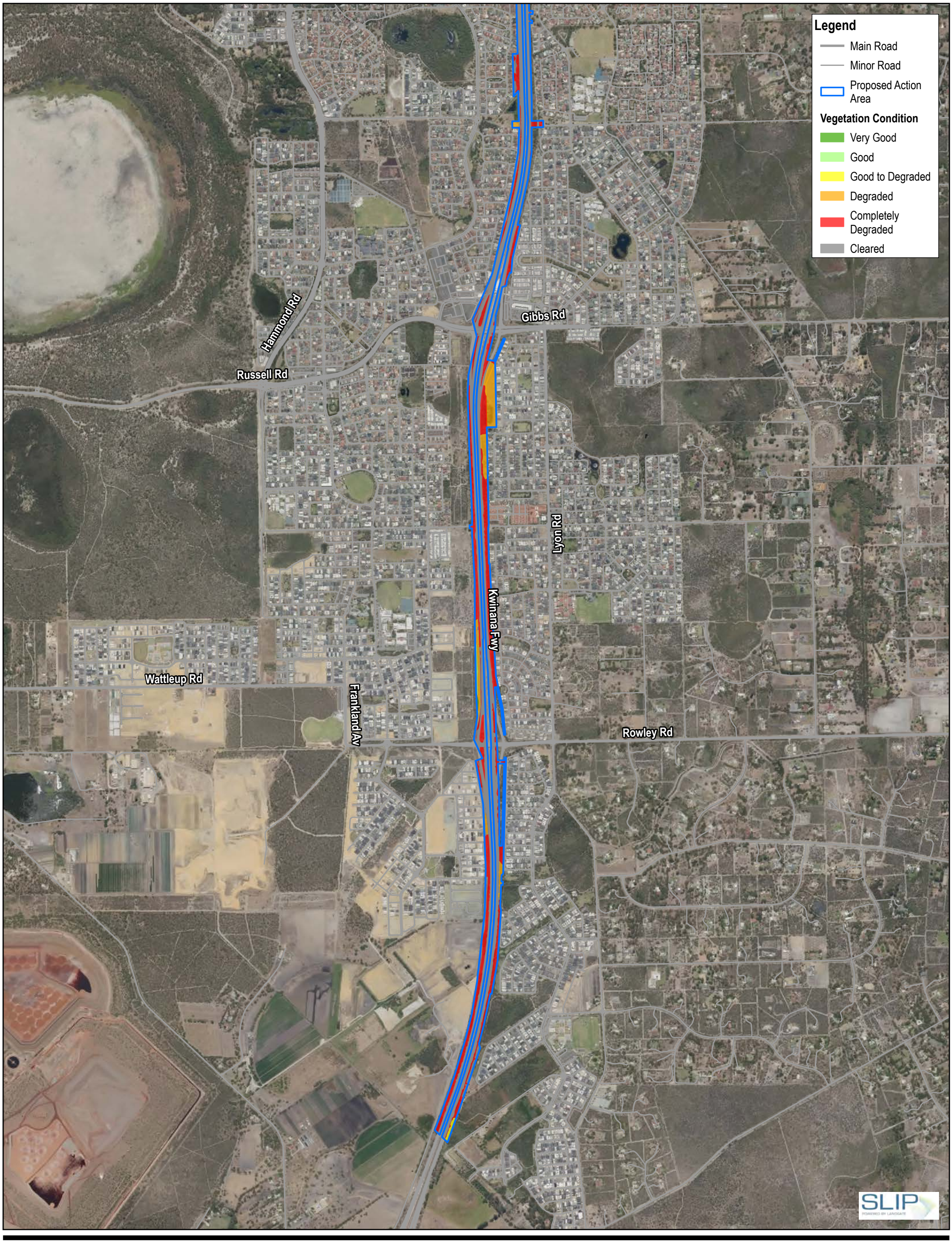

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **0**
Date **13/08/2025**

Vegetation Condition within the PAA

FIGURE 8

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_008_VegetationCondition_Rev0
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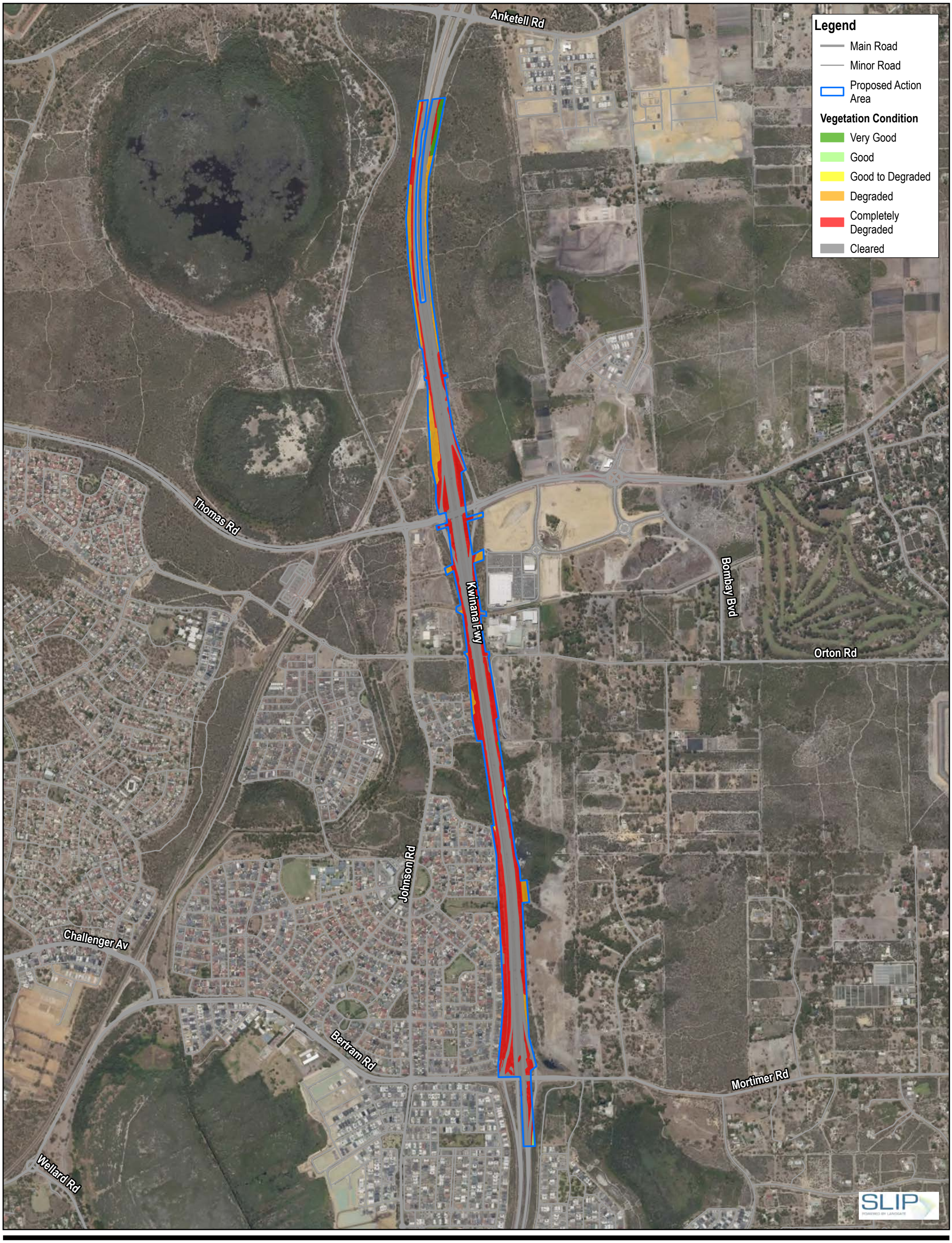

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Project No. **12657323**
Revision No. **0**
Date **13/08/2025**

Vegetation Condition within the PAA

FIGURE 8

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_008_VegetationCondition_Rev0
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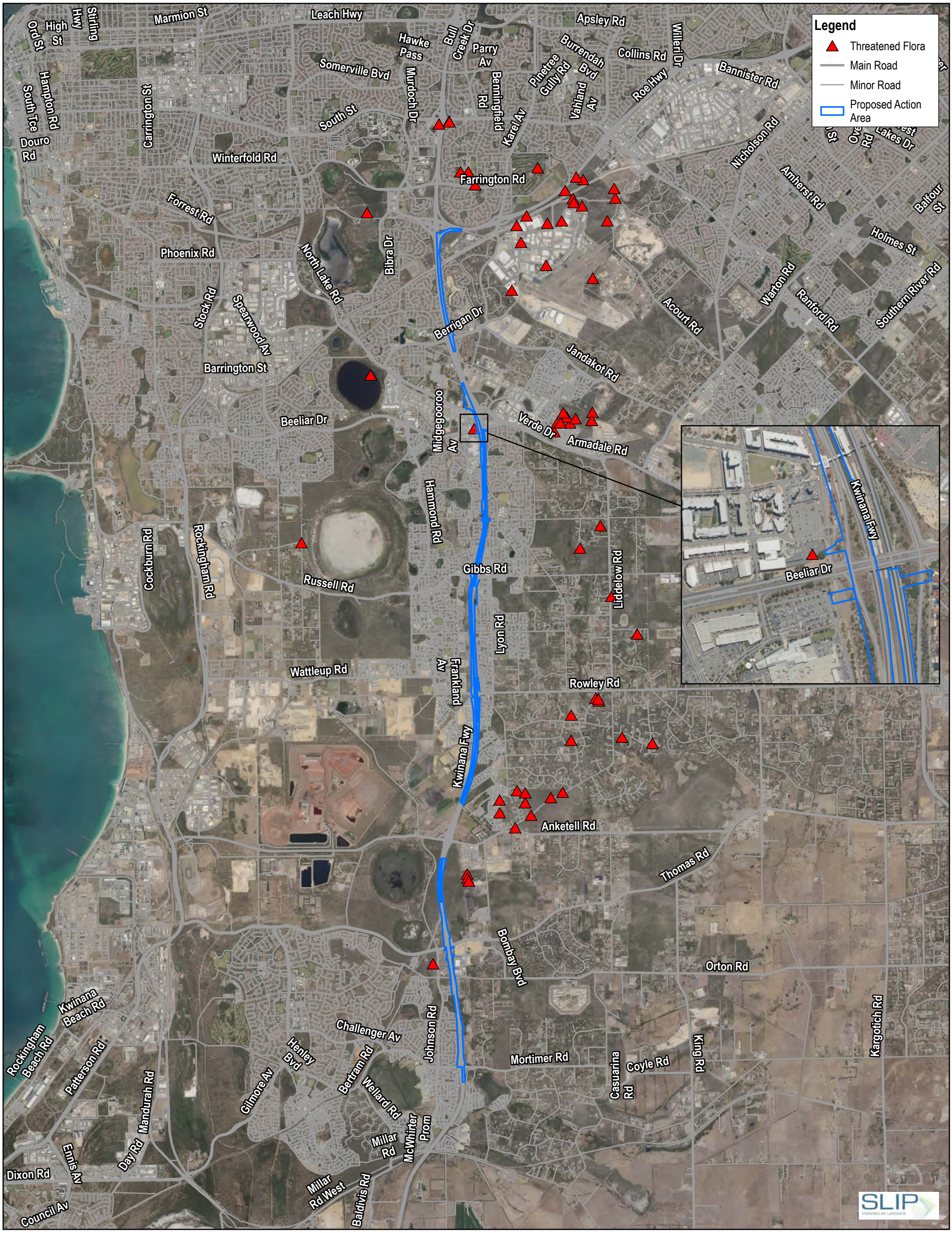

Paper Size ISO A3

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Historic MNES Flora Records Within 5km of the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 9

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_009_SignificantFlora_Rev1
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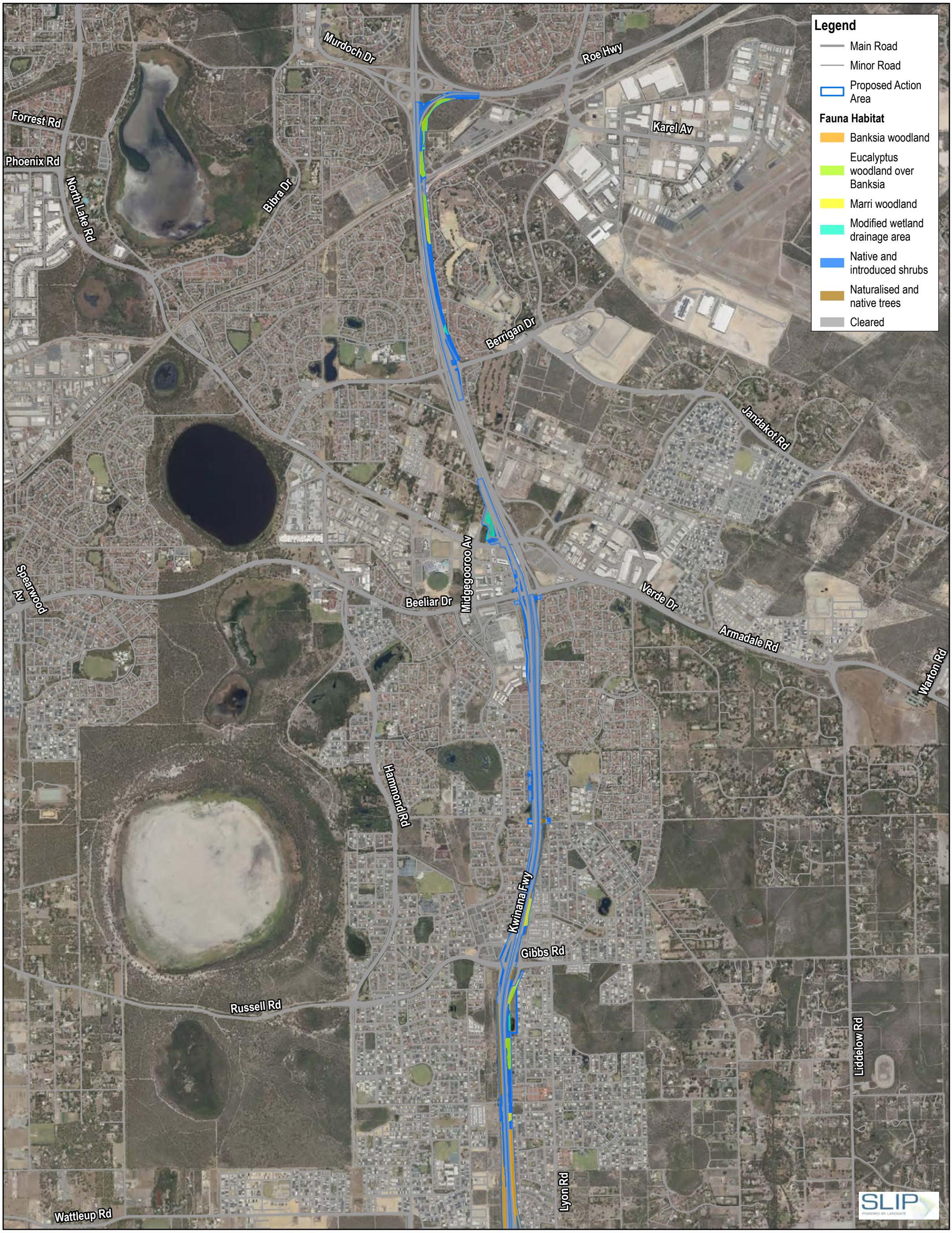

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Fauna Habitat Within the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 10

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_010_FaunaHabandSigFauna_Rev1
Print date: 18 Aug 2025 - 07:46

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Paper Size ISO A3

0 300 600 900 1,200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

Fauna Habitat Within the PAA

FIGURE 10

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_010_FaunaHabandSigFauna_Rev1
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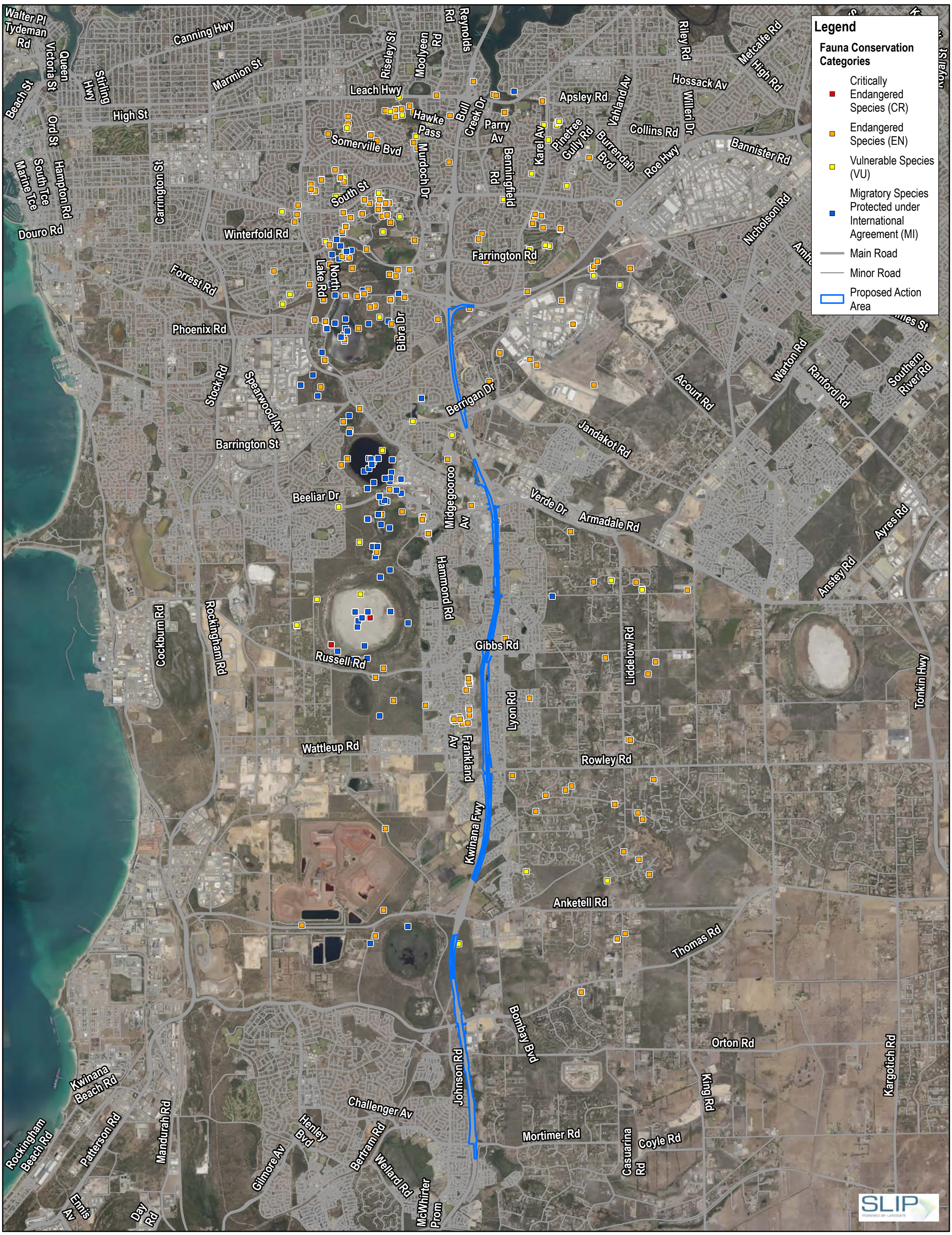

Paper Size ISO A3

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Historic MNES Fauna Records Within 5km of the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_011_SignificantFauna_Rev1
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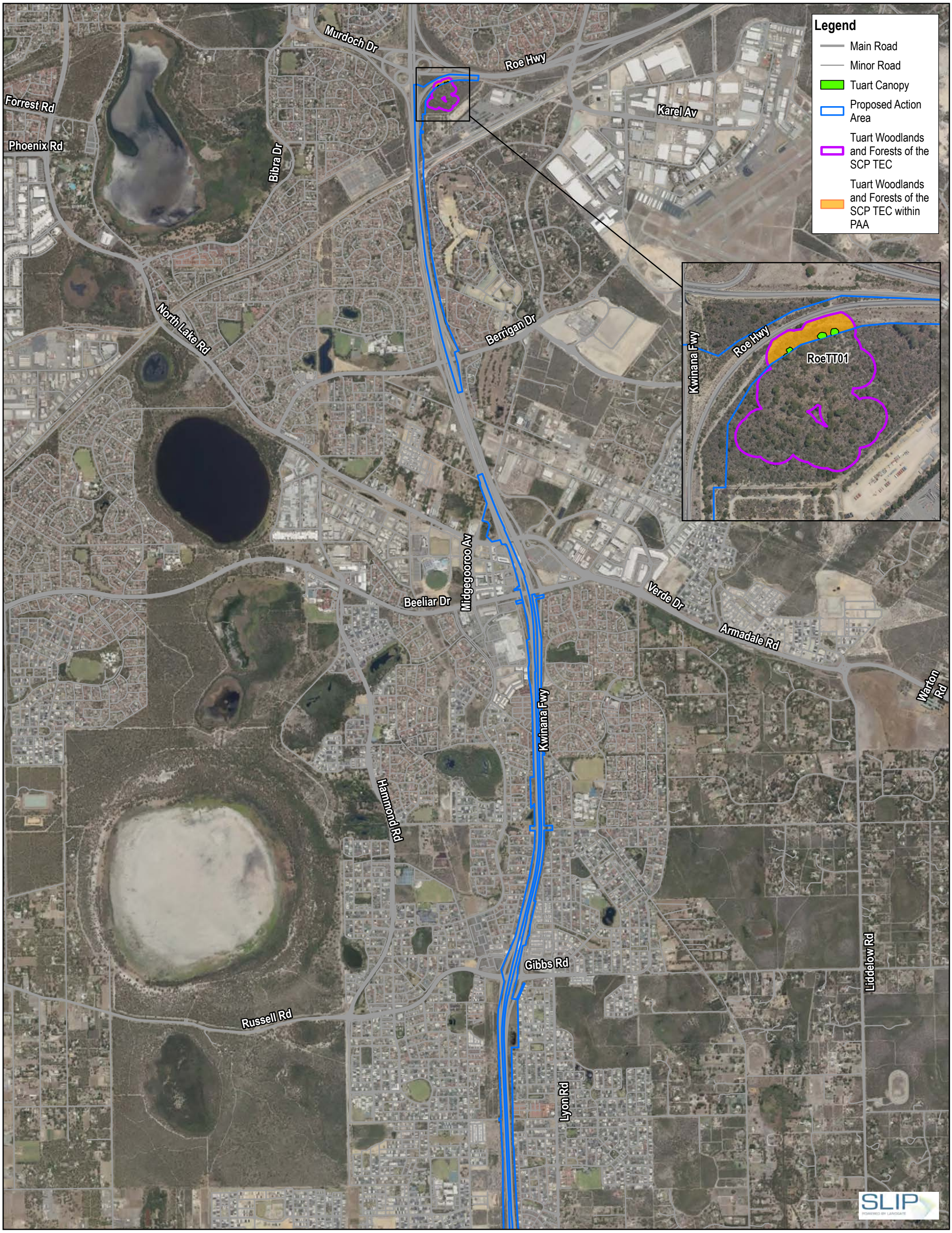

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Tuart TEC Patches That Overlap With the PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 12

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_012_TuartWoodlandsTEC_Rev1_Page1
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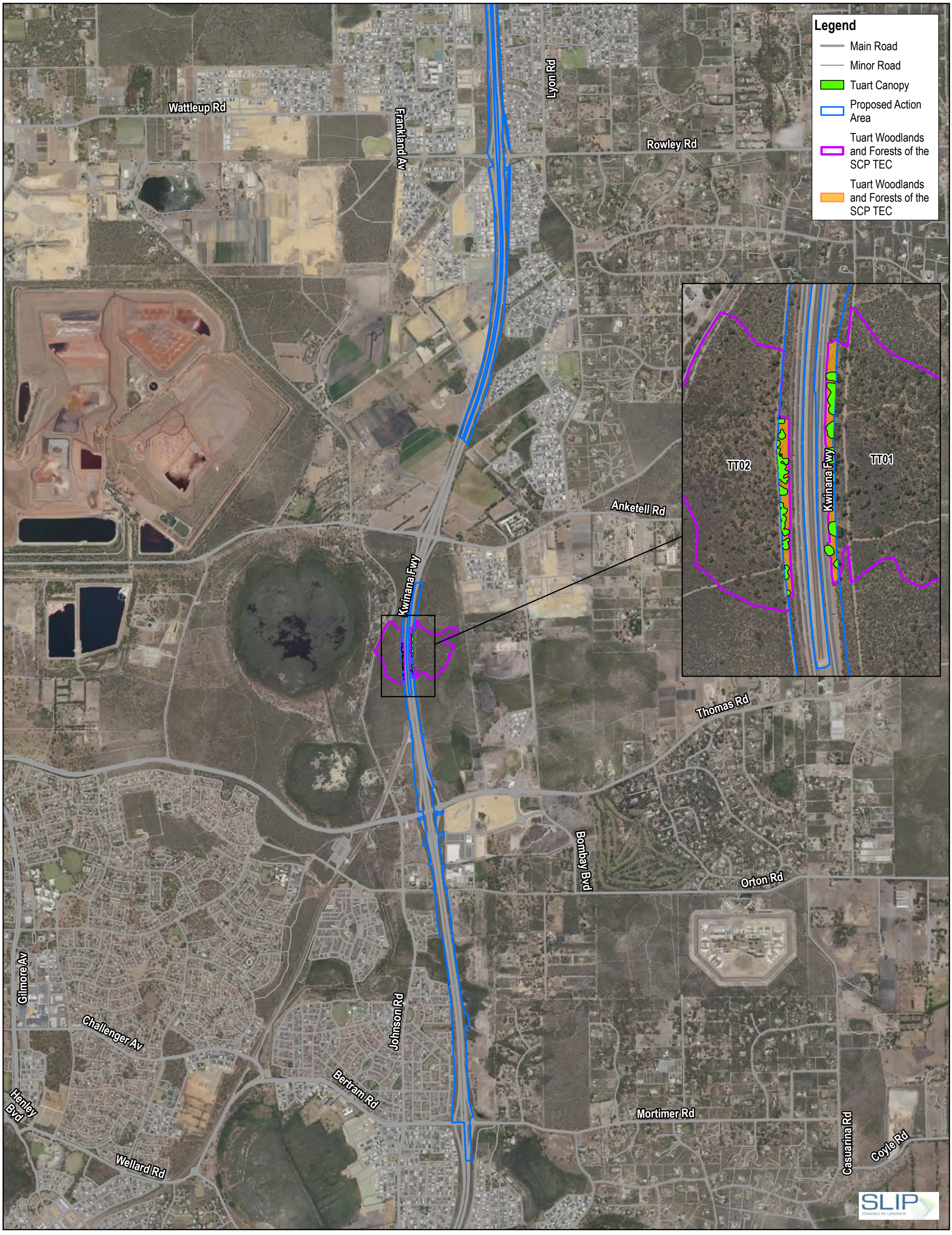


Paper Size ISO A3

0 250 500 750 1,000

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

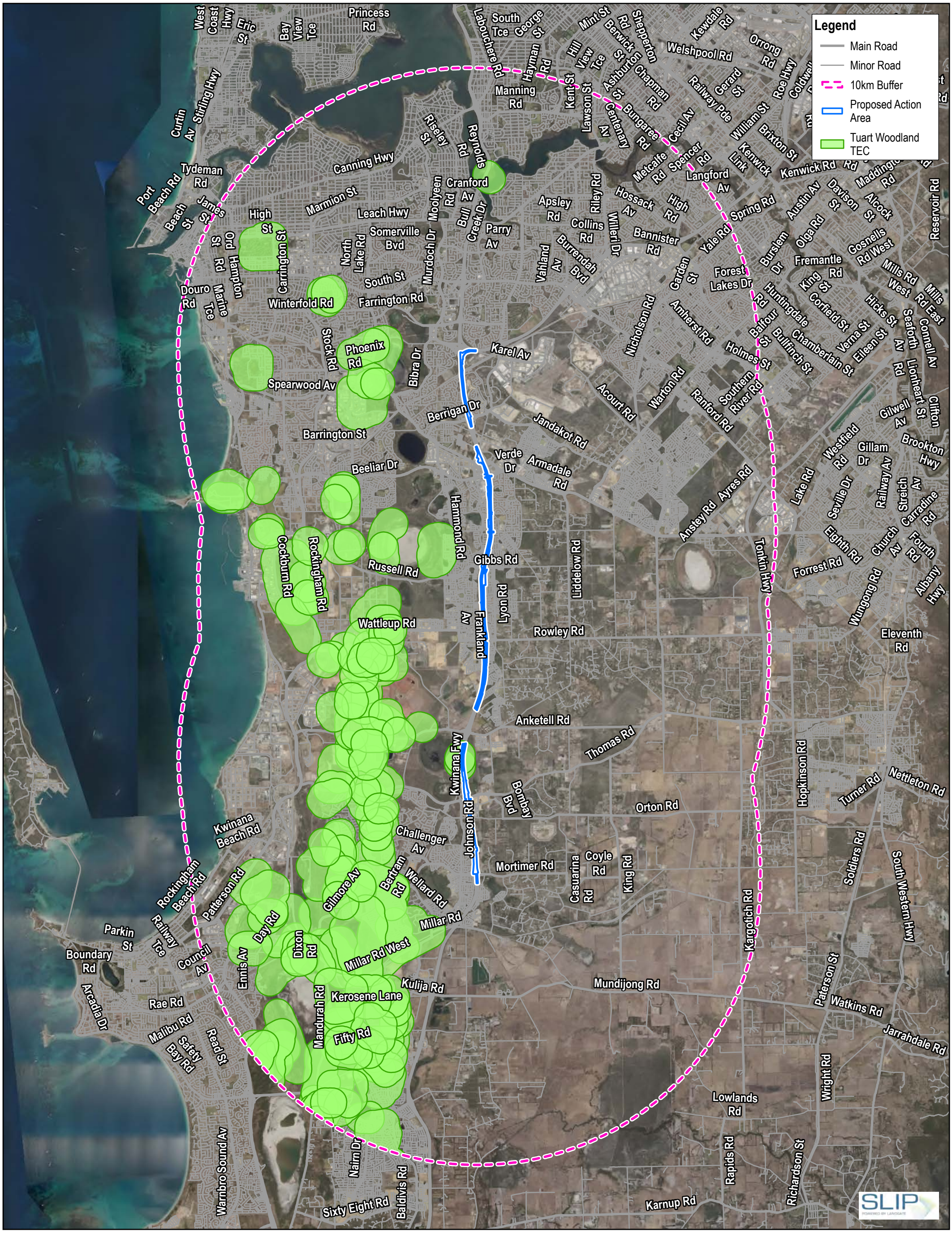
Tuart TEC Patches That Overlap With the PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 12

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_012_TuartWoodlandsTEC_Rev1_Page2
Print date: 18 Aug 2025 - 07:51

Data source: WANow: . Created by: shart2



Paper Size ISO A3

0 1 2 3 4

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Tuart TEC Within 10km of the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 13

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_013_TuartWoodlandsTEC10km_Rev1
Print date: 18 Aug 2025 - 07:53

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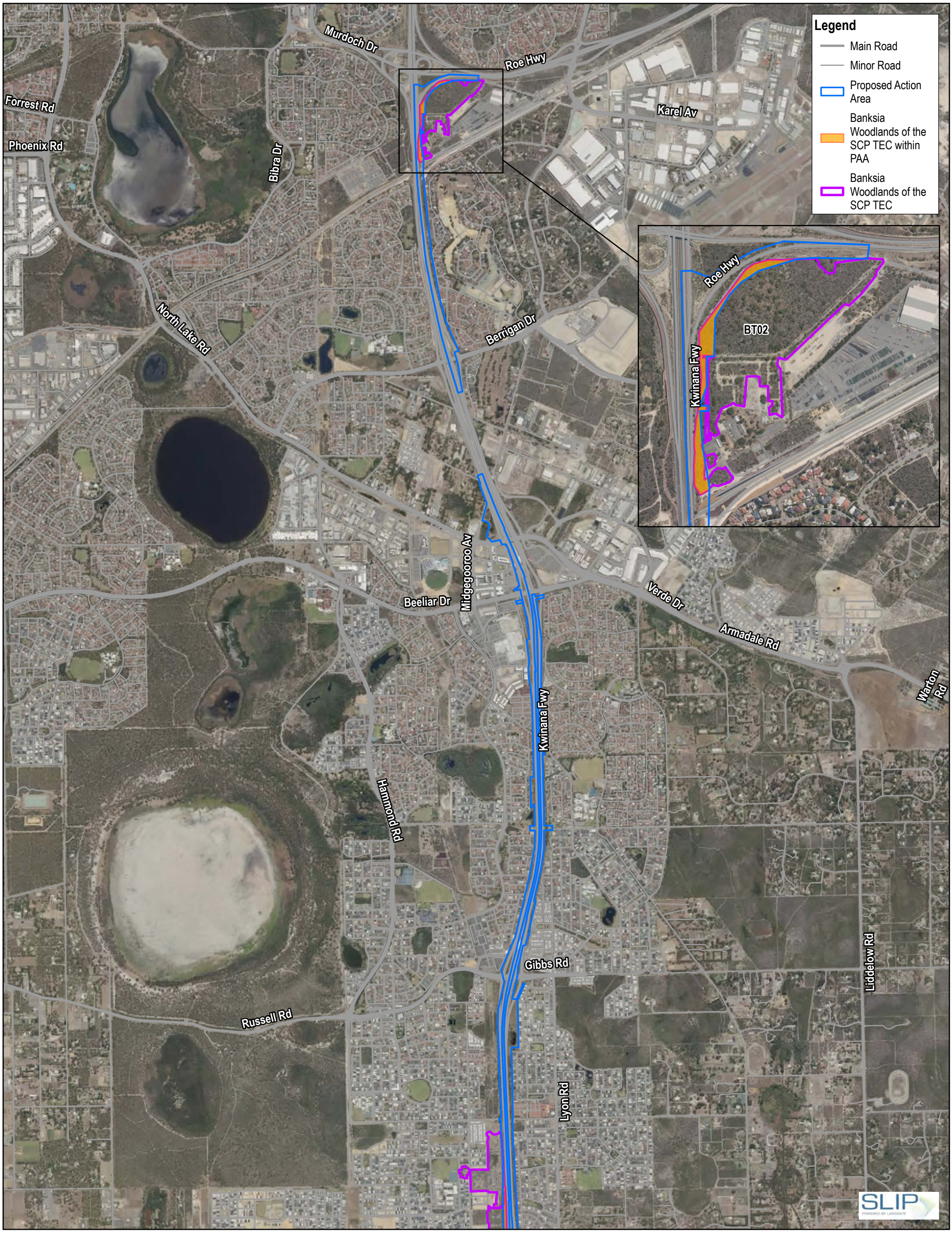


Paper Size ISO A3

0 300 600 900 1,200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

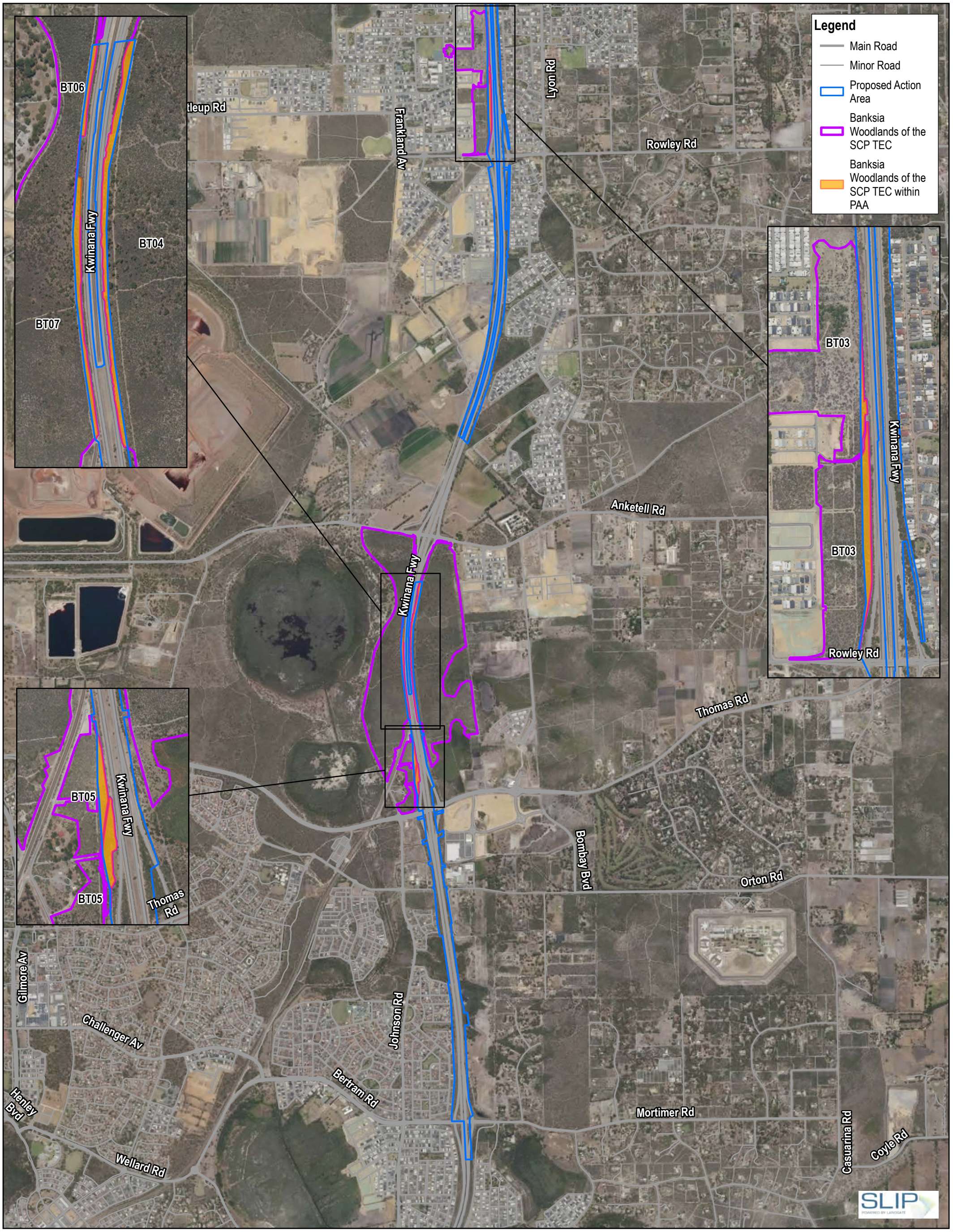
Banksia TEC Patches That Overlap With the PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 14

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_014_BanksiaWoodlandsTEC_Rev1_Page1
Print date: 18 Aug 2025 - 07:56

Data source: WANow: . Created by: shart2



Paper Size ISO A3

0 300 600 900 1,200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Banksia TEC Patches That Overlap With the PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 14

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_014_BanksiaWoodlandsTEC_Rev1_Page2
Print date: 18 Aug 2025 - 08:23

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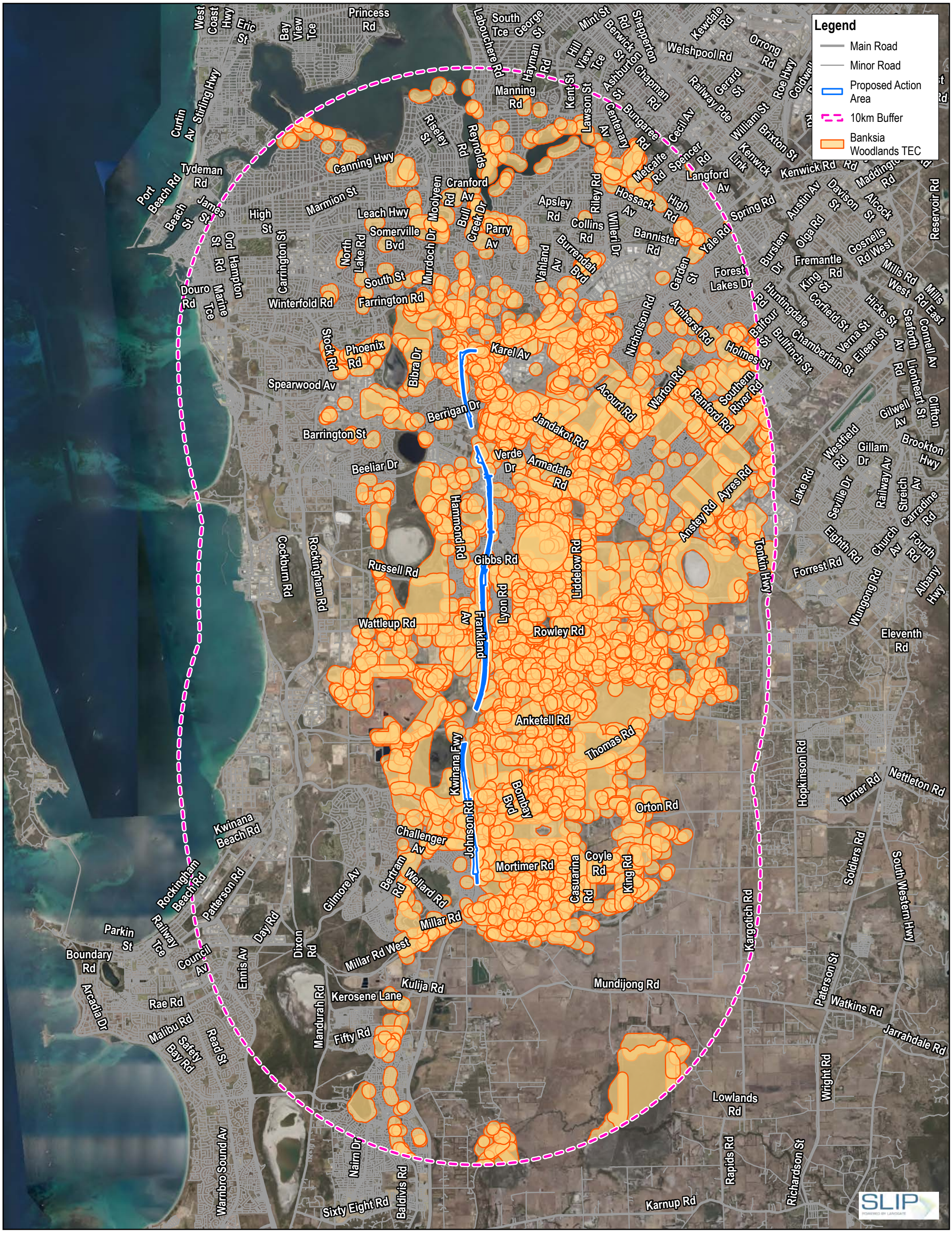

Paper Size ISO A3

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Banksia TEC Within 10km of the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 15

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_015_BanksiaWoodlandsTEC10km_Rev1
Print date: 18 Aug 2025 - 07:58

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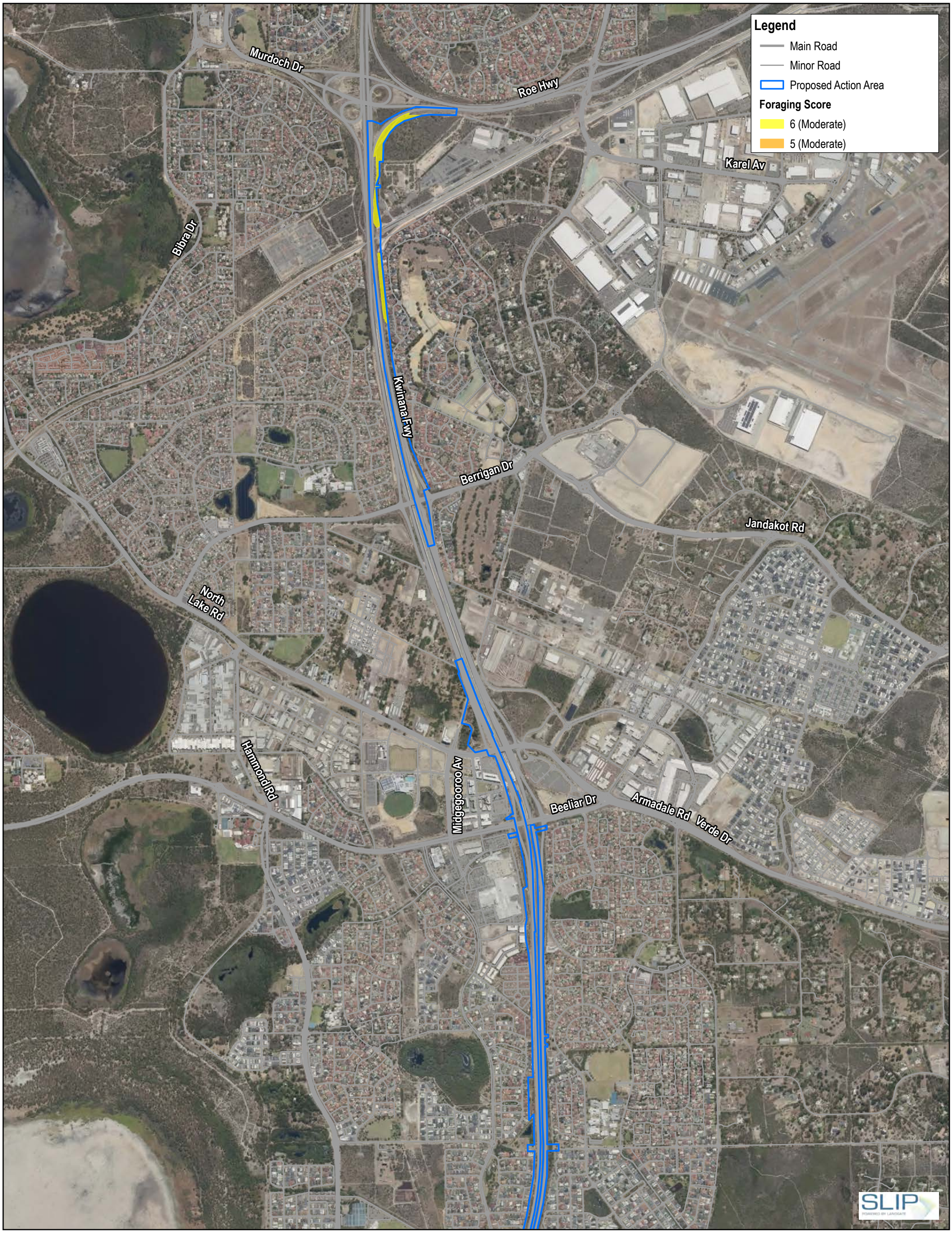

Paper Size ISO A3

0 0.2 0.4 0.6 0.8

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Carnaby's Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 16

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_016_CBCForagingHabitat_Rev1
Print date: 18 Aug 2025 - 08:03

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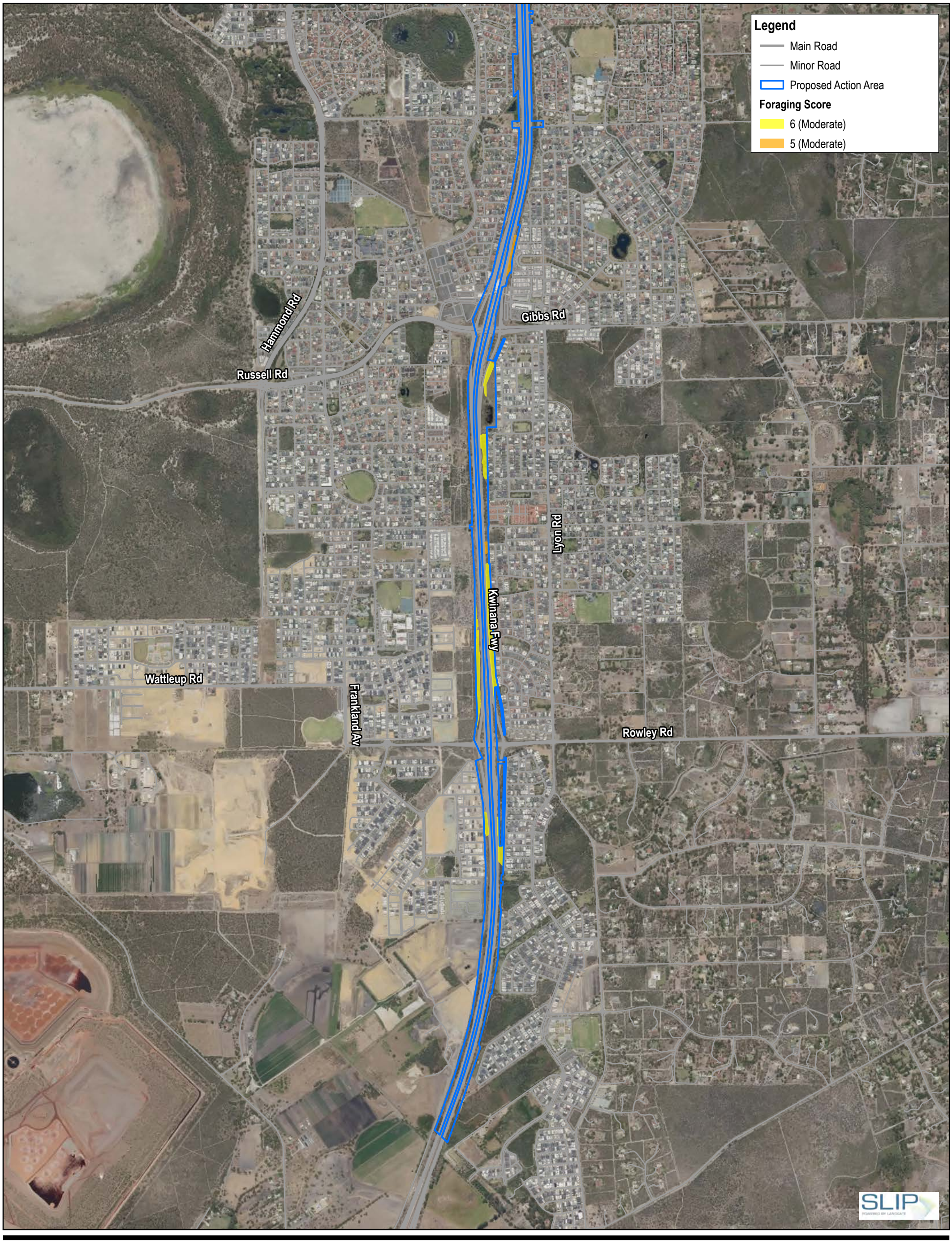

Paper Size ISO A3

0 0.2 0.4 0.6 0.8

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Carnaby's Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 16

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_016_CBCForagingHabitat_Rev1
Print date: 18 Aug 2025 - 08:03

Data source: WANow: . Created by: shart2

Paper Size ISO A3

0 0.15 0.3 0.45 0.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Carnaby's Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 16

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_016_CBCForagingHabitat_Rev1
Print date: 18 Aug 2025 - 08:04

Data source: WANow: . Created by: shart2

Legend
Main Road
Minor Road
Proposed Action Area
12km Buffer
Carnaby's Black Cockatoo Foraging Habitat

Paper Size ISO A3
0 1 2 3 4
Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

Carnaby's Cockatoo
Foraging Habitat
Within 12km of the PAA

Project No. 12657323
Revision No. 1
Date 19/08/2025

FIGURE 17

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_017_CBCForagingHabitat_LocalContext_Rev1
Print date: 19 Aug 2025 - 10:33

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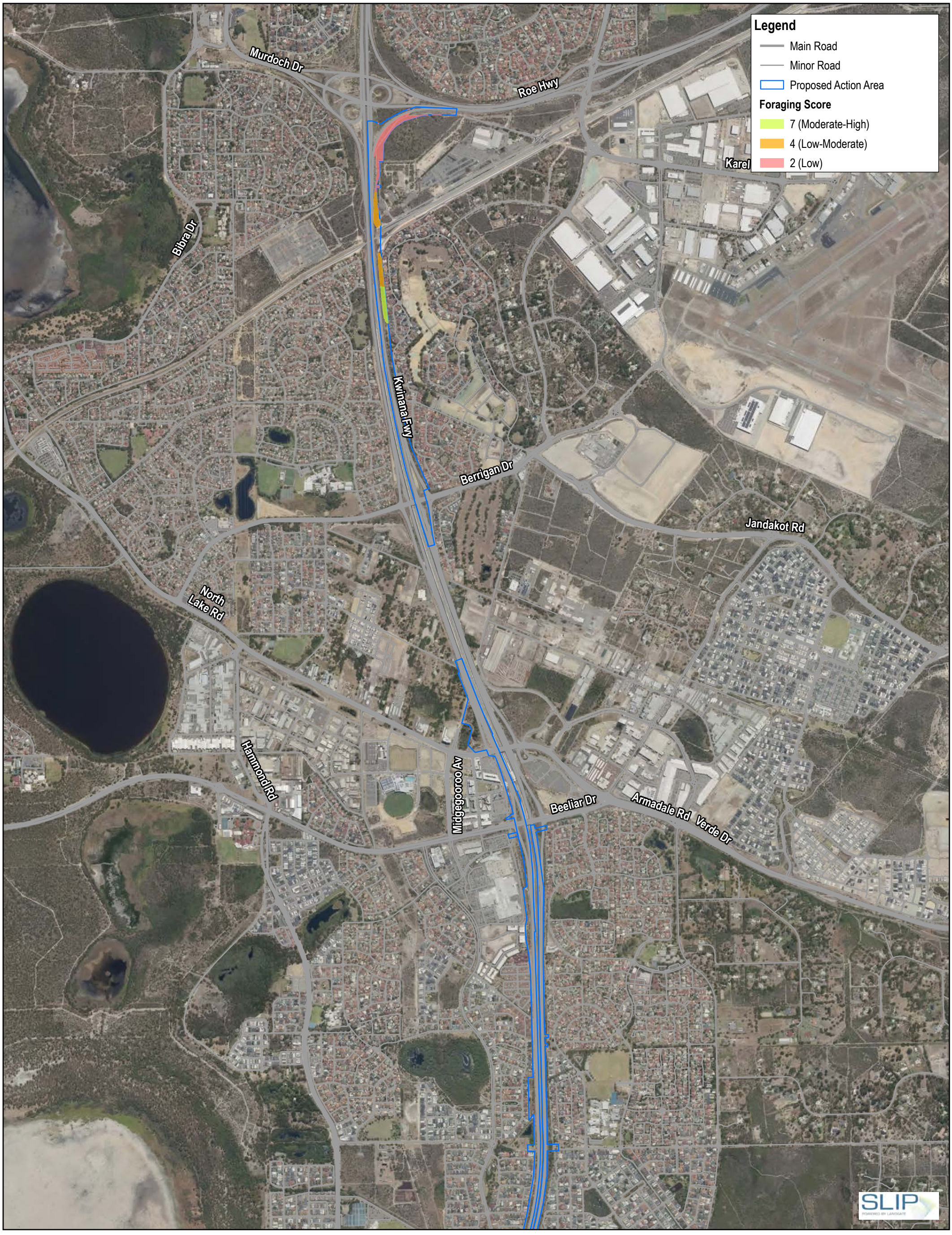

Paper Size ISO A3

0 0.25 0.5 0.75 1

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Forest Red-tailed Black Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **0**
Date **13/08/2025**

FIGURE 18

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_018_FRTBCForagingHabitat_Rev0
Print date: 13 Aug 2025 - 11:06

Data source: WANow: . Created by: shart2

Paper Size ISO A3

0 0.25 0.5 0.75 1

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Forest Red-tailed Black Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **0**
Date **13/08/2025**

FIGURE 18

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_018_FRTBCForagingHabitat_Rev0
Print date: 13 Aug 2025 - 11:06

Data source: WANow: . Created by: shart2

Paper Size ISO A3

0 0.25 0.5 0.75 N

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Forest Red-tailed Black Cockatoo Foraging Habitat Within the PAA

Project No. **12657323**
Revision No. **0**
Date **13/08/2025**

FIGURE 18

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_018_FRTBCForagingHabitat_Rev0
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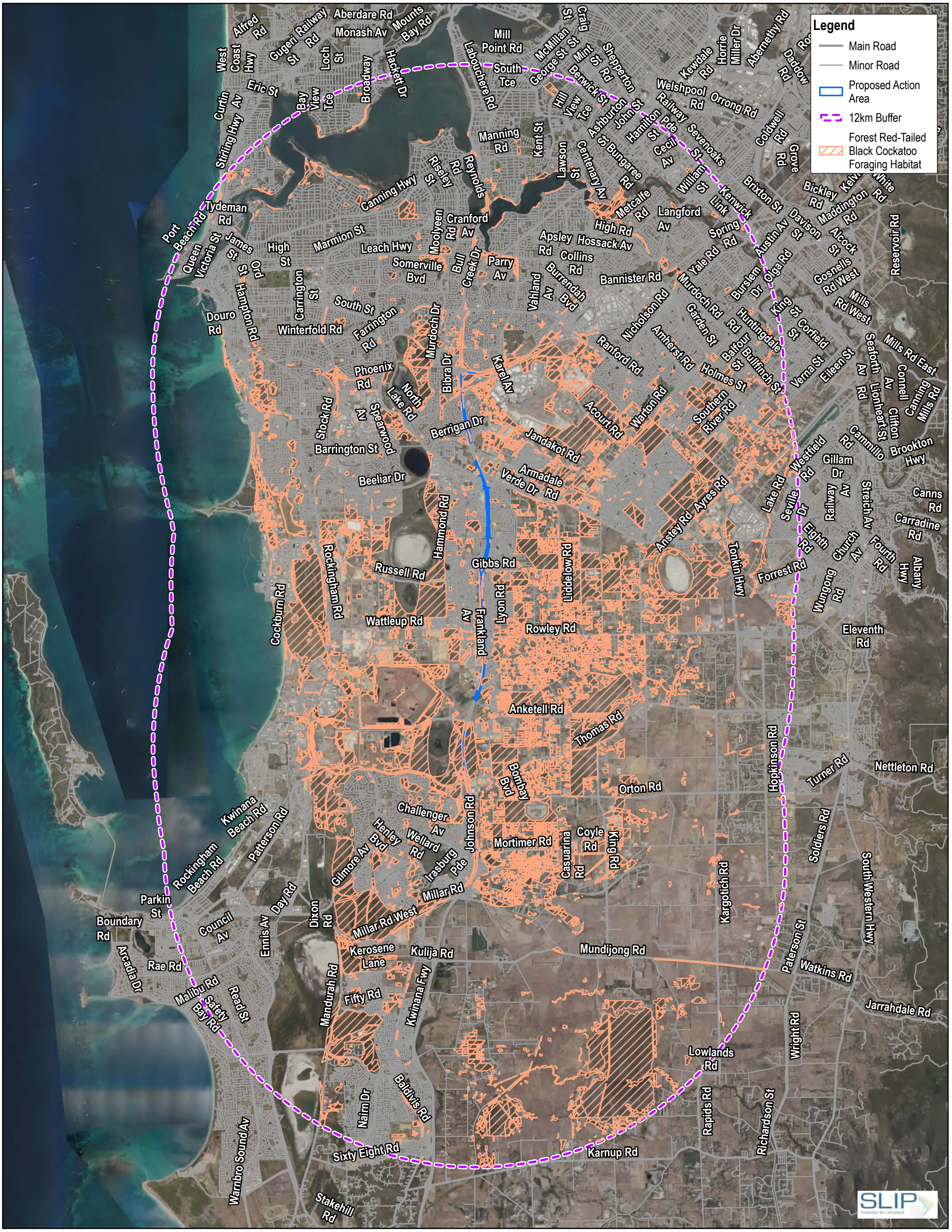

Paper Size ISO A3

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Forest Red-tailed Black Cockatoo Foraging Habitat Within 12km of the PAA

Project No. **12657323**
Revision No. **1**
Date **19/08/2025**

FIGURE 19

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_019_FRTBCForagingHabitat_LocalContext_Rev1
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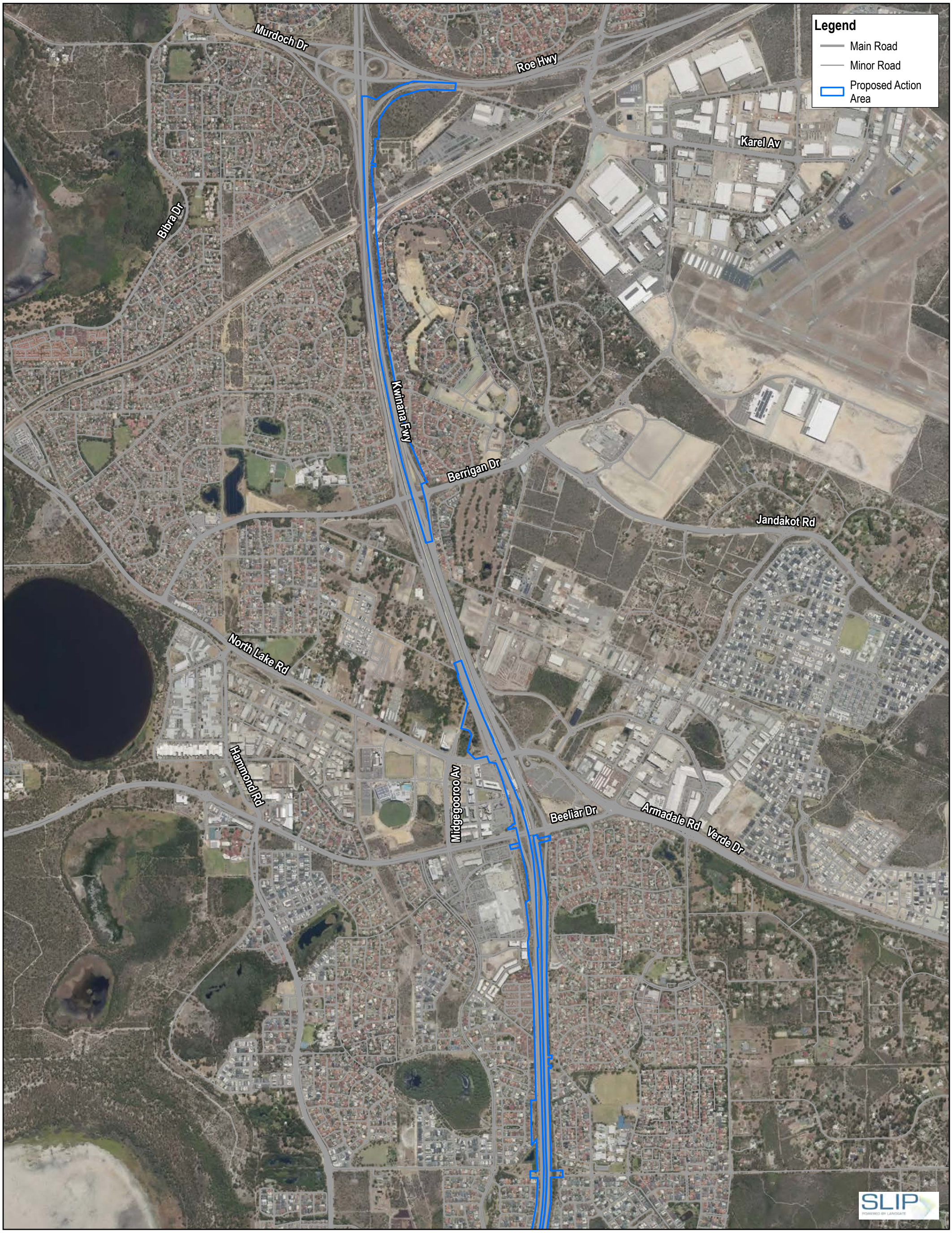

Paper Size ISO A3

0 0.2 0.4 0.6 0.8

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Suitable DBH Trees Within PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 20

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_020_BCHabitatTrees_Rev1_Page1
Print date: 18 Aug 2025 - 08:09

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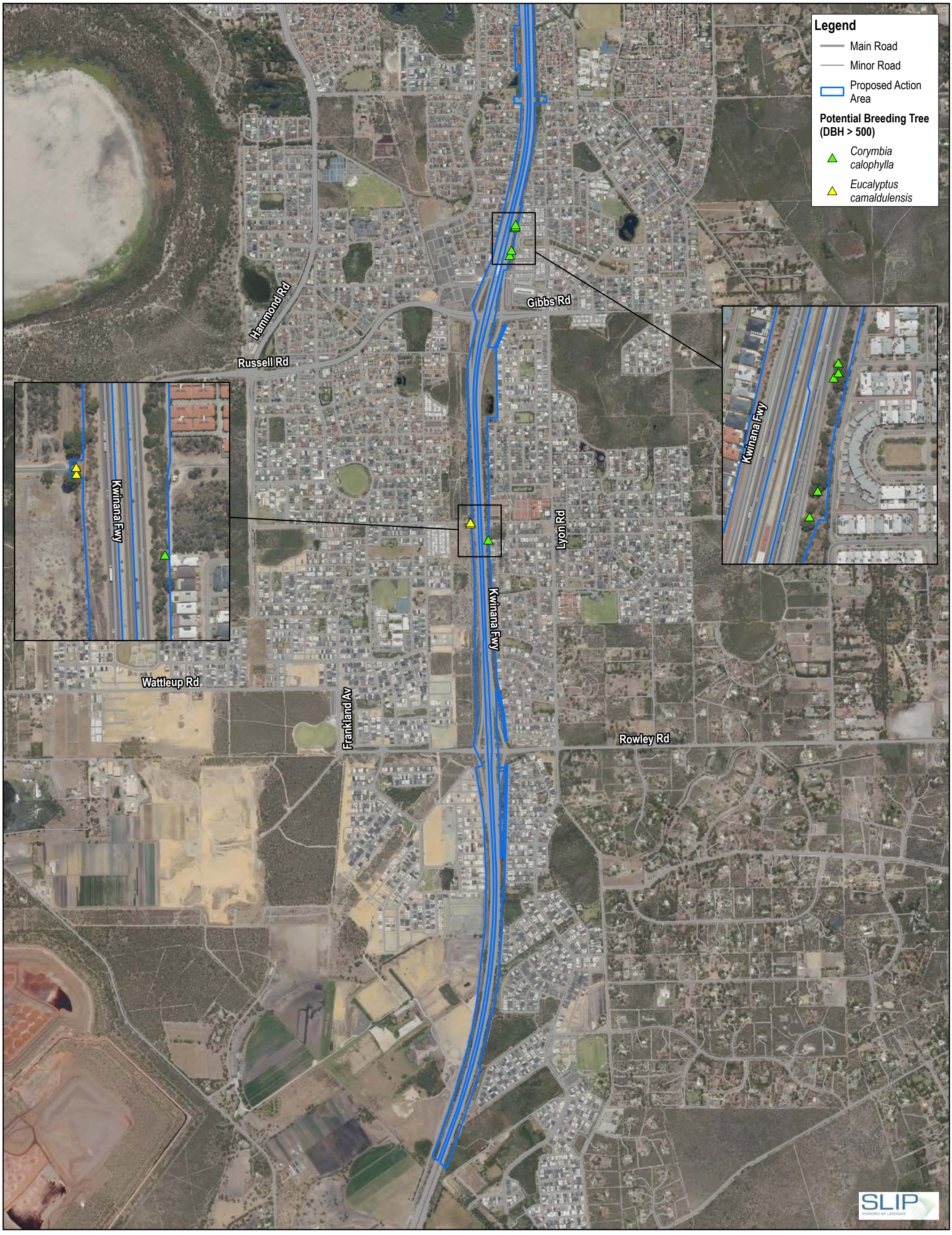

Paper Size ISO A3

0 0.2 0.4 0.6 0.8

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Suitable DBH Trees Within PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 20

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_020_BCHabitatTrees_Rev1_Page2
Print date: 18 Aug 2025 - 08:10

Data source: WANow: World Street Map: Esri, HERE, Garmin, NGA, USGS. Created by: shart2

Paper Size ISO A3

0 0.16 0.32 0.48 0.64

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Suitable DBH Trees Within PAA

Project No. **12657323**
Revision No. **1**
Date **08/07/2025**

FIGURE 20

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_020_BCHabitatTrees_Rev1_Page3
Print date: 18 Aug 2025 - 08:12

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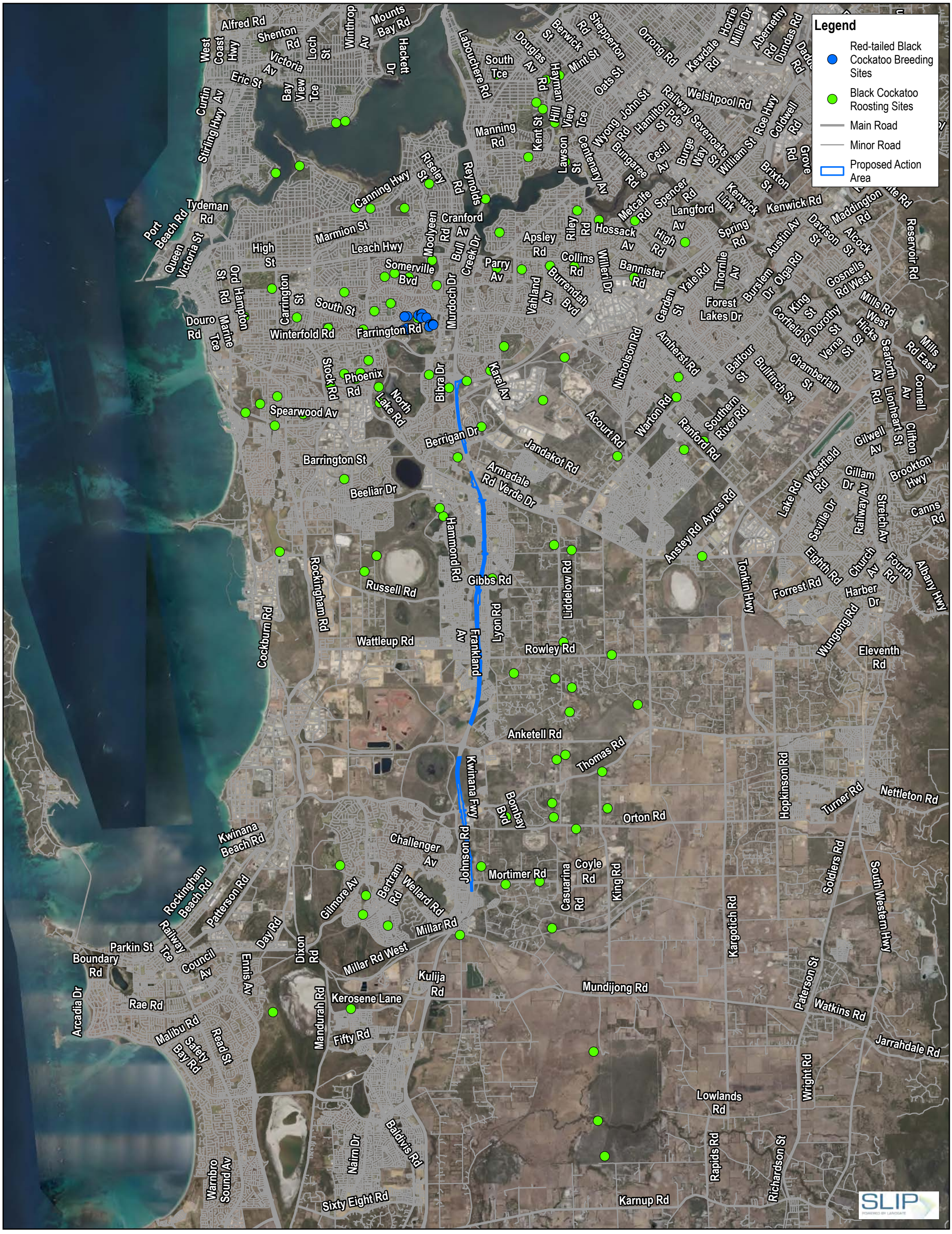

Paper Size ISO A3

0 1.25 2.5 3.75 5

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road Referral

Black Cockatoo Breeding and Roosting Habitat Within 12km of the PAA

Project No. **12657323**
Revision No. **1**
Date **18/08/2025**

FIGURE 21

\\ghdnet\ghd\AU\Perth\Projects\61\12657323\GIS\Maps\Working\12657323_KwinanaFwyEPBC_PD_Figures\12657323 Kwinana Fwy EPBC PD.aprx - 12657323_021_BCBreedingandRoosting_Rev1
Print date: 18 Aug 2025 - 08:17

Data source: WANow: World Street Map: Esri, HERE, Garmin, NGA, USGS. Created by: shart2

Appendix 2: MRWA Kwinana Freeway widening - Biological Survey (GHD 2025a)

Kwinana Freeway Widening Project

Biological Survey

Main Roads WA

18 August 2025

→ **The Power of Commitment**

Project name		Main Roads Highway Widening Flora and Fauna Assessment					
Document title		Kwinana Freeway Widening Project | Biological Survey					
Project number		12634226					
File name		12634226-REP-1- Main Roads Kwinana Freeway Widening - Flora and Fauna Survey.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	Rev 0	P. Patterson A. Benkovic	D. Farrar		D. Farrar		01/7/2025
S4	Rev 1	D. Farrar	P. Patterson		D. Farrar		11/7/2025
S4	Rev 2	D. Farrar	R. Champion		D. Farrar		18/8/2025

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Executive Summary

As part of the Smart Freeway initiative based on Maximum Sustainable Flow Rate requirements contained in the Smart Freeways guidelines Main Roads Western Australia (Main Roads) is planning to widen the Kwinana Freeway from Roe Highway south to Mortimer Road and upgrade the Mundijong and Safety Bay Road on ramps.

GHD Pty Ltd (GHD) was commissioned by Main Roads to undertake a Detailed and Targeted flora and vegetation survey, Floristic Community Type (FCT) assessment, Basic fauna survey, including a Targeted Short-Range Endemic (SRE) survey for signs of burrows of the trapdoor spider (*Idiosoma sigillatum*) and Targeted Black Cockatoo habitat assessment, and wetland assessment of the survey area. The survey area is located along the alignment of the Kwinana Freeway, beginning at the Roe Highway intersection and consists of three sections:

– Kwinana Freeway from the intersection of Roe Highway south to Mortimer Road
– Kwinana Freeway, Mundijong intersection west
– Kwinana Freeway, Safety Bay Road intersection west

Combined, the survey area covers 285.44 hectares (ha) and is approximately 27 kilometres (km) in extent north to south.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.5 and the assumptions and qualifications contained throughout the Report.

Vegetation

Most of the survey area consisted of Cleared areas (173.87 ha, 60.9%) and roadside revegetation (92.65 ha, 32.5%) from circa 2002 or before. Native vegetation covered 18.92 ha (6.6%) of the survey area. In some sections, particularly where the revegetation lies adjacent to remnant vegetation the revegetation has been mapped using a consistent vegetation type to the native vegetation extents. This is because endemic flora species were selected when these areas were revegetated and as a result the revegetation has integrated with adjacent remnant bushland. Five native vegetation types were mapped for the survey area three Banksia woodland types, one *Corymbia calophylla* woodland and a wetland vegetation type. Another five vegetation types were mapped for the roadside revegetation. These vegetation types have been grouped under roadside revegetation and were split to assist with Black Cockatoo foraging habitat mapping. Infrastructure such as roads and houses were mapped as Cleared.

A FCT analysis was performed using native vegetation quadrats. However, the native vegetation of the survey area were generally fragmented linear extents where the quality of the vegetation was variable. As a result, not all quadrats were able to be placed in vegetation of good or better condition. For the analysis ten Kwinana quadrats and 17 Roe Highway quadrats (GHD, 2025) were used. Roe Highway quadrats were used to supplement the Kwinana data due to the vegetation quality in the survey area. From the analysis four FCTs were determined, wetland community 11 and *Banksia/ Eucalyptus* communities 21a, 23a and 28. None of the FCTs identified in the survey area are listed as Threatened Ecological Communities (TECs) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act), nor are they listed as Priority Ecological Communities (PECs) by Department of Biodiversity, Conservation and Attractions (DBCA).

Vegetation condition was variable throughout the survey area and ranged from Very Good to Completely Degraded. Apart from Cleared areas (which were not rated) most of the survey area was in Completely Degraded condition (89.30 ha, 31.3%). The poor condition of the survey area was reflected in the patch assessments for significant vegetation. Patch and condition thresholds were applied to patches of remnant vegetation considered representative of Banksia Woodlands of the Swan Coastal Plain Ecological Community and/or Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain, EPBC Act listed TECs and DBCA listed PECs. The results of the patch assessments concluded 13.34 ha of the Banksia Woodlands of the SCP TEC and PEC and 2.56 ha of the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the SCP TEC and PEC occur within the survey area.

Two hundred and twenty vascular flora species were recorded in the survey area, none of these species were EPBC Act listed taxa. Three significant flora species were recorded, however two of these species are considered

naturalised and therefore they are not bound by the regulatory requirements for significant species as listed by the EPBC Act and/ or BC Act or DBCA.:

– *Jacksonia gracillima* (P3)
– *Grevillea curviloba* listed as Endangered under the BC Act (naturalised)
– *Grevillea olivacea* (P4) (naturalised)

The likelihood of occurrence assessment post-field survey concluded one taxon was known and recorded in the survey area during the survey (*Jacksonia gracillima*) and two taxa were considered possibly to occur.

Of the 240 flora species recorded 64 were introduced. Five of the introduced species are listed as Declared Pest (DP) plants in Western Australia under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), two are also listed as Weeds of National Significance (WoNS) (Australian Weeds Committee, 2012).

Wetlands

Thirty-four geomorphic wetlands had been mapped across the survey area by DBCA (2024c). A Preliminary wetland evaluation was carried out on eight Conservation category and one Resource Enhancement wetland. Upon completion it was determined that a secondary evaluation (DBCA, 2017a) was not required as all nine wetlands met the preliminary criteria as detailed in DBCA (2017a) to meet the Conservation category. Resource Enhancement wetland UFI 6664 was deemed fit to be upgraded to a Conservation category. This wetland was dissected by an existing freeway noise/screening wall, with the extent considered Conservation category occurring outside the survey area.

The remaining 25 wetlands intersecting the survey area were not evaluated, as they had been subject to high levels of clearing or fragmentation, had lost functionality, or were classified as a Dryland by DBCA.

Fauna Habitats

Eight broad fauna habitat types were identified across the survey, including cleared areas that accounts for 60.9% of the total survey area. Habitats are generally highly degraded in most areas due to survey area location in an extensively urbanised landscape. Habitat remnants are highly fragmented and subject the long-term degradation from the effects of weed invasion, landscape modification, and vegetation loss. Habitat present does provide suitable foraging and shelter for several locally occurring significant fauna.

The regional scale setting of the survey area is within the Swan Coastal Plain which is known for its high fauna biodiversity. This is reflected in the desktop assessment database list showing a diverse assemblage totalling 54 species including migratory shorebirds, and a range of mammals, reptiles and invertebrates occurring within the region. Even though this list is comprehensive, the characteristics, quality and extent within the survey area limit the types of species likely to occur and potentially use the habitat. For example, there are approximately 20 Migratory shore birds occurring locally due to proximity of the survey area to Ramsar, coastal and estuarine wetlands, therefore locally occurrence is well documented and frequent, however habitat within the survey area is marginal to unsuitable.

Significant fauna

Carnaby's Cockatoo was recorded during the field survey at several locations from sightings and foraging evidence in Banksia woodland habitats. Suitable diameter breast height (DBH) potential breeding trees and potential roosting habitat includes Naturalised and native trees, and Modified wetland drainage areas.

Forest Red-tailed Black Cockatoo was observed and heard calling at several locations and foraging evidence recorded at several locations across the survey area. Suitable DBH potential breeding trees and potential roosting habitat includes Naturalised and Native trees, and Modified wetland drainage areas.

Baudin's Cockatoo was not recorded during the survey but is known to occasionally forage and roost regionally. The survey area is located on the western edge of current known foraging distribution and lies outside the known breeding range of this species, which has a bearing on the habitat suitability and value for this cockatoo. Baudin's Cockatoo should be considered an occasional visitor however this is only likely to be in the context of temporary fly-over activity or rare and temporary foraging activity.

In terms of Black Cockatoo foraging habitat the following foraging values and extents were mapped:

– Carnaby's Black Cockatoo – 26.67 ha (mod-high)
– Forest Red-tailed Black Cockatoo – 1.97 ha (high), 14.40 ha (mod) and 10.30 ha (low)

In terms of Black Cockatoo breeding habitat, 44 suitable DBH trees without breeding hollows were recorded within the survey area comprising Marri, Flooded Gum, Tuart, and Jarrah trees. It is noteworthy that many of these are replanted trees and while they ultimately carry the potential as future breeding trees, this is unlikely to be the case for at least another 50 to 100 years in some cases.

Although no confirmed roosts occur within the survey area, 40 individual tree groupings of suitable height, species type and location were assessed as potential roost habitat based on suitable roosting habitat criteria.

Quenda were recorded from signs of foraging during the field survey and scat confirming species' presence within the survey area. Numerous local records indicate populations persisting in small, fragmented bushland areas within and around the survey area. Dense remnant and modified vegetation provides habitat for this species.

Several species of vertebrate and invertebrate occurring locally were not recorded during the survey but are likely to occur based on habitat suitability and proximity of records including Peregrine Falcon (OS), Perth Slider (P3), Black-striped Snake (P3), Swan Coastal Plain Shield-backed Spider (P3), Blue-billed Duck (P4), and Graceful Sun Moth (P4).

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1. Introduction

1.1 Background

As part of the Smart Freeway initiative based on Maximum Sustainable Flow Rate requirements contained in the Smart Freeways guidelines Main Roads Western Australia (Main Roads) is planning to widen a section of the Kwinana Freeway between Roe Highway south to Mortimer Road, with upgrades to on ramps at Mundijong Road and Safety Bay Road.

GHD Pty Ltd (GHD) was commissioned by Main Roads to undertake a Detailed and Targeted, flora and vegetation survey, including a Floristic Community Type (FCT) assessment, a Basic fauna survey including a Targeted Short-Range Endemic (SRE) survey for trapdoor spider (*Idiosoma sigillatum*) burrows and Targeted Black Cockatoo habitat assessment, and wetland assessment of the survey area.

1.2 Purpose of this report

GHD was commissioned by Main Roads to assess the biological values within the survey area. The purpose of this report is to document the biological values identified during the survey. The outcome of the survey and information supplied in this biological survey report will be used to inform the environmental assessment and approvals process and refinement of the proposals design. The results of the biological survey may also assist in the preparation of Environmental Impact Assessment documentation.

1.3 Project location

1.3.1 Survey area

The survey area is located along the alignment of the Kwinana Freeway, beginning at the Roe Highway intersection 14 kilometres (km) south of Perth. The survey area consists of three sections:

– Kwinana Freeway from the intersection of Roe Highway south to Mortimer Road
– Kwinana Freeway, Mundijong intersection west
– Kwinana Freeway, Safety Bay Road intersection west.

With the three sections combined, the survey area covers 285.44 hectares (ha) and is approximately 27 km in extent north to south (Figure 1, Appendix A).

1.3.2 Context vegetation area

Context area mapping was undertaken to broadly identify vegetation patterns and vegetation units immediately adjacent to the survey area. The area represents a 500 m buffer of the three sections of the survey area.

1.3.3 Study area

A study area was defined using a 5 km buffer around each of the three sections of the survey area for the desktop search assessment.

1.4 Scope of works

GHD and Main Roads agreed the scope of work for the current project and biological survey includes the following for the survey area:

– A desktop assessment of the study area, prior to the field survey component work to identify biological features and constraints
– A two phase Detailed and Targeted, flora and vegetation survey, including FCT analysis, a Basic fauna survey, a Targeted SRE survey and Targeted Black Cockatoo habitat assessment, and wetland assessment

– One stand-alone technical report covering the flora, vegetation, fauna and Black Cockatoo assessment
– Survey data in electronic format consistent with Index of Biodiversity Surveys for Assessments and Main Roads data standards.

1.5 Report limitations and assumptions

This report has been prepared by GHD for Main Roads WA and may only be used and relied on by Main Roads WA for the purpose agreed between GHD and Main Roads WA as set out in section1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Main Roads WA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads Western Australia and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed desktop environmental aspects and biological factors in the field for the survey area. Should these areas change or be refined, further assessment may be required.

1.6 Relevant legislation, conservation codes and background information

In Western Australia (WA), some ecological communities and flora are protected under both Federal and State Government legislation. In addition, regulatory authorities also provide a range of guidance and information on expected standards and protocols for environmental surveys.

An overview of key legislation and guidelines, conservation codes and background information relevant to this flora and vegetation survey and fauna survey are provided in Appendix B.

2. Methods

2.1 Desktop assessment

Prior to the commencement of the field survey, a desktop assessment was undertaken to identify relevant environmental information pertaining to the study area and to assist in survey design. The information sources utilised in the desktop assessment are presented in Table 1 below.

Table 1 Desktop information sources

Aspect	Information source
Climate	Bureau of Meteorology (BoM) Climate Data Online (BoM, 2024)
Geology, landforms and soil	Department of Primary Industries and Regional Development (DPIRD) soil landscape mapping (DPIRD, 2022)
Environmentally Sensitive Areas (ESAs)	Department of Water and Environmental Regulation (DWER) mapping of Environmentally Sensitive Areas (DWER-046) (DBCA, 2024b, 2024a; DWER, 2018a)
Conservation reserves and areas	Department of Biodiversity, Conservation and Attractions (DBCA) – Legislated Lands and Waters (DBCA – 011) (DBCA, 2024a) DBCA – Lands of Interest (DBCA-012) (DBCA, 2024b)
Hydrology and wetlands	Public Drinking Water Source Areas (DWER-033) (DWER, 2018b) Rights in Water and Irrigation Act 1914 (RIWI Act), Surface Water Areas and Irrigation Districts (DWER-037) (DWER, 2022a) RIWI Act, Groundwater Areas (DWER-034) (DWER, 2022b) RIWI Act, Rivers (DWER-036) (DWER, 2022c) Waterways Conservation Act Management Areas (DWER-072) (DWER, 2018c) Ramsar Sites (DBCA-010) (DBCA, 2017a) Directory of Important Wetlands in Australia - Western Australia (DBCA-045) (DBCA, 2018a) Mapping of internationally significant (RAMSAR) wetlands, Nationally Important Wetlands and Geomorphic wetlands of the Swan Coastal Plain (DBCA, 2017c, 2018, 2024c) (DBCA, 2024c)
Vegetation	Pre-European Vegetation (DPIRD-006) (DPIRD, 2019) Native Vegetation Extent (DPIRD-005) (DPRID, 2023) State-wide Vegetation Statistics (GoWA, 2019) Broad vegetation mapping of the survey area (Beard, 1979; Heddle et al., 1980) Regional biogeography, including of Interim Biogeographic Regionalisation of Australia (IBRA) mapping (DCCEEW, 2023b) and detailed subregional information from the Department of Conservation and Land Management (CALM) biodiversity audit (CALM, 2002)
Threatened and Priority Ecological Communities (TECs and PECs)	The DBCA Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) database to determine the potential for TECs or PECs to be present within the study area as provided by Main Roads (DBCA, 2024d)
Significant flora and fauna	DBCA Threatened and Priority Flora database (TPFL) and WA Herbarium database (WAHERB) (DBCA, 2024g) DBCA Threatened and Priority Fauna database (DBCA, 2024f). This database contains data from various sources, including Atlas of Australian Birds, BirdLife Australia, DBCA Fauna Survey Returns database and WA Museum (WAM) databases. Black cockatoo breeding and roosting data was also provided as part of the search results DBCA NatureMap database (DBCA, 2024e) (Appendix C)
Matters of National Environmental Significance	EPBC Act Protected Matters Search Tool (PMST) - The Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2024a) (Appendix C)

2.2 Field survey

2.2.1 Survey timing and personnel

GHD Senior Botanists Angela Benkovic (flora licence no. FB62000080-3) and Alex Sleep (flora licence no. FB62000557) completed a two phase, Detailed flora and vegetation survey, Targeted flora search and wetland assessment. The Basic Fauna Survey, Targeted SRE survey and Targeted Black Cockatoo Habitat Assessment was completed by Senior Zoologist/Ecologist Sarah Flemington and Zoologist Melissa Wood. In total 18 person days were used to complete the field survey component (Table 2).

Table 2 Survey timing

Date	Survey type	Survey effort
29 July – 30 July 2024	Wetland assessment, Targeted Flora survey *Drakaea elastica*	4 person days
16 – 17 September 2024	Targeted Flora and Detailed flora and vegetation survey Basic Fauna Survey, Targeted SRE survey and Targeted Black Cockatoo Habitat Assessment	8 person days
26 and 27 November 2024	Detailed flora and vegetation survey Basic Fauna Survey, Targeted SRE survey and Targeted Black Cockatoo Habitat Assessment	6 person days

2.2.2 Vegetation and flora

The survey methodology and data collection by GHD was consistent with relevant aspects of:

- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- A methodology for the evaluation of wetlands on the Swan Coastal Plain (DBCA, 2017a)
- Methods for survey and identification of Western Australian threatened ecological communities (DBCA, 2023a)
- Technical guidance on the Threatened Ecological Community Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain (Main Roads Western Australia, 2021a)
- Technical guidance on the Threatened Ecological Community - *Banksia* Woodlands of the Swan Coastal Plain (Main Roads Western Australia, 2021b)
- Approved Conservation Advice for the *Banksia* Woodlands of the Swan Coastal Plain Ecological Community (Threatened Species Scientific Committee (TSSC), 2016)
- Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community (DotEE, 2019).

Data collection and storage

The survey methods involved a combination of quadrats, relevés and field notes. Sampling was undertaken from 10 quadrats, 21 relevés and opportunistic collections. Quadrats measuring 10 x 10 m or 100m^2 as per regulatory expectations for the Swan Coastal Plain (SCP) bioregion were established. Four of the 10 quadrats that showed affinities to TEC communities were rescored. A minimum of three quadrats were located within each identified vegetation type, where possible. In some instances, less than three quadrats were described per vegetation type, this was due to the limited area and geographic range of the vegetation type and/or the degraded condition of the vegetation. One vegetation type, EmBspp, has one quadrat representing it. This is because most of this vegetation was Degraded and only a restricted patch was found to be in Good condition.

In areas of poor-quality vegetation, relevés using a search area of approximately 100 m^2 were conducted to assist with mapping. The survey effort (track log and sample sites) are presented in Figure 2, Appendix A.

Field data at each quadrat and relevé was recorded on a pro-forma data sheet and included the parameters detailed in Table 3.

Table 3 Data collected at each quadrat and relevé

Aspect	Measurement
Collection attributes	Site code, personnel/recorder, date, photograph
Physical features	Aspect, slope, landform, soil attributes, ground surface cover, leaf and wood litter.
Location	Coordinates recorded in GDA2020 datum using Stonex S580+ tablets with S580 DGPS to an accuracy of approximately ± 1cm
Vegetation condition	Vegetation condition was assessed using the condition rating scale adapted by the Environmental Protection Authority (EPA) (2016a) for South West and Interzone Botanical Province
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, clearing)
Flora	List of dominant flora from each structural layer, list of all species within the quadrat including average height and cover (using National Vegetation Information System (NVIS))

A flora inventory was compiled from taxa listed in quadrats, relevés and from opportunistic floristic records throughout the survey area. The data is provided in Appendix D.

Flora field data collection for the survey was undertaken using Stonex S580+ tablets with S580 DGPS units to achieve centimetre-level accuracy. Fauna field data was captured using Global Positioning System (GPS) enabled Samsung tablets using electronic forms in Collector. Data was synced to the cloud at the conclusion of each field day. GPS devices were used to capture survey effort (track logs) displayed in Figure 2, Appendix A. Field photographs were stored and where applicable have been provided as part of the deliverables.

Vegetation types

Vegetation types were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations. Vegetation types were described based on structure, dominant taxa and cover characteristics as defined by quadrat data, relevé data, Black Cockatoo tree point data and field observations. Where vegetation types aligned, quadrat and relevé data from the Roe Highway survey (GHD 2025) were used to supplement the Kwinana survey data. In some instances, revegetation types for Kwinana freeway were restrictive and degraded, therefore only mapping notes were taken. Relevés from Roe highway were used to provide a description of these areas. Vegetation type descriptions follow NVIS and are consistent with NVIS Level V (Association). At Level V up to three taxa per stratum are used to describe the association (NVIS Technical Working Group, 2017).

Much of the survey area has been previously disturbed and subject to landscaping or revegetation with infill planting of a range of different species, including locally native species, native species occurring outside their native range (for example *Melaleuca nesophila*), non-native species and commercially available cultivars. Vegetation types were divided up into native vegetation types and roadside revegetation. In the determination of native vegetation compared to roadside revegetation, a number of aspects were considered:

– Species composition
– Structural formation
– Age of individual plants/trees
– Landform – is the landform/ground level naturally occurring or is it part of freeway infrastructure for example battered slopes
– Mapping of native vegetation extent (DPIRD, 2023).

Context vegetation mapping

Context vegetation area mapping was undertaken by extrapolation of survey data, aerial imagery and a review of nearby Gibson et al. (1994) and Keighery et al. (2012) quadrats to broadly identify vegetation patterns and vegetation units. No ground-truthing of the context area was undertaken. The context area is mapped in Figure 6, Appendix A.

Vegetation condition

The vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (devised by Keighery (1994) and adapted by EPA (2016). The scale recognises the intactness of vegetation and consists of six rating levels. The vegetation condition rating scale is outlined in Appendix B.

Significant vegetation and Floristic Community Types (FCT)

Floristic analyses were undertaken to determine relationships between the vegetation units described from the survey area and the SCP FCT defined by Gibson et al. (1994) and Government of Western Australia (2000a, 2000b). Two datasets are available and include the Gibson et al. (1994) dataset (referred to as the Gibson Dataset) and the Keighery et al. (2012) dataset (previously accessed through NatureMap (DBCA, 2024e) referred to as the Keighery Dataset). The Gibson dataset includes floristic data for 509 sites across the SCP and the Keighery Dataset includes floristic data from the Gibson Dataset as well as data from more than 500 additional sites.

The Gibson and Keighery datasets were updated by GHD to reflect current flora nomenclature and analysed against quadrat data from the field survey. Due to the fragmented and modified remnant vegetation along Kwinana Freeway and Roe Highway it was difficult to locate vegetation in good or better condition to enable a three sample site representation for each vegetation type. Therefore, quadrat data from the Roe Highway survey (GHD, 2025) has been used in conjunction with the Kwinana Freeway quadrats to provide more context when vegetation mapping and a more robust statistical analysis.

To confirm identified GHD vegetation types an analysis was completed on only GHD quadrats. Introduced and annual species were not removed for statistical analysis. Weed dominance in the wetland quadrats resulted in limited species to undertake an analysis with. The GHD quadrat analysis is provided in Appendix D.

Analysis methods using GHD quadrats against SCP datasets followed those outlined in DBCA (2024g). These included:

– Analysis of GHD quadrats from the Kwinana and Roe survey area with the Gibson Dataset
– Analysis of GHD quadrats from the Kwinana and Roe survey area with the Keighery Dataset
– Single site insertion (SSI) analysis of GHD quadrats from the Kwinana and Roe survey area with the Gibson Dataset
– SSI analysis of GHD quadrats from the Kwinana and Roe survey area with the Keighery Dataset.

For all the above analyses introduced and annual species were not removed from the Gibson or Keighery datasets as they were unable to be removed from the GHD quadrats.

SSI analysis involves running analyses for each quadrat, one at a time, with the respective datasets. SSI is considered an alternate and more reliable means of deriving a classification for each quadrat as it causes less ‘disruption’ of the clustering of the datasets (DBCA, 2024d).

Primer software was used to conduct the analyses, and analysis methods undertaken with reference to the methods utilised by Gibson et al. (1994). A Cluster analysis using the Bray-Curtis similarity measure (no overall transform or weighting) was undertaken to produce a similarity matrix. Using Group average cluster mode a dendrogram was created. Similarity matrices and dendrograms were used to infer vegetation type and FCT relationships. It is important to note that statistical analyses such as classifications are not absolute. To provide further support for the inferences made, taxon lists from quadrats were also compared to the typical species lists for SCP FCTs presented in Gibson et al. (1994), as well as consideration of landforms, soils, topography and geographical distribution data.

Banksia woodlands of the SCP TEC

Data captured in quadrats was used to determine the presence of the *Banksia* woodlands of the SCP TEC within the survey area based on the key diagnostic characteristics and condition thresholds listed within the Approved Conservation Advice (TSSC, 2016) and Main Roads technical guidance (Main Roads Western Australia, 2021b). At least one quadrat was captured within each mapped *Banksia* patch.

Small scale variations, gaps and disturbances (tracks, paths, breaks in vegetation including exposed soil, leaf litter, watercourses and drainage lines) that did not significantly alter the overall functionality of the TEC were

included in the mapping of *Banksia* patches. Conversely, breaks in native vegetation cover of 30 m or more from the tree canopy, including housing, extensive cleared areas and bitumen roads, were excluded from patches as per the Approved Conservation Advice (Threatened Species Scientific Committee, 2016).

Tuart Woodlands and Forests TEC

Quadrat data and key diagnostic characteristics and condition thresholds listed within the Approved Conservation Advice (DotEE, 2019) and Main Roads technical guidance (Main Roads Western Australia, 2021b) were used to determine the presence of the Tuart Woodlands and Forests TEC within the survey area. At least one quadrat was captured within each Tuart patch and tree canopy was mapped.

Small scale variations, gaps and disturbances (tracks, paths, breaks in vegetation including exposed soil, leaf litter, watercourses and drainage lines) that did not significantly alter the overall functionality of the TEC were included in the mapping of tuart patches. Conversely, breaks in tree canopy cover of >60m constituted multiple patches present as per Approved Conservation Advice (Threatened Species Scientific Committee, 2016).

Targeted Flora searches

Habitats and vegetation types in the survey area considered to have the potential to support significant flora (based on previously recorded significant flora records and associated habitat preference information) were targeted in the field to record the presence or absence of significant flora. Planted and highly modified vegetation were generally not targeted as these areas did not provide habitat for significant flora given the historic previous disturbances and clearing. For potential significant orchid species, habitats were searched then grid searched at a suitable distance apart as per Draft Survey Guidelines for Australia's Threatened Orchids (DCCEEW, 2013). Where significant flora taxa were identified the locations, number of plants present were recorded using Stonex S580+ tablets with S580 DGPS.

Flora inventory, identification and nomenclature

A flora inventory was compiled from species listed in described quadrats, relevés and from opportunistic floristic records throughout the survey area. Species well known to the survey botanists were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. All specimens collected during the field assessment were dried and processed in accordance with the requirements of the WA Herbarium. Species were identified by the use of taxonomic literature, electronic keys and online electronic databases.

2.2.3 Fauna

The Basic Fauna Survey, including a Targeted SRE survey for trapdoor spider (*Idiosoma sigillatum*) burrows and Targeted Black Cockatoo habitat assessment was consistent with relevant aspects of:

- EPA Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020)
- EPA Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA, 2016b)
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Survey Guidelines for Australia's Threatened Mammals (DSEWPC, 2011)
- Environmental Factsheet Technical Guidance Protecting Black Cockatoos – Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo (Main Roads Western Australia, 2022)
- Referral guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) (DAWE, 2022)
- Environmental Factsheet: Technical Guidance Protecting Black Cockatoos – Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo (Main Roads Western Australia, 2021b).

In the context of a Basic fauna survey, the guidance statement advises field observers to describe the fauna habitats of the survey area, which gives a comprehensive list of fauna that can reasonably be expected to occur. Therefore, the aim of the fauna component of the survey included descriptions of fauna habitats in the survey area and a compilation of fauna species recorded opportunistically as the survey area was traversed. Significant fauna considered likely to occur were targeted during the traverses undertaken, through targeting and recording any

secondary signs of fauna (mounds, tracks, feeding evidence) or visible/audible encounters of the target species in suitable habitat. Fauna survey effort and methods are presented in Figure 9A, Appendix A.

Habitat assessments

Fauna habitat assessment was undertaken at point locations to document the type, value and extent of habitats within the survey area and to inform habitat mapping. Specifically, the assessment included:

– Habitat structure (e.g. vegetation types, structural layers / strata such as ground cover and mid storey)
– Presence/absence of refuge including density of ground covers, fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
– Presence/absence of waterways
– Location of the habitat within the survey area in comparison to the habitat within the surrounding landscape
– Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey area
– Current land use and disturbance history
– Evaluation of key habitat features, and types identified during the desktop assessment relevant to fauna of conservation significance
– Evaluation of the likelihood of occurrence of significant fauna (based on presence of suitable habitat)
– A representative photograph of each habitat type
– Floristic species present and foliage density estimates for the purposes of assessing Black Cockatoo foraging habitat.

Fauna habitats were delineated and mapped on field tablet at broad scale based on characteristics recorded in the habitat assessments, and in consideration of the vegetation community types identified during the field survey. Habitat types where practicable align with VTCs mapped polygon boundaries.

Opportunistic fauna observations and active searches

Targeted searches and opportunistic observations were undertaken in the survey area, specifically including:

– Searching the survey area for tracks, scats, remains, diggings and feeding areas for both native and feral species
– Searching through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and logs
– Visual and aural surveys, which accounted for many bird species potentially utilising the survey area
– Recording GPS locations of any significant fauna species observed.

Targeted transects for Idiosoma sigillatum burrows

The Targeted searches for *Idiosoma sigillatum* included following:

– Transect searches a suitable distance apart through suitable habitat for burrows of *Idiosoma sigillatum*
– Opportunistic hand foraging under leaf litter and around tree bases for evidence of *Idiosoma sigillatum.*

2.2.4 Black Cockatoo assessment

A Black Cockatoo habitat assessment for Baudin's Cockatoo (*Zanda baudini*), Carnaby's Cockatoo (*Zanda latirostris*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) was undertaken across the survey area to assess the presence, quality, and extent of habitat for foraging, breeding and roosting. The assessment involved visual and aural assessment of the survey area, identifying breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, roosting areas, current species' activity, and any other signs of use by Black Cockatoos.

Foraging habitat

Foraging habitat is defined by DAWE (2022) as 'Plant species known to support foraging within the range of cockatoo species'. Foraging habitat was assessed to quantify the value of each habitat type within the survey area.

The flora species were identified within the survey area from on-site habitat assessment and floristic community sampling. Plants were classified as foraging species based on established cockatoo food plant species in literature (Valentine and Stock 2008). As part of the foraging assessment, the ground below known food plants and trees was searched for evidence of Black Cockatoo foraging residue such as Marri and Jarrah chewed seed pods, chewed Banksia cones and foliage clippings. Opportunistic sightings of foraging cockatoos were also recorded as part of the assessment. Vegetation and foraging data were used to calculate foraging quality score.

The foraging score method preferred by Main Roads and used in this assessment is that developed by Bamford Consulting Ecologists (Bamford, 2020). The foraging scoring system established by Bamford are shown in Table 4 through to Table 8. Scores are included in the fauna habitats descriptions (Table 33) and foraging scores (Table 35). Detailed forage value assessment is presented in Appendix E.

Table 4 Summary of the BCE system (Bamford, 2020)

Component	BCE system
Site condition	Out of 6
Site context	Out of 3
Species density (stocking rate)	Out of 1
Total score	**Out of 10**
Moderation of score	-/+
Final score	**Out of 10**

Table 5 Site Condition (Bamford, 2020)

Site condition	Score	Description (Carnaby's Cockatoo)	Description (Forest Red-tailed Black Cockatoo)	Description (Baudin's Cockatoo)
High	6	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).	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).	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).
Moderate to high	5	– 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).	– 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 death – Sheoak Forest with > 60% projected foliage cover.	– 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.

Site condition	Score	Description (Carnaby's Cockatoo)	Description (Forest Red-tailed Black Cockatoo)	Description (Baudin's Cockatoo)
Moderate	4	– Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover – Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover – Eucalypt Woodland/Forest with Marri 20-60% projected foliage cover.	– 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.	– 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).
Low to moderate	3	– 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 Marris <10% projected foliage cover.	– Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5- 20% projected foliage cover – Parkland-cleared Eucalypt Woodland/Forest with known food plants such as Marri 10-40% projected foliage cover but badly-degraded understorey (poor long-term viability without management) – Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	– 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	2	– Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover – Woodland with tree banksias 2-5% projected foliage cover – Eucalypt woodland/mallee of small-fruited species – Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source	– Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover – Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys* – Paddocks with *Erodium* spp. and other weeds.	– Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover – Urban areas with scattered foraging trees.
Negligible to low	1	– Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could	Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.	Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.

Site condition	Score	Description (Carnaby's Cockatoo)	Description (Forest Red-tailed Black Cockatoo)	Description (Baudin's Cockatoo)
		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 Cockatoos has been reported but appears to be unusual).		
No foraging value	0	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 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 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).

Table 6 Site Context (Bamford, 2020)

Percentage of existing native vegetation within the 'local' area[1] that the study site represents		
Score	Description	
	"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%

Table 7 Species density (stocking rate) (Bamford, 2020)

Presence/absence of species	
Score	Description
1	Species is reported regularly and/or there is abundant foraging evidence (seen at intervals of every few days or weeks for at least several months of the year).
0	Species is recorded or reported very infrequently and there is little or no foraging evidence.

[1] "Local" area is defined as within a 15 km radius of the centre point of the study site.

Table 8 Moderation of scores (Bamford, 2020)

Moderation of site context and species density scores for site condition[2]		
Score	**Context score**	**Species density score**
3-6 (low/moderate to high value)	Assessed as per Table 6	Assessed as per Table 7
0-2 (no to low value)	0	0

Breeding habitat

For most tree species such as Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), Blackbutt (*E. patens*), Tuart (*E. gomphocephala*) and Flooded Gum (*E. rudis*), suitable DBH is ≥ 500mm. For Wandoo (*E. wandoo*) and Salmon Gum (*E. salmonophloia*) suitable DBH is ≥ 300mm. On average, Carnaby's Cockatoo is known to nest in hollows with an entrance greater than 20 cm (Johnstone & Storr, 1998; Groom, 2011). While the Forest Red-tailed Black Cockatoo is known to nest in hollows with an entrance greater than 12 cm (Johnstone & Storr, 1998). Hollows also tend to be selected in preference for being vertical or near vertical, with diagonal and horizontal hollows generally regarded as marginal to unsuitable. Therefore, hollow suitability was assessed in consideration of these hollow characteristics.

The survey site was targeted on foot where accessible, to record potential trees with suitable DBH for Black Cockatoos. For each habitat tree (DBH ≥ 500 mm) located, binoculars were used to detect presence of suitable nesting hollows (adequate hollow orientation and hollow entrance diameter). All suitable DBH trees had their location recorded on GPS tablet together with tree species, DBH, size and numbers of hollows observed, any evidence of cockatoo use and any other significant observations were recorded.

The assessment methodology based on Main Roads environmental factsheet (Main Roads, 2023) distinguishes actual and potential breeding habitat as per the following:

– Actual nest trees: Evidenced as currently being used or have been used in the past (visible chews of hollow entrances)
– Potential breeding habitat: Trees with available hollows that do not show evidence of use now or in the past, trees with hollows that do not show evidence of use now or in the past where the hollow is not available (e.g. hollows are occupied by bees or galahs); and those trees without hollows but which have the potential to develop hollows in the future, and which have DBH >500 mm or 300 mm for different species.

In addition to identifying suitable breeding trees, Main Roads (2023) have developed a tree category system where trees are assigned a category number which refers to the degree of suitability of the tree/hollow. Table 9 presents the Main Roads seven categories for assessing suitable DBH trees, that was referred to during the survey.

For each potential or actual nesting tree, details of the tree location, tree species, DBH, hollow size (diameter) suitable for Black Cockatoo entry, number of hollows available in the tree, evidence of use (chews around entry, signs of foraging/roosting) and any other significant observations were recorded.

Table 9 Suitable DBH Tree Categories for Black Cockatoos (Main Roads, 2023)

Category number	Tree category	Description
1	Suitable DBH Tree with Known Nesting Hollows – hollows where breeding has been recorded or there is evidence of previous use.	Hollow where breeding has been recorded (i.e. bird/s observed in hollow) or there is evidence of previous use (i.e. hollow contains Black Cockatoo feathers or eggs).
2	Suitable DBH Tree with a potential suitably hollow with signs of use (not confirmed).	Hollows that appear to have a suitably sized entry and display signs of use, however internal dimensions have not been assessed. Although signs of use may be present, the signs, such as chew marks, could be from prospecting Black Cockatoos or other birds such as Galahs, which leave very distinctive marks on hollow and trees (impacted potentially suitably sized hollows should be confirmed by competent observer). Where hollows

[2] 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.

Category number	Tree category	Description
		cannot be avoided, the status of Category 2 hollows must be reassessed during the assessment process to determine whether it is a Category 1, 3, 4 or 6 hollow.
3	Suitable DBH Tree with a suitable hollow with no signs of use (confirmed).	Hollows that appear to have a suitably sized entry, with internal dimensions assessed. Category usually based on follow up hollow assessment with pole camera or drone. Although hollow appears to be suitable, there is no evidence of Black Cockatoo use. Where hollows cannot be avoided, status of Category 3 hollows should be reassessed immediately prior to clearing.
4	Suitable DBH Tree with a marginally unsuitable hollow with no signs of use (confirmed)	Hollows that are not currently suitable but have the potential to become suitable within five years. Where hollows cannot be avoided and have not been checked within 5 years, the hollow status must be reassessed to determine whether it has become suitable (Category 3 hollows) or a Known Nesting Hollow (Category 1 hollows).
5	Suitable DBH Tree with a potential suitable hollow with no signs of use (not confirmed).	Hollows that appear to have a suitably sized entry, however internal dimensions have not been assessed. Category usually based on ground observation only. Where hollows cannot be avoided, status of Category 5 hollows must be reassessed during the assessment process to determine whether it is a Category 1, 3, 4 or 6 hollow.
6	Suitable DBH Tree with unsuitable hollows.	Hollows that have a hollow entry greater than 50 mm that is not suitable due to the size of its entry, internal dimensions, angle and/or height off ground.
7	Suitable DBH Tree without hollows.	Trees with a 500 mm DBH (or 300 mm for Wandoo or Salmon Gum) that do not have visible hollows (hollows with an entry opening below 50 mm not considered a hollow). Note – multiple stemmed trees that branch above DBH may not be suitable.

Roosting habitat

Based on the referral guidelines, night roosts for Black Cockatoo species tend to be the tallest trees of an area, and usually close to a source of drinking water and in proximity to quality foraging habitat (DAWE, 2022). The survey area was visually surveyed for trees or stands of trees that matched these descriptions, and for any evidence of recent use as a roost site (feathers and droppings).

2.3 Wetland assessment

The wetland assessment was carried out in accordance with DBCA guidelines 'A methodology for the evaluation of wetlands on the Swan Coastal Plain' (DBCA, 2017a). This document provides an evaluation process for the identification of a wetland management category. The wetland assessment was conducted using a combination of field survey data and publicly available datasets referred to in the DBCA evaluation methodology, including Ramsar Sites (DBCA, 2017c), the Directory of Important Wetlands in Australia (DBCA, 2018), DBCA Legislated Lands and Waters (2024b) Lands of Interest (2024a), Geomorphic Wetlands (DBCA, 2024c) and EPA Redbook Recommended Conservation Reserves (DBCA, 2017b).

2.4 Limitations

2.4.1 Desktop limitations

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the study area. The records from the DBCA searches of Threatened and Priority flora provide more accurate information for the study area and local occurrence. However, some collections cannot be dated and often misrepresent the current range of Threatened and Priority species.

2.4.2 Field survey limitations

The EPA (2016, 2020) Technical Guidance states that flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 10. Based on this assessment, the survey effort has not been subject to any constraints that affect the thoroughness of the assessment, and the conclusions formed.

Table 10 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information.	Nil	Adequate information is available for the survey area, this includes: - Broadscale (1:250,000) mapping by Beard (1979) and digitised by Shepherd et al. (2002) - Vegetation complex mapping (Heddle et al., 1980; Webb et al., 2016) - DBCA Threatened and Priority ecological community, flora and fauna database searches (DBCA, 2024g, 2024f, DBCA 2024h) and *NatureMap* (DBCA, 2024e).
Scope (what life forms were sampled etc.).	Nil	Vascular flora were sampled during the survey. Terrestrial vertebrate fauna and SRE *Idiosoma sigillatum* were surveyed. Non-vascular flora, aquatic fauna and other invertebrates were not surveyed.
Proportion of flora collected and identified (based on sampling, timing and intensity). Proportion of fauna identified, recorded and/or collected.	Nil	The Two-Phase Detailed flora and vegetation survey, wetland assessment and Targeted flora survey was undertaken from July to November 2024, which is within the recommended timing for flora surveys in the South West and Interzone Botanical Province region (September-November) (EPA 2016a). A full flora species list is provided in Appendix D. All significant fauna relevant to the study area and region were assessed according to the requested level during the field surveyed via on-ground searches and habitat assessment.
Flora determination	Moderate	Flora determination was undertaken by the survey botanists in the field. Species that could not be identified in the field were collected and identified using appropriate taxonomic keys. One taxon was only identified to family level, 8 taxa were only able to be identified to genus level and six were tentatively identified to species due to lack of flowering/fruiting material or the specimen was in a juvenile form. One taxon, *Dodonaea* sp. may possibly be *Dodonaea hackettiana* (P4). One plant was observed by the survey botanist on an onramp between Kwinana Freeway and Roe Highway. The area was unsafe to stop and so the plant was unable to be collected or properly identified. All other collections not identified to species level are not similar to known significant flora (as identified in the desktop searches). The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time report development, but it should be noted this may change in response to ongoing research and review of International Union for Conservation Nature criteria.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	The survey area was considered adequately surveyed to compile a representative list of species, as well as to describe and map vegetation at a level appropriate for management decisions. Mapping of the context area was conducted at a desktop level using extrapolation, Gibson *et al*. (1994) plots, Keighery *et al.* (2012) plots, and Google Maps Street View. Therefore, assigned vegetation types can only be considered indicative, as their presence has not been confirmed by on-ground survey.
Mapping reliability	Nil	The survey was conducted using high-resolution aerial imagery obtained from Landgate, topographical features, previous vegetation mapping (Heddle *et al*. 1980 and Webb *et al*. 2016) and field data.

Aspect	Constraint	Comment
		Data was recorded in the field using hand-held GPS tools (e.g. Samsung tablet, Garmin GPS and Stonex S580+ tablets with S580 DGPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers, including tree canopies. The Garmin GPS units used for fauna component are accurate to within ±5 metres on average. Therefore, data points consisting of coordinates recorded from the GPS may contain minor inaccuracies. The flora and vegetation component used Stonex S580+ tablets with S580 DGPS, these devices are accurate to within ± 1cm.
Timing/weather/ season/cycle	Nil	The field survey was conducted during late winter to early spring (July to November 2024). This is within the recommended survey timing for flora and vegetation surveys within the South-West botanical province (EPA, 2016). In the three months prior to the survey (May-July) 447.6 mm of rainfall was recorded. This total is comparable to the long-term average for the same period (May- July 429 mm) (BoM, 2024), therefore the season is not considered to be a limitation.
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	The majority of the survey area has been subjected to urban development; however, these disturbances did not affect the results of the survey.
Intensity (in retrospect, was the intensity adequate)	Nil	The vascular flora of the survey area was sampled in accordance with EPA (2016a). The fauna survey was sampled in accordance with EPA (2020). The survey area was sufficiently covered by the field team using 18 people days.
Resources	Nil	Adequate resources were employed during the field survey. Two Senior Botanists, one Senior Zoologist and one Zoologist undertook the survey over 18 person days.
Access restrictions	Moderate	The survey area was in some parts, unable to be accessed on foot, due to the freeway restrictions (safety in parking), high security fencing, sound-blocking walls and suburb boundaries. In some areas, the site was driven by in the vehicle as slow as safely possible to map vegetation and make assessments for significant vegetation, potential significant flora habitat, habitat suitability for Black Cockatoos and other significant fauna. In this instance vegetation mapping was done through aerial imagery and extrapolation. Potential significant flora habitat was judged on the density of weeds in the understorey and vegetation. For fauna this involved assessing the plants present, and the height and canopy cover range for the patches of Banksia woodland adjacent the freeway. When the zoologists were unable to reach sections of the survey area due to the constraints listed above, they would park as close as was possible and utilise binoculars to make an assessment of the habitat that was present. The limitation here is that a full detailed search for signs of fauna and significant flora was not possible in some areas.
Experience level	Nil	The botanists and zoologists who executed the survey are practitioners suitably qualified and experienced in their respective fields: – Senior Botanist Angela Benkovic has over 18 years experience in undertaking flora and vegetation surveys – Senior Botanist Alex Sleep has over 16 years experience in undertaking flora and vegetation surveys – Senior Zoologist Sarah Flemington has over 7 years' experience conducting fauna surveys – Zoologist Melissa Wood has over 4 years experience in undertaking fauna surveys.

3. Desktop assessment

3.1 Physical environment

3.1.1 Climate

The Perth Metropolitan area where is project is located has a temperate climate of hot dry summers and cold winters. The climate is characteristic of a mediterranean climate with low summer rainfall followed by wet winters (BoM, 2024).

At the Jandakot Airport weather station (site number: 009172) the mean maximum temperature is 24.7 C° and the mean minimum temperature is 11.7 C°. July receives the highest mean rainfall of 174.0mm, and December the lowest of 9.9mm. The mean annual rainfall is 810mm. In the three months prior to the survey (May-July) 447.6 mm of rainfall was recorded. This total is comparable to the long-term average for the same period (May-July; 429mm). Climate statistics for the region are illustrated in Plate 1 (BoM, 2024).

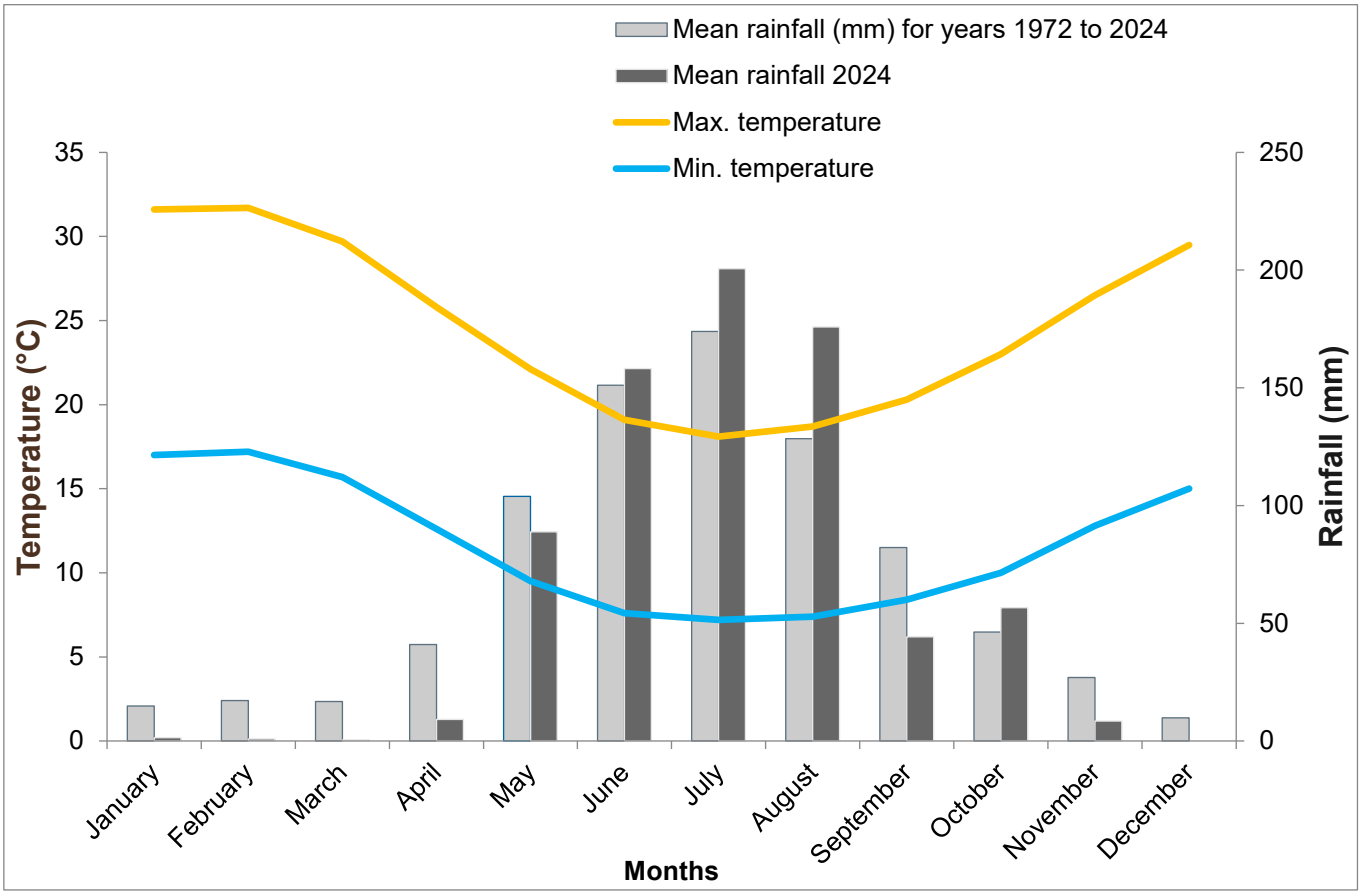

Plate 1 *Jandakot Airport monthly climate statistics (BoM weather station: 009172)*

3.1.2 Land systems and soil

Geology

The survey area intersects two geological units at the broad 1:500,000 scale (DMIRS, 2018):

– Coolyena Group: Composition of chalk, greensand, glauconitic sandstone, siltstone, marl; and glauconite
– Warnbro Group: Interbedded sandstone, siltstone, and shale; minor conglomerate.

Soil types

The survey area intersects the following unique soil landscape zones (DPIRD, 2025).

– Bassendean Zone (212): Mid Pleistocene Bassendean sand. Fixed dunes inland from coastal dune zone. Non-calcareous sands, podsolised soils with low-lying wet areas
– Perth Coastal Zone (211): Coastal sand dunes and calcarenite. Late Pleistocene to Recent age. Calcareous and siliceous sands and calcarenite
– Pinjarra Zone (213): Alluvial deposits (early Pleistocene to recent) between the Bassendean Dunes Zone and the Darling Scarp, colluvial and shelf deposits adjacent to the Darling Scarp. Clayey to sandy alluvial soils with wet areas.

Land zones have been further classified into soil-landscape systems (DPIRD, 2022). The survey area intersects four soil landscape systems:

– Bassendean system (212Bs): Swan Coastal Plain from Busselton to Jurien. Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths
– Pinjarra System (213Pj): Swan Coastal Plain from Perth to Capel. Poorly drained coastal plain with variable alluvial and aeolian soils. Variable vegetation includes Jarrah, Marri, Wandoo, paperbark sheoaks and Rudis
– Spearwood System (211Sp): Sand dunes and plains. Yellow deep sands, pale deep sands and yellow/brown shallow sands
– Vasse System (211Va): Poorly drained estuarine flats, of the Swan Coastal Plain. Tidal flat soil, saline wet soil and pale deep sand. Samphire, sedges and paperbark woodland.

The survey area is predominantly located within a moderate to low acid sulfate soil risk area (DWER, 2017). There are intersects with high-risk acid sulfate soil areas across the Survey Area.

3.2 Land use

Land use constraints relevant to the survey area are shown in Figure 3, Appendix A.

3.2.1 Conservation reserves and estates

A total of 66 DBCA managed lands occur within the study area, comprising 55 Crown freehold DBCA-managed lands, 3 conservation parks, seven nature reserves and one Section 5(1)(h) reserve (DBCA, 2024b).

While no conservation reserves intersect the survey area, a group of reserves east of the Spectacles do lie on the survey area boundary (identifiers R 53313, 1758/697, 2781/538) (DBCA, 2024b).

3.2.2 Environmentally sensitive areas

There were 71 ESAs identified in the study area, the survey area intersects six of these (identifiers 3287, 3290, 3296, 3299, 3349 and 3393) (DWER, 2018a). The ESAs are represented by wetland areas and the Banksia Woodlands of the Swan Coastal Plain ecological communities. ESAs are declared under section 51B of the *Environmental Protection Act 1986* and impacts to ESAs are considered by the EPA during the assessment process. A clearing permit may be required for vegetation clearing within an ESA unless Schedule 6 exemptions apply.

3.2.3 Bush forever

Forty-nine Bush Forever sites occur within the study area. Bush Forever Site 270 – Sandy Lake and Adjacent Bushland Anketell occurs within the survey area boundary (DPLH, 2019).

3.3 Hydrology

The DWER geographic data layers identified the following hydrology and hydrogeology aspects proclaimed under the RIWI Act within the survey area are provided in Table 11. Hydrology aspects are illustrated in Figure 4, Appendix A.

Table 11 Hydrology aspects within the study area

Aspect	Details	Results
Groundwater Areas	Groundwater areas proclaimed under the RIWI Act	The survey area is within the Jandakot, Serpentine and Stakehill groundwater areas (DWER, 2018c)
Surface Water Areas	Surface water areas proclaimed under the RIWI Act	The survey area does not intersect any RIWI listed Surface water areas (DWER, 2018e)
Irrigation District	Irrigation Districts proclaimed under the RIWI Act	The survey area does not intersect any RIWI listed Irrigation District areas (DWER, 2018e)
Rivers	Rivers proclaimed under the Rights in RIWI Act	The survey area does not intersect any RIWI listed Rivers (DWER, 2018d)
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the *Country Area Water Supply Act 1947*	The northern and central sections of the survey area intersect the Jandakot Underground Water Pollution Control Area. The intersected areas are listed as PDWSA Priority 3 areas (DWER, 2018b)
Waterways Management Areas	Areas proclaimed under *the Waterway Conservation Act 1976*	The Safety Bay Road section of the survey area intersects the Peel Inlet Management Area (DWER, 2018f)

3.3.1 Wetlands

Globally and nationally significant wetlands

The desktop study of various databases reported one wetland system of global RAMSAR listing significance occurring within the study area, the Thomsons and Forestdale Lakes wetland system (DBCA, 2017c). Thomson Lake is 1.3 km west of the survey area, between Beeliar Drive and Gibbs Road, while Forestdale Lake is to the east of the survey area, outside the study area.

A further two wetlands listed in the Directory of Important Wetlands in Australia were identified within the study area (DBCA, 2018), Spectacles Swamp and Gibbs Road Swamp System. The nearest of these is Spectacles Swamp, which is 0.2 km west of the survey area, between Anketell Road and Thomas Road.

No globally or nationally significant wetlands occur within the survey area.

Geomorphic wetlands of the Swan Coastal Plain

Wetlands cover more than 25% of the Swan Coastal Plain, with approximately 75% of these occurring as seasonally waterlogged flats or basins. The geomorphic classification system developed by Semeniuk and Semeniuk (1987; 1995) has been used to classify wetlands on the Swan Coastal Plain into types based on the shape of the host landform and hydrological regime. This table was reproduced in "*A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western Australia*" (DBCA, 2017a), and adapted for this report (Table 12).

Table 12 Wetland landform types adapted from DBCA (2017a) methodology for evaluation of wetlands

Hydrology	Wetland Landform			
	Basin	**Flat**	**Channel**	**Slope**
Permanent inundation	Lake		River	
Seasonal inundation	Sumpland	Floodplain	Creek	
Seasonal waterlogging	Dampland	Palusplain	Trough	Paluslope

Consanguineous suites

Wetlands on the Swan Coastal Plain have been grouped into 62 recognised consanguineous suites based on similar regional features such as "*wetland's classification, geometry, stratigraphy, inferred origin and hydrology*" (DBCA, 2017a; Semeniuk, 1988). The survey area is primarily contained within the Jandakot suite, however a

small sliver of the survey area between Anketell Road and Thomas Road intersects the Bibra suite, and the Safety Bay Road and Mundijong Road sections fall within the Keysbrook suite.

Wetland management categories

Wetlands in the Geomorphic Wetlands Dataset (DBCA, 2024c) are assigned management categories to guide management and protection. Wetlands on the Swan Coastal Plain have been assigned either a Conservation, Resource Enhancement or Multiple Use management category (Table 13).

Table 13 Wetland management categories (DBCA, 2017a)

Category	General Description	Objectives
Conservation	Wetlands which support a high level of attributes and functions.	To preserve and protect their existing conservation values through various mechanisms including: – reservation in national parks, Crown reserves and state-owned land – wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.
Resource Enhancement	Wetlands which may have been modified or degraded, but still support substantial attributes and functions.	To manage, restore and protect towards improving their conservation value and hydrological/hydrogeological regime. These wetlands have the potential to be restored or rehabilitated to Conservation category focusing on wetland functions, structure and biodiversity value.
Multiple Use	Wetlands with few remaining important attributes and functions.	The use, development and management of these wetlands should be considered in the context of ecologically sustainable development and best management practice catchment planning. Their role in managing the natural hydrological and hydrogeological regime of the general area should be maintained.

Approximately 25% of the survey area has been mapped as geomorphic wetlands by DBCA (2024c), totalling 73.2 ha across 34 wetlands. These are currently assigned the following conservation categories:

– Conservation – nine wetlands, intersecting 2.2 ha (0.7%) of the survey area
– Resource Enhancement – six wetlands, intersecting 17.1 ha (6.0%) of the survey area
– Multiple Use – 14 wetlands, intersecting 44.0 ha (15.4%) of the survey area
– Not Applicable – five wetlands, intersecting 9.9 ha (3.4%) of the survey area.

Of the these, eight Conservation category and one Resource Enhancement wetland were evaluated using the criteria detailed by DBCA (2017a) to provide supporting information for environmental approvals for the Project. Details of these are shown in Table 14 and the results of the wetland evaluation are shown in section 4.4.

Note that in two cases, one distinct wetland, observable as a single wetland via aerial imagery, was mapped by DBCA as two neighbouring polygons with different UFIs (Unique Feature Identifiers). In these cases, the smaller UFI intersection was merged and assessed as part of the larger neighbouring UFI (see Table 14).

The remaining 25 Geomorphic Wetlands were not evaluated, as they aligned with one or more of the following considerations, and it was therefore concluded that a formal assessment was not necessary:

– comprised predominantly cleared land or highly disturbed road verges. These wetlands no longer retain any natural attributes, functions or values of a wetland and are considered ‘no longer a wetland’
– categorised as a Dryland by DBCA assigned a management category of ‘not applicable’
– did not represent functioning wetlands where they intersected the survey area, due to fragmentation, degradation or clearing . The remaining remnant portion of the wetland is not reliant on the disturbed and highly modified portion of the wetland that occurs within the survey area. This portion of the wetland within the survey area is considered no longer a wetland.

Wetlands of the survey area are shown in Figure 4, Appendix A. Appendix F contains a list of wetlands intersecting the survey area, including a justification for wetlands which were not formally evaluated.

Table 14 Geomorphic Wetlands within the survey area which were evaluated using DBCA methodology (2017a).

UFI	Wetland name	Type	Category	Total wetland area (ha)	Area intersected by survey area (ha)	Proportion of wetland intersected by survey area
6664	Mandogalup Swamp Mid Nth	Sumpland	Resource Enhancement	6.3	2.8	45.1%
12981	Mandogalup Swamp South	Dampland	Conservation	3.4	0.5	15.2%
14663[3]	Mandogalup Swamp Mid Sth	Sumpland	Conservation	4.9	<0.1	<0.1%
15397	Unknown	Sumpland	Conservation	5.9	0.5	8.0%
15399[4]	Unknown	Sumpland	Conservation	0.6	<0.1	5.5%
15584	Mandogalup Swamp Mid Sth	Sumpland	Conservation	0.9	0.3	35.8%
15968	Unknown	Sumpland	Conservation	0.7	<0.1	13.3%
15970	Unknown	Sumpland	Conservation	0.8	0.2	20.1%
15973	Unknown	Sumpland	Conservation	5.8	0.4	7.7%

3.4 Vegetation and flora

3.4.1 Regional biogeography

The survey area lies within the SCP bioregion of the Perth (SWA2) subregion in WA (CALM, 2002).

– The SCP is a low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials (CALM, 2002).

3.4.2 Broad vegetation mapping and extent

Broad scale (1:250,000) pre-European vegetation mapping identified three vegetation associations as present within the survey area (DPIRD, 2019). These are shown in Table 15 along with their extents in the survey area.

Table 15 Pre-European Vegetation Associations and extents in the survey area

Pre-European Vegetation Association	Extent (ha) in survey area
6: Medium woodland of Tuart and Jarrah.	3.8
968: Medium woodland of Jarrah, Marri and Wandoo	16.3
1001: Medium very sparse Jarrah woodland with low woodland of Banksia and Casuarina.	265.6

The vegetation associations of the survey area have been subject to a high proportion of clearing with less than 38.32% of pre-European Vegetation extents remaining. Two of the three vegetation associations within the survey area have > 21% of their extents remaining within the State, Interim Biogeographic Regionalisation for Australia (IBRA) Region, IBRA Subregion, and Local Government Area (LGA) extents. Vegetation association 968 has 6.62% of its extent remaining within the SCP bioregion and Perth subregion and only 3.69% remaining within the City of Rockingham LGA (Table 16).

[3] Assessed as part of neighboring wetland 15584
[4] Assessed as part of neighboring wetland 15397

Table 16 Extents of vegetation associations for the survey area within the state, IBRA regions, subregions and LGA

Vegetation association	Scale		Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% current extent in all DBCA managed land (proportion of current extent)
Veg Assoc No. 6	Statewide: WA		56,343.01	13,362.25	23.72	39.83
	IBRA Bioregion	Swan Coastal Plain	56,343.01	13,362.25	23.72	39.83
	IBRA Sub-region	Perth	56,343.01	13,362.25	23.72	39.83
	Local Government Authority	City of Cockburn	2,286.74	480.29	21.00	47.25
		City of Kwinana	1,477.48	547.36	37.05	-
Veg Assoc No. 968	Statewide: WA		296,877.84	95,048.82	32.02	57.64
	IBRA Bioregion	Swan Coastal Plain	136,188.20	9,017.32	6.62	21.61
	IBRA Sub-region	Perth	136,188.20	9,017.32	6.62	21.61
	Local Government Authority	City of Kwinana	52.80	13.08	24.77	-
		City of Rockingham	4,013.82	148.11	3.69	-
Veg Assoc No. 1001	Statewide: WA		57,410.23	12,660.76	22.05	14.19
	IBRA Bioregion	Swan Coastal Plain	57,410.23	12,660.76	22.05	14.19
	IBRA Sub-region	Perth	57,410.23	12,660.76	22.05	14.19
	Local Government Authority	City of Cockburn	7,328.39	2,002.93	27.33	14.92
		City of Kwinana	4,694.17	1,745.29	37.18	1.96
		City of Rockingham	3,010.32	1,153.53	38.32	6.38

Regional vegetation has been mapped by Heddle et al (1980) with updates from Webb et al. (2016) based on major geomorphic units of the Swan Coastal Plain. The mapping indicates five complexes are present within the survey area (Table 17).

Table 17 Vegetation complexes of the survey area

Vegetation Complex	Structure	Landform	Description	Extent (ha) within survey area
Cottesloe Complex – Central and South	Woodland and open forest and closed heath	Aeolian deposits	Mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri); closed heath on the Limestone outcrops.	17.29
Serpentine River Complex	Closed scrub and fringing woodland	Fluviatile deposits	Closed scrub of Melaleuca species and fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark) along streams.	13.98
Herdsman Complex	Sedgelands and fringing woodland	Aeolian deposits	Sedgelands and fringing woodland of *Eucalyptus rudis* (Flooded Gum) - Melaleuca species.	10.80
Karrakatta Complex – Central and South	Open forest and woodland	Aeolian deposits	Predominantly open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) and woodland of *Eucalyptus marginata* (Jarrah) - Banksia species. *Agonis flexuosa* (Peppermint) is co-dominant south of the Capel River.	2.28

Vegetation Complex	Structure	Landform	Description	Extent (ha) within survey area
Bassendean Complex – Central and South	Woodland to low woodland and sedgelands	Aeolian deposits	Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* (Jarrah) to *Eucalyptus todtiana* (Pricklybark) in the vicinity of Perth.	241.09

GoWA (2018) assessed the vegetation complexes against presumed pre-European extents within the SCP IBRA bioregion, Perth sub-region and the Cities of Cockburn, Kwinana and Rockingham respectively. Annual updates were provided from 2016 to 2018, however note that this data has not been updated since then. Serpentine River Complex had the lowest extent remaining at 9.58%, Karrakatta Complex – Central and South and Bassendean Complex Central and South had less than 30% extent remaining. Cottesloe Complex – Central and South and Herdsman Complex had marginally over 30% remaining at 32.17% and 31.88% respectively (Table 18). Extents by LGA are included in Table 19.

***Table 18 Extents of vegetation complexes on the Swan Coastal Plain mapped within the survey area* (GoWA 2018)**

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed lands
Cottesloe Complex – Central and South	45,299.61	14,571.43	32.17	14.55
Serpentine River Complex	19,855.41	1,902.48	9.58	2.61
Herdsman Complex	9,665.15	3,081.05	31.88	10.97
Karrakatta Complex – Central and South	53,080.99	12,465.24	23.48	8.06
Bassendean Complex – Central and South	87,476.25	23,533.09	26.90	4.99

Table 19 Extents of Vegetation Complexes in LGAs (GoWA 2018)

Vegetation Complex	LGA	Pre-European extent (ha)	Current extent (ha)	% of pre-European extent	Proportion of the vegetation complex within the LGA (%)
Cottesloe Complex – Central and South	City of Cockburn	4,990.60	965.91	19.35	11.02
	City of Kwinana	3,789.77	1,281.71	33.82	8.37
	City of Rockingham	2,017.46	743.90	36.87	4.45
Serpentine River Complex	City of Kwinana	3.56	2.97	83.44	0.02
	City of Rockingham	3,658.19	366.54	10.02	18.42
Herdsman Complex	City of Cockburn	1,230.82	507.62	41.24	12.73
	City of Kwinana	579.45	282.06	48.68	6.00
	City of Rockingham	531.85	294.80	55.43	5.50
	City of Cockburn	1,390.24	145.48	10.46	2.62
	City of Kwinana	1,633.94	485.73	29.73	3.08

Vegetation Complex	LGA	Pre-European extent (ha)	Current extent (ha)	% of pre-European extent	Proportion of the vegetation complex within the LGA (%)
Karrakatta Complex – Central and South	City of Rockingham	4,275.59	1,140.32	26.67	8.05
Bassendean Complex – Central and South	City of Cockburn	6,809.99	1,766.14	25.93	7.78
	City of Kwinana	4,678.84	1,743.46	37.26	5.35
	City of Rockingham	1,977.56	912.09	46.12	2.26

3.4.3 Significant ecological communities

A review of the DBCA TEC and PEC database and EPBC Act PMST identified the presence of 18 listed communities previously recorded within (or potentially occurring within as identified by the PMST) the study area (Table 20).

The survey area intersects three significant ecological communities or their mapped buffer

– Banksia Woodlands of the Swan Coastal Plain ecological community (EPBC TEC and DBCA P3)
– Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain (EPBC TEC and DBCA P3)
– Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) / Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain (EPBC and State TEC).

The locations of TECs and PECs in the vicinity of the survey area are mapped in Figure 5, Appendix A.

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Table 20 Significant Ecological Communities

Community Name	Status		Description (derived from (DBCA, 2021) unless specified)	Distance from survey area
	EPBC Act	BC Act/DBCA		
Banksia ilicifolia woodlands (SCP22) A component of the Banksia Woodlands of the Swan Coastal Plain ecological community EPBC listed TEC	EN	P3	Low lying sites generally consisting of *Banksia ilicifolia – B. attenuata* woodlands, but *Melaleuca preissiana* woodlands and scrubs are also recorded. Occurs on Bassendean and Spearwood systems in the central Swan Coastal Plain north of Rockingham. Typically has very open understorey, and sites are likely to be seasonally waterlogged.	All previously recorded occurrences of this community occur to the east of the survey area, the nearest being 700 m east of the survey area south of Anketell Road in line with the extensive remnant vegetation that occurs between Anketell Road and Thomas Road.
Banksia Woodlands of the Swan Coastal Plain ecological community	EN	P3	Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are *B. prionotes* or *B.ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	A total of 104 occurrences (or their buffers) of this community intersect the survey area.
Clay Pans of the Swan Coastal Plain	CR	EN	The ecological community generally occurs as a shrubland (less commonly as a low, open woodland) over a ground layer of geophytes, herbs and sedges which are characteristic of the wetter parts of the sites (Threatened Species Scientific Committee, 2012). There are no dominant species which characterise the entire ecological community (Threatened Species Scientific Committee, 2012). The ecological community, however, shows similar landform and vegetation structural features across its range. A distinctive feature of these clay pan wetlands is the suite of geophytes and annual flora that germinates, grows and flowers sequentially as these areas dry over summer, producing a floral display for over three months (Threatened Species Scientific Committee, 2012). The clay pans have very high species richness, a number of local endemics and are the most floristically diverse of the Swan Coastal Plain wetlands (Threatened Species Scientific Committee, 2012). Includes the following WA listed TECs: – Herb rich saline shrublands in clay pans (SCP07) – Herb rich shrublands in clay pans (SCP08) – Dense shrublands on clay flats (SCP09) – Shrublands on dry clay flats (SCP10a)	‘Dense shrublands on clay flats SCP09’ occurs 4.3 km east of the survey area.

Community Name	Status		Description (derived from (DBCA, 2021) unless specified)	Distance from survey area
	EPBC Act	BC Act/DBCA		
Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) / Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	EN	CR	The habitat of this community is characterised by continuous discharge of groundwater in raised areas of peat (Department of Environment and Conservation, 2005). The peat and surrounds provide a stable, permanently moist series of microhabitats (Department of Environment and Conservation, 2005). Typical species associated with the tumulus springs include *Banksia littoralis, Melaleuca preissiana, Eucalyptus rudis, Agonis linearifolia, Pteridium esculentum, Astartea fascicularis and Cyclosorus interruptus* (Department of Environment and Conservation, 2005). Common weed species include *Isolepis prolifera* and *Cenchrus clandestinus* (Department of Environment and Conservation, 2005).	One occurrence (or buffer) of this community intersects the survey area.
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain			A series of *Corymbia calophylla* dominated plant communities on heavy soils on the eastern side of the Swan Coastal Plain (Department of Environment and Conservation, 2011b). Typical understorey species include *Banksia nivea, Philotheca spicata, Kingia australis* and *Xanthorrhoea preissii* with herbs, rushes and sedges *Cyathochaeta avenacea, Dampiera linearis, Haemodorum laxum, Desmocladus fasciculatus, Mesomelaena tetragona* and *Morelotia octandra* (Department of Environment and Conservation, 2011b).	Identified by PMST only, no known occurrence within study area.
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	EN	CR	Plant community located on heavy soils of the eastern side of the Swan Coastal Plain between Bullsbrook, and Waterloo near Bunbury. Dominant species in the community are the trees *Corymbia calophylla* and occasionally *Eucalyptus wandoo*; the shrubs *Xanthorrhoea preissii, Acacia pulchella, Banksia nivea, Gompholobium marginatum*, and *Hypocalymma angustifolia* and the herbs *Burchardia congesta*, *Cyathochaeta avenacea* and *Neurachne alopecuroidea.* The introduced species *Briza maxima* and *Romulea rosea* are also common (English & Blyth, 2000).	All occurrences of this community are to the east of the survey area. The nearest is approximately 4 km east of the Mundijong Road section.
Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. (1994)) A component of the Clay Pans of the Swan Coastal Plain EPBC listed TEC.	CR	VU	The community occurs as shrublands or open woodlands on clay flats that are inundated for long periods. It has been recorded between Moore River National Park and Dunsborough. Sedges are more apparent in the community than in other claypans, generally with moderate frequencies of *Chorizandra enodis* (black bristlerush), *Cyathochaeta avenacea, Lepidosperma longitudinale* (pithy sword-sedge) and *Leptocarpus coangustatus*. The community has a lower species richness and weed frequency than other claypan threatened ecological communities.	Nearest record of this community is approximately 4.3 km east of the survey area (Mundijong Road section).

Community Name	Status		Description (derived from (DBCA, 2021) unless specified)	Distance from survey area
	EPBC Act	BC Act/DBCA		
Empodisma peatlands of southwestern Australia	EN		An assemblage of plants, animals and other organisms associated with a type of freshwater, peat-based wetland that is found in the High Rainfall Province of the south-west of Western Australia (DCCEEW, 2023a). It is typically a sedgeland to shrubland vegetation complex on peaty substrates that almost always includes the perennial grass-like twig rush *Empodisma gracillimum* (DCCEEW, 2023a). *Empodisma* peatlands predominantly occur in the Warren IBRA bioregion and he Southern Jarrah Forest IBRA subregion of the Jarrah Forest bioregion (DCCEEW, 2023a).	Identified by PMST only, no known occurrence within study area.
Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)	EN	P3	This type occurs sporadically between Gingin and Bunbury and is largely restricted to the Bassendean system. The type tends to occupy lower lying wetter sites and is variously dominated by *Melaleuca preissiana, Banksia attenuata, B. menziesii, Regelia ciliata, Eucalyptus marginata* or *Corymbia calophylla*. Structurally, this community type may be either a woodland or occasionally shrubland.	The nearest record of this community is approximately 780 m east of the survey area, south of Anketell Road in line with the extensive remnant vegetation that occurs between Anketell Road and Thomas Road.
Melaleuca huegelii - Melaleuca systena shrublands on limestone ridges (floristic community type 26a as originally described in Gibson et al. (1994)) / Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	CR	EN	Species rich thickets, heaths or scrubs dominated by *Melaleuca huegelii, M. systena* (previously *M. acerosa), Banksia sessilis* over *Grevillea preissii, Acacia lasiocarpa* and *Spyridium globulosum,* occurring on skeletal soil on ridge slopes and ridge tops (community 26a as described by Gibson et al. 1994) (Luu & English, 2005). The broader community type 26 occurs on Spearwood Sands (Tamala Limestone) on large limestone ridges (Luu & English, 2005). Two distinct subgroups are related to the degree of soil development on the limestone ridges. 26a occurs on skeletal soils on ridge slopes and ridge tops. The other subgroup (26b) is found on the lower slopes or in pockets with deeper soil and is not listed as threatened (Luu & English, 2005).	The survey area is generally considered outside the known range of this vegetation type, which occurs closer to the coast (in association with limestone ridges). Nearest record is approximately 2.9 km west of the survey area (Anketell Rd).
Microbial community of a coastal saline lake (Lake Walyungup) / Brackish microbial community number 1 (Lake Walyungup)	Not listed	P1	Microbial community formed in Lake Walyungup, Rockingham.	This PEC is a discrete community associated with Lake Walyungup. The DBCA data includes a substantial buffer, the edge of which is approximately 1.5 km west of the survey area (Safety Bay Road). Lake Walyungup itself is approximately 3.3 km west of the survey area.
Northern Spearwood shrublands and woodlands (SCP24)	Not listed	P3	Heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system. The heathlands in this group typically include *Banksia sessilis, Calothamnus quadrifidus*, and *Schoenus grandiflorus*.	The nearest record of this community is approximately 1.3 km west of the survey area

Community Name	Status		Description (derived from (DBCA, 2021) unless specified)	Distance from survey area
	EPBC Act	BC Act/DBCA		
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19a as originally described in in Gibson et al. (1994))	EN	CR	The community occurs in linear damplands and occasionally sumplands, between Holocene dunes. Typical and common native species are the shrubs *Acacia rostellifera, Acacia saligna, Xanthorrhoea preissii*, the sedges *Baumea juncea, Ficinia nodosa, Lepidosperma gladiatum*, and the grass *Poa porphyroclados*. Several exotic weeds are found in this community but generally at low cover values (Department of Environment and Conservation, 2011a)	Nearest occurrences of this community are approximately 1.3 km west of the survey area (Safety Bay Road).
Southern *Eucalyptus gomphocephala-Agonis flexuosa* woodlands (SCP25)	EN/CR	P3	Can be a component of the Endangered *Banksia* Woodlands of the Swan Coastal Plain EPBC listed TEC, or the Tuart woodlands and forests of the Swan Coastal Plain EPBC listed TEC) Priority 3(iii) Endangered /Critically Endangered TEC (part) Woodlands of *Eucalyptus gomphocephala - Agonis flexuosa* south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than Tuart were occasionally recorded, including *Corymbia calophylla* at Paganoni block and *Eucalyptus decipiens* at Kemerton. Banksias found in this community include *Banksia attenuata, B. grandis* and *B. littoralis.*	Nearest record of this community is approximately 1 km west of the survey area (Mundijong Road).
Subtropical and Temperate Coastal Saltmarsh	VU	P3	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23oS latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas or seagrass is not greater than 50%.	Identified by PMST only, no known occurrence within study area.

Community Name	Status		Description (derived from (DBCA, 2021) unless specified)	Distance from survey area
	EPBC Act	BC Act/DBCA		
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain	CR	P3	Mostly confined to Quindalup Dunes and Spearwood Dunes but can also occur on the Bassendean dunes and Pinjarra Plain. It can occur on the banks of rivers and wetlands. Tuart is the key upper canopy species although it may co-occur with trees of other species. Trees commonly co-occurring with Tuart *include Agonis flexuosa* (peppermint), *Banksia grandis, Banksia attenuata, Eucalyptus marginata;* and less commonly, *Corymbia calophylla, Banksia menziesii* and *Banksia prionotes*. An understorey of native plants is typically present, which may include grasses, herbs and shrubs. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community. Threats: land clearing, weed invasion, grazing, disease, altered fire regimes, hydrological change	Two occurrences (or their buffers) of this community intersect the survey area.
Wooded wetlands which support colonial waterbird nesting areas	Not listed	P2	Includes Chandala, Booragoon Lake, unnamed wetland near Pinjarra and McCarleys Swamp. Melaleuca dominated, fresh-brackish.	The nearest record of this community is at Booragoon Lake. The locations has been given a substantial buffer in the DBCA data, the edge of which is approximately 3.1 km north of the northern most end of the survey area. Booragoon Lake is approximately 5.2 km north of the survey area.
Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).(SCP19b)	EN	CR	This TEC is a sub-community of Sedgelands in Holocene dune swales of the southern Swan Coastal Plain. It represents older occurrences, between 4500 and 7000 years of age that generally have a tree overstorey and so the community is subdivided into 'sedgelands in Holocene dune swales' (Sub-type 19a) and 'woodlands over sedgelands in Holocene dune swales' (Sub-type 19b) based on floristic differences between these groups, but both sub-community types represent the TEC 'sedgelands in Holocene dune swales' (Department of Environment and Conservation, 2011a) Typical and common native shrub species are summer-scented wattle (*Acacia rostellifera*), orange wattle (*Acacia saligna*) and grass tree (*Xanthorrhoea preissii*). Typical sedges include the bare twigrush (*Baumea juncea*), knotted club rush (*Ficinia nodosa*) and coast sword-sedge (*Lepidosperma gladiatum*). The native *grass Poa porphyroclados* is also common in the community. Some older occurrences have an overstorey characterised by Tuart (*Eucalyptus gomphocephala*), swamp paperbark (*Melaleuca rhaphiophylla)* and swamp banksia (*Banksia littoralis*) (Department of Environment and Conservation, 2011a).	Nearest record of this community occurs approximately 1.9 km west of the survey area.

3.4.4 Flora diversity

The *NatureMap* database search of the study area identified 2,130 flora species belonging to 698 genera and 161 families (DBCA, 2024e). The most dominant families and genera of the study area are summarised in Table 21.

Table 21 Dominant families and genera of the study area

Family	Number of Species	Genus	Number of Species
Fabaceae	180	*Stylidium*	60
Poaceae	147	*Schoenus*	50
Cyperaceae	139	*Lepidosperma*	45
Orchidaceae	129	*Acacia*	41
Myrtaceae	126	*Drosera*	36

3.4.5 Significant flora

The EPBC Act PMST (DCCEEW, 2024a) and DBCA TPFL and WA Herbarium databases (DBCA, 2024g) identified the presence/potential presence of 41 significant flora taxa within the desktop study area, comprising of :

– Fifteen Threatened taxa listed under the EPBC Act and/or BC Act.
– Five Priority 1 taxa, listed by the DBCA
– Three Priority 2 taxa, listed by the DBCA
– Eight Priority 3 taxa listed by the DBCA
– Ten Priority 4 taxa listed by the DBCA.

The locations of significant flora registered on the DBCA database are mapped in Figure 5, Appendix A. A pre-survey likelihood determined that twelve taxa were considered likely to occur and ten were considered to possibly occur. The remainder were considered unlikely or highly unlikely to occur in the survey area. The full likelihood of occurrence assessment is shown in Appendix D.

3.5 Fauna

3.5.1 Fauna diversity

The *NatureMap* database (DBCA, 2024e) identified 605 terrestrial vertebrate fauna taxa, representing 397 bird species, 60 mammal species, 19 species of amphibians and 129 species of reptiles. In addition, the search identified 247 species of terrestrial invertebrate fauna officially recorded within the survey area. The *NatureMap* database search is provided in Appendix C.

3.5.2 Significant fauna

Desktop searches of the EPBC Act PMST (DCCEEW 2024a), *NatureMap* (DBCA 2007-), DBCA Threatened Fauna databases (DBCA, 2024f) identified the presence/potential presence of 54 significant fauna taxa within the study area, of which 49 were terrestrial vertebrate species and 5 were invertebrate species of conservation significance. Exclusively Marine species identified in the PMST were excluded from the likelihood of occurrence assessment as marine habitats are not present in the survey area. From an analysis of vertebrate and invertebrate fauna, the desktop searches recorded:

– Four species taxa listed as Critically Endangered (CR) under the EPBC Act and/or BC Act
– Six species listed as Endangered (EN) under the EPBC Act and/or BC Act
– Six species listed as Vulnerable (VU) under the EPBC Act and/or BC Act
– One species listed as Conservation Dependant (CD) under the EPBC Act and/or BC Act
– One species listed as a species of Special Protection (OS) under the BC Act

– Twenty-three species listed as Migratory (MI) under the EPBC Act and/or BC Act
– One species of Priority 1 taxa listed by the DBCA
– Four species listed as Priority 3 taxa listed by the DBCA
– Eight species listed as Priority 4 taxa listed by the DBCA.

The location of significant fauna as recorded by the DBCA database is presented in Figure 5, Appendix A. The likelihood of occurrence assessment is included in Appendix E.

3.5.3 Black Cockatoos

Based on the desktop assessment, all three Black Cockatoo species occur regionally and two locally, based on previous database records and distribution patterns. Carnaby's Cockatoo (*Zanda latirostris*) - Endangered, Baudin's Cockatoo (*Zanda baudinii*) - Endangered and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) - Vulnerable are endemic to the south-west of Western Australia with a wide-spread distribution. The survey area is within the modelled distribution for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo, including within the modelled breeding range for Carnaby's Cockatoo (DAWE, 2022). Baudin's Cockatoo are anecdotally known to occur within the vicinity of the survey area, with additional confirmed DBCA records extending as far as 4km further North and North-West of the survey area (DBCA, 2025), the most recent of which have been recorded in 2012. However, the scarcity of such recordings and the position of the species on the very edge of it's foraging known range and lack of breeding records indicates that the species is considered unlikely to occur, being a rare occasional visitor, with their modelled distribution occurring to the east and south.

A review of the Black Cockatoo breeding sites buffered (DBCA-063) dataset (GoWA, 2024a) identified the nearest breeding sites are of Carnaby's Cockatoo located at the Murdoch University campus, approximately 3 km northwest of the survey area. Majority of the breeding accounts are from artificial hollows but there is one confirmed natural hollow. The last recorded breeding event is in 2019. There were no breeding sites for the Forest Red-tailed Black Cockatoo recorded within 15 km of the survey area from data. A potentially suitable breeding hollow assessed as Category 2 was recorded nearby during the survey at Roe Hwy (see section 4.3.3). The survey area is located outside the known and predicted breeding range for Baudin's Cockatoo, and while this species is known to occur regionally i.e. eastern parts of Perth Swan Coastal Plain and Scarp approximately 15 km east of the survey area, these occurrences are associated with opportunistic foraging and feeding activity and not for specific breeding purposes.

There are numerous confirmed and un-confirmed roosts of Carnaby's and Forest Red-tailed Black Cockatoo within the western portion of the Swan Coastal Plain including a 10 km radius of the survey area (GoWA, 2024b). A review of the Black Cockatoo Roosting Sites – Buffered (DBCA-064) (GoWA, 2024b) identified five roost site buffers intersecting the survey area, and numerous other roost sites recorded nearby. A summary of the five roost sites intersecting the survey area (buffer only) is provided in Table 22. Of note, is the data from COCCOCR001, that recorded 15 and 102 Forest Red-tailed Black Cockatoos in 2018 and 2019 respectively.

Table 22 Roost Site data (DBCA-064) for roost site buffers intersecting the survey area

Site Code	Coordinates	Survey years	Bird count
COCBIBR003	-32.09055600 115.84666700	White-tailed Black Cockatoo – 2010, 2011, 2013 – 2017 Forest Red-tailed Black Cockatoo – 2014-2017	0 for all years
COCJANR002	-32.08833300 115.85361100	White-tailed Black Cockatoo –2010 and 2016 Forest Red-tailed Black Cockatoo – 2016.	0 for all years
COCJANR001	-32.10361100 115.85916700	White-tailed Black Cockatoo – 2012 – 2014, 2016 Forest Red-tailed Black Cockatoo – 2014 and 2016	0 for all years
COCCOCR001	-32.11371200 115.84973600	White-tailed Black Cockatoo – 2018 and 2019 Forest Red-tailed Black Cockatoo – 2018 and 2019	White-tailed Black Cockatoo – 0 for all years Forest Red-tailed Black Cockatoo – 2018: 15 birds

Site Code	Coordinates	Survey years	Bird count
			2019: 102 birds
COCATWR001	-32.15416700 115.86277800	White-tailed Black Cockatoo – 2010 – 2013, 2015 – 2017 Forest Red-tailed Black Cockatoo – 2015 - 2017	0 for all years

4. Field survey results

4.1 Vegetation

4.1.1 Vegetation Types

The vegetation of the survey area occurs either side of the Kwinana Freeway and consisted patches of native vegetation (18.92 ha, 6.6%) intermittently divided by roadside revegetation (92.65 ha, 32.5%), and infrastructure/cleared areas (173.87 ha, 60.9%). Vegetation type mapping is provided in Figure 6, Appendix A and site data is presented in Appendix D.

Five remnant native vegetation types were mapped within the survey area. Three were Banksia woodlands, differentiated by the presence or absence of *Eucalyptus* spp. one was a *Corymbia calophylla* woodland (Cc) and the fifth represented wetlands. The dominant remnant native vegetation type for the survey area was *Eucalyptus gomphocephala* and *Banksia* spp. Woodland (EgBspp) with 7.45 ha. This vegetation type was mapped predominately between Anketell and Mortimer Roads where the Spearwood system intersects the survey area. Cc occurred in a restricted area adjacent to *Eucalyptus rudis* and *Melaleuca rhaphiophylla* woodland (ErMr) vegetation types. Cc made up 0.42 ha consisting of two isolated patches in Very Good to Good condition. There was 3.94 ha of ErMr mapped in the survey area but only 1.14 ha was in Good or better condition for quadrat establishment. Due to the restrictive extent of Cc and the restrictive extent of vegetation in good or better condition for ErMr both of these vegetation types were represented by two quadrats each. Descriptions and representative photographs for remnant vegetation types are presented in Table 23.

Roadside revegetation was split into seven vegetation types, these areas were split to assist with Black Cockatoo foraging habitat mapping. Most of the revegetation within the survey area is from circa 2002 (Main Roads coms) and before. Endemic flora species were selected when areas were being revegetated and as a result the revegetation has in some places integrated with remnant bushland adjacent to the survey area. Although not to the same condition and diversity as remnant bushland some of the revegetation has established enough to be able to be mapped as vegetation types BmBa (1.84 ha) and EgBspp (1.86 ha). Mixed shrubland was the most dominant roadside revegetation and was mapped in patches along the entire length of the survey area with 61.27 ha. Roadside revegetation types are listed in Table 24.

Infrastructure such as roads, cycle paths and rail were mapped as Cleared, which represented the majority of the survey area.

GHD native vegetation type analysis

There were clear groupings for GHD quadrats assigned to vegetation type BmBa at more than 35% similarity. The wetland quadrats Kwin06 and Kwin07 from ErMr showed little to no similarity (11.11%) to each other and were also separated out from the other vegetation types. These two quadrats were grouped together based on landscape position and dominant upper storey vegetation. Both had *Melaleuca rhaphiophylla* and *Eucalyptus rudis* as dominants, this was distinctive from other vegetation types mapped in the survey area. For the understorey species Kwin06 was dominated by weeds, whilst Kwin07 was dominated by several native sedges.

The vegetation types with *Eucalyptus gomphocephala* (EgBspp.) and *Eucalyptus marginata* (EmBspp.) were separated based on the emergent Eucalypts and land system position. Quadrats from these two vegetation types also showed similarity to quadrats from vegetation type BmBa as all are Banksia woodlands. However emergent Eucalypt species were either absent or rare in vegetation type BmBa. The last vegetation type to be mapped was *Corymbia calophylla* woodland (Cc). The two quadrats that represented this vegetation type showed strong similarity to each other (53.33%) and then grouped with the *Banksia* woodland quadrats on a larger clade (Appendix D).

4.1.2 Context area

The extrapolation of vegetation type mapping for the context area determined the following extents (and percentage of the context area):

- BmBa (32.34ha, 1.3%)
- EgBspp. (22.82 ha, 0.9%)
- EmBspp. (204.34 ha, 8,4%)
- ErMr (274.11 ha (11.2%)
- Isolated Banksia spp.(4.38 ha, 0.2%)
- Isolated Corymbia calophylla (4.41 ha, 0.2%)
- Isolated Euca spp. (170.01 ha, 7.0%)
- Mixed Shrubland (62.60 ha, 2.6%)
- Modified wetland drainage area (96.63 ha, 4.0%)
- Pinus sp. (2.04 ha, 0.1%)
- Cleared (1567.08, 64.2%).

Vegetation type mapping in the context area is provided in Figure 6, Appendix A.

Table 23 Remnant native vegetation types and Floristic Community Types

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Sample location and FCT alignment	Photograph
BmBa - *Banksia menziesii B. attenuata* woodland	*Banksia menziesii* and *Banksia attenuata* woodland over *Hibbertia hypericoides Scholtzia involucrata Styphelia conostephioides* low shrubland over *Patersonia occidentalis, Desmocladus flexuosus* and *Lyginia barbata* open herb/sedgeland	Bassendean system	Very Good to Completely Degraded	2.02	Kwin05, Roe01, Roe06, Roe07, Roe08, Roe12, Roe13, Roe14, Roe 15, Roe16 Roe02R, Roe04R, Roe17R FCT 23a - Central *Banksia attenuata-B. menziesii* woodland	
Cc – *Corymbia calophylla* woodland	*Corymbia calophylla* tall woodland over *Kunzea glabrescens* tall sparse shrubland over *Xanthorrhoea preissii* and *X. gracilis* mid shrubland over *Phlebocarya ciliata, Dasypogon bromeliifolius* and *Desmocladus flexuosus* herbland/ sedgeland	Bassendean system	Very Good to Good-Degraded	0.42	Kwin08, Kwin09 21a – Central *Banksia attenuata – Eucalyptus marginata* woodlands	

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Sample location and FCT alignment	Photograph
EgBspp. -*Eucalyptus gomphocephala* and *Banksia* spp. woodland	+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella var pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia* and **Ehrharta calycina* sedgeland/ grassland	Spearwood system and Bassendean system	Very Good to Degraded	7.45	Kwin01, Kwin02, Kwin03, Kwin10, Roe02, Roe10 Kwin02R, Kwin03R, Kwin05R, FCT 28 - Spearwood *Banksia attenuata*- or *Banksia attenuata Eucalyptus* woodland	
EmBspp. *Eucalyptus marginata* and *Banksia* spp. woodland	+/- *Eucalyptus marginata* tall open woodland over *Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* woodland over *Acacia pulchella* var *pulchella Hibbertia hypericoides, Bossiaea eriocarpa* low open shrubland over weedy grasses	Bassendean system	Good to Completely Degraded	5.09	Kwin04, Kwin09R, Kwin10R, Kwin21R 21a – Central *Banksia attenuata – Eucalyptus marginata* woodlands	

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Sample location and FCT alignment	Photograph
ErMr - *Eucalyptus rudis* over *Melaleuca rhaphiophylla +/- M. preissiana* woodland	*Eucalyptus rudis* over *Melaleuca rhaphiophylla +/- M. preissiana* over *Kunzea glabrescens* tall sparse shrubland over *Xanthorrhoea preissii* low shrubland over *Lepidosperma longitudinale* sedgeland	Bassendean system	Very Good to Completely Degraded	3.94	Kwin06, Kwin07, Roe06R Kwin19R, Kwin14R, Kwin07R, Kwin16R, Kwin18R, Kwin11R FCT 11 Wet forests and woodlands	

Table 24 Roadside revegetation types and cleared areas

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Sample locations	Photograph
Isolated *Corymbia calophylla*	Isolated stands of *Corymbia calophylla* over scattered natives and weeds	Completely Degraded	1.55	no site	
Isolated *Eucalyptus* spp.	Native and planted naturalised *Eucalyptus* spp. over scattered natives and weeds	Degraded -Completely Degraded to Completely Degraded	13.28	Kwin04R, Kwin20R, Kwin15R, , Roe01R, Roe03R, Roe09R	
Isolated *Banksia* spp.	Isolated *Banksia menziesii* and *B. attenuata* over scattered natives and weeds	Degraded to Completely Degraded	6.44	Kwin01R Kwin17R, Kwin08R, Roe05R	

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Sample locations	Photograph
Mixed shrubs	Native and Introduced shrubs	Completely Degraded	61.27	Kwin12R	
Modified wetland	Modified wetland/ drainage area	Degraded – Completely Degraded to Completely Degraded	6.40	Roe03R, KwinR06, Kwin13R	
BmBa	*Banksia menziesii* B. *attenuata* woodland	Very Good to Completely Degraded	1.84	See Table 23 for sample locations for this vegetation type	
EgBspp.	*Eucalyptus gomphocephala* and *Banksia* spp. woodland	Very Good to Degraded	1.86	See Table 23 for sample locations for this vegetation type	

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Sample locations	Photograph
Cleared	Cleared- infrastructure, roads	Cleared	173.87		

Note: The above revegetated vegetation types may include a limited number of isolated remnant native trees and/or shrubs, however the majority of the area has been historically completely cleared and revegetated and no longer represents an intact native vegetation type.

4.1.3 Floristic Community Types

The Floristic Community Types (FCTs) identified in the survey area are not listed as TECs under the EPBC Act or BC Act, nor are they listed as PECs by DBCA. However, remnant patches of FCTs/ vegetation types that meet key criteria as listed in TSSC (2016) and DotEE (2019) are considered TECs under the EPBC Act and listed as PECs by DBCA (discussed further in section 4.1.5).

Floristic analyses were undertaken to determine relationships between vegetation types and quadrats in the survey area and SCP FCTs defined by Gibson et al. (1994) (analyses methods described in section 2.2.2). Analysis was run using two scenarios on the complete datasets for both:

Gibson:

– All species (base quadrat data) (Stress: 0.15)
– Removal of single species (species only recorded once in both datasets) (Stress: 0.15).

Keighery:

– All species (base quadrat data) (Stress: 0.19)
– Removal of single species (species only recorded once in both datasets) (Stress: 0.19).

A third scenario for statistical analysis was also be performed by removing introduced species, however the results proved even more inconclusive due to the dominance of weeds and lack of native species in some GHD quadrats.

As the removal of single species did not affect the stress value of the results, the first scenario presence and absence of all species, has been used to lessen the degree of data manipulation.

The cluster analysis and the resulting dendrogram using the Gibson and GHD datasets showed GHD vegetation types mostly grouping together with a couple of outliers. The GHD vegetation types BmBa and Espp.Bspp. clustered together on clades associated with FCTs S15, 17, 19b 20a, 21a, 23a, 25 and 28. Two quadrats from ErMr grouped together then clustered with 21a and 23a. One ErEm quadrat clustered with multiple S17 quadrats, and another grouped with 6, S07 and S17. This preliminary analysis indicates that, statistically, the vegetation recorded in the GHD quadrats do not have strong affinities to any particular Gibson FCT. The dendrogram of the cluster analysis is presented in Appendix D. Nodes that showed no association with GHD vegetation types at <30% have been collapsed, to simplify viewing of the dendrogram.

The cluster analysis and the resulting dendrogram using the Keighery and GHD datasets showed an even closer grouping of GHD vegetation types with each other. The GHD vegetation types BmBa and Espp.Bspp. initially clustered together and then at 25-30% similarity grouped with FCTs 1a, 20a, 20b, 20c, 21a, 21c 23a, 23b 25, and 28. Most of these FCTs are associated with Banksia woodland communities. Two quadrats from ErMr clustered together and then formed a clade with one quadrat from 21a. The other two ErMr quadrat had a weak relationship with each other and FCTs 11 and 13. As with the Gibson data, preliminary analysis indicates that, statistically, the vegetation recorded in the GHD quadrats do not have strong affinities to any Keighery FCT. The dendrogram of the cluster analysis is presented in Appendix D. Nodes that had no association with GHD vegetation types have been collapsed to simplify viewing of the dendrogram.

DBCA (2024g) recommends using the Single Site Insertion (SSI) method as its common for localised quadrat data (eg GHD quadrats from the survey area) to group together when analysed against regional datasets such as Gibson and Keighery. Table 25 shows the results of the similarity matrix for each GHD quadrat using SSI and final determination of the FCT assigned to each GHD quadrat. It should be noted that the data analysis only performs a presence/absence comparison, it includes no consideration of dominant taxa within each vegetation type. Therefore, in addition to the statistical analysis the experience of the survey botanists, landform characteristics and key dominant species within each vegetation type was also used to assign the appropriate FCT to GHD vegetation types.

Table 25 Floristic Community Type determination

Quadrat (Vege unit)	Single Site Insertion (Gibson Dataset)				Single Site Insertion (Keighery Dataset)				Final determination
	Similarity	FCT	SCP Q	Dendrogram	Similarity	FCT	SCP Q	Dendrogram	
Kwin01 (EgBspp.)	41.37	23a	kalis02	Clustered with a quadrat from 21c. Part of a larger clade from predominately 23a	40.62	21c	hymus03	Clustered with a quadrat from 6 then formed a larger clade with FCTs 21c, 28, 20c, 20a, 20b, 23b, 23a, 21a, 1a	28- due to the quadrat's position on the Cottesloe unit of the Spearwood and system review of GHD quadrats of the same vegetation type and supported by statistical analysis with 37.89% and 39.67%, similarity to FCT 28 quadrats from Gibson and Keighery respectively. It should be noted that this vege type could also represent FCT 21a. GoWA (2000) has both FCTs inferred for Bush Forever site 270, that occurs adjacent to this quadrat and others of this vege type. When comparing the typical and common species list by Gibson et al (1994) for both FCTs EgBspp. had slightly more in common with FCT 28
	41.30	23a	Cresw01		40.00	21a	low04		
	38.46	23a	kalis01		43.47	23a	WAND-1		
Kwin02 (EgBspp,)	29.16	19b	cool14	Clustered with a large clade with quadrats from 25,17, and 19b at around 26% similarity	14.43	25	KEME-1	Clustered with a very large clade at 3.94% with most FCTs	Inconclusive, the area adjacent to the quadrat has been revegetated, therefore weed encroachment from edge effects was high. Kwin02 aligns closest with Kwin03 and Kwin04. Therefore, based on placement in the landscape, surrounding vegetation, species composition and landform this quadrat has been mapped as FCT 28
	29.26	17	leda03		15.15	24	KERO-2		
	27.27	S11	m4601		18.46	25	MEAL-1		
Kwin03 (EgBspp,)	32.55	25	bold16	Clustered with quadrats from 25 and S15. Part of a larger clade with 25, 28, 26b, 18, 24, 30b,	34.92	24	NEER-11	Clustered with a quadrat from 6 then formed a larger clade with FCTs 21c, 28, 20c, 20a, 20b, 23b, 23a, 21a, 1a	Inconclusive as the area is Degraded. Therefore, based on placement in the landscape, surrounding vegetation, species composition and landform this quadrat has been mapped as FCT 28
	32.55	S09	ELE21		31.25/ 31.25	24/28	THOM-2/ NEER-3		
	32.83	24	star01		32.25	28	WOODV-1		
Kwin04 (EmBspp.)	44.15	21a	Cavs10	Clustered with a quadrat from 25 and S15. Then formed part of a larger clade with 25, 28, 26b, 18, 24, 30b,	46.75	28	NEER-3	Clustered with quadrats from FCT 21a	21a- due to land system, dominant species and supported by statistical analysis
	42.22	23a	Cresw01		47.22	21a	NINE-1		
	41.66	28	yela01		44.70	21a	PAGA-4		

Quadrat (Vege unit)	Single Site Insertion (Gibson Dataset)				Single Site Insertion (Keighery Dataset)				Final determination
	Similarity	FCT	SCP Q	Dendrogram	Similarity	FCT	SCP Q	Dendrogram	
Kwin05 (BmBa)	50.57	21a	Cavs10	Clustered with a clade of quadrats from 20b,21a and 28 at around 41%. Then grouped with a larger clade of 23a	49.54	23a	hurst03	Clustered with a quadrat from 21b, then formed a larger clade with more quadrats from FCT 21b	23a- due to land system, dominant species and supported by statistical analysis
	48	23a	Cresw01		48.00	23a	WAND-1		
	47.78	23a	Light01		46.93	23a	YULE-2		
Kwin06 (ErMr)	23.52	S07	benn01	Clustered with a large clade at around 16% similarity, which included quadrats from FCTs S07, 6, S17 and 11	24.39	11	low10b	Clustered with a quadrat from 13, then formed a larger clade with FCTs 11, and 14	11- Statistical analysis showed a weak association with the SCP FCTs. FCT 11 was most closely aligned due to land system, position in the landscape, surrounding SCP quadrat locations and dominant species
	20	S11	m4601		27.27	13	MILT-2		
	21.42	S17	raven02		18.18	16	Possum2		
Kwin07 (ErMr)	30.76	18	ELE13	Clustered with quadrats from FCT S17.	33.33	13	MILT-2	Clustered with a quadrat from 13 then formed part of a larger clade with 10, 11, 14, 25, 12	11-S Communities do not occur near the survey area. FCT 11 was most closely aligned due to land system, position in the landscape, surrounding SCP quadrat locations and dominant species
	40	S17	pinj13		26.08	11	MODO-3		
	33.33	S17	raven02		23.52	12	RIVD-1		
Kwin08 (Cc)	29.50	23b	5D01	Part of a large clade that contains quadrats from FCT 20a, 21a, 21c, 22, 23a, 23b, 23c, 28 and S09	33.84	21a	card7	Clustered with quadrats from FCT 6 at 21.21%	21a- due to land system, Gibson et al. (1994) typical and common species and supported by statistical analysis
	28.20	23a	beel02		34.37	21c	low07		
	35.71	21a	ELE04		35.29	24	THOM-2		
Kwin09 (Cc)	37.20	21a	Cavs11	Clustered with 21c then formed part of a larger clade with quadrats from FCT 23a and 21a	35.955	1a	AUSTRA-1	Clustered with a quadrat from 21a at 36.36% then formed a larger clade with quadrats from FCT 21c at 29.3%	21a- due to land system, Gibson et al. (1994) typical and common species and supported by statistical analysis
	36.58	23a	gosn04		36.36	21a	DEPOT-1		
	39.53	21a	Hamp03		36.11	21c	MODO-2		
Kwin10 EgBspp.)	42.30	23a	Cresw01	Clustered with a large clade represented by quadrats from FCTs 28, 21a and 20b	46.29	28	HARRY-2	Clustered with several quadrats from FCT 28 at 37.17% and 34.67%	28- due to land system, common shrub layer and supported by statistical analysis
	42.73	23a	Light02		43.29	28	KING-2		
	46.72	28	wire01		46.15	28	NEER-3		

Floristic Community Type assignment

Most of the vegetation within the survey area has been impacted to some degree by edge effects or has been revegetated. Bushland remnants in most cases lie adjacent to the revegetated areas and so have been influenced by edge effects. In some cases, the SSI analysis would group GHD quadrats with SCP quadrats of a certain FCT however final determination would place the GHD quadrat in a different FCT. This is because the final determination for FCT assignment took into account landform and dominant species as well as statistical analysis. For example, Kwin01 showed similarities to SCP quadrats from FCT 23a, 21a and 21c. However, 23a and 21c are restricted to the Bassendean system, and the Gibson et al. (1994) typical and common species from Kwin01 was more similar to FCT 28 than 21a (Table 26).

The final determination of GHD quadrats Kwin02, Kwin03, Kwin08 and Kwin09 were deemed inconclusive. Kwin 02 and Kwin03 were established in areas of Tuart so that a TEC Patch Assessment (MRWA 2021a) could be completed. Kwin02 lies adjacent to roadside vegetation and Kwin03 is south of more revegetation. Both these quadrats were highly modified and in Degraded condition and showed only weak associations with SCP FCTs.

Kwin08 and Kwin09 were two very restricted areas between the Kwinana Freeway and *Melaleuca* wetlands. It's thought that these areas are ecotones from the *Melaleuca* wetlands into *Banksia* woodlands that once existed where the Kwinana freeway now dissects. These two quadrats showed strong similarities to each other and then clustered with a suite of FCTs (1a, 21a, 21c 23a, 23b and 24). FCTs 21a, 21c 23a and 23b are *Banksia* spp. communities. Even though *Banksia* spp. were not common or dominant within the upper storey stratum for Kwin08 and Kwin09 it should be noted that the names applied to FCTs in Gibson *et al.* (1994) are intended to be descriptive, not diagnostic. DBCA (2024) report occurrences of '*Banksia attenuata* woodlands over species rich dense shrublands' (FCT 20a) that do not contain *Banksia attenuata* but occur in the appropriate habitat, with statistical analyses of the quadrat data to indicate alignment. The dominant species for Kwin08 and Kwin09 was *Corymbia calophylla,* which are rare in FCTs 23b (<5%) and 23a (<6%). Occurrences of *C. calophylla* are higher in FCT 21c (23%) and again in FCT 21a (36%) Gibson *et al* (1994). The final determination for FCT assignment to these two quadrats was FCT 21a - Central *Banksia attenuata-Eucalyptus marginata* woodlands. Statistical analysis supports this alignment, and the typical and common species recorded in these quadrats was also supportive of FCT 21a (Table 26).

Table 26 ***Typical and common species occurrence in Gibson et al (1994) quadrats compared with GHD quadrats***

Quadrat	**Typical and common species occurrence in FCT quadrats (Gibson et al. 1994)**	
	Typical species >50%	**Common species 50>30%**
Kwin01	21a - 13	21a - 2
	28 - 14	28 - 5
Kwin08	21a - 9	21a - 1
	21c - 7	21c - 4
Kwin09	21a - 11	21a - 6
	21c - 8	21c - 5

Typical species of 21c and 21a that were in common with vegetation type Cc (Kwin08 and Kwin09) are shown in Table 27. The percentage occurrence of these species in Gibson et al (1994) quadrats that represented FCTs 21a and 21c are also shown.

Table 27 ***Typical and common species of FCTs 21c and 21a that were recorded in vegetation type Corymbia calophylla woodland***

Species	**21c**		**21a**	
	Typical species	**Common species**	**Typical species**	**Common species**
**Aira caryophyllea*				44%
Banksia menziesii	61%			
Bossiaea eriocarpa		30%	76%	

Species	21c		21a	
	Typical species	Common species	Typical species	Common species
**Briza maxima*	57%		75%	
Burchardia congesta	50%		78%	
Chamaescilla corymbosa var. *corymbosa*		30%	53%	
Conostylis juncea		42%	63%	
Corymbia calophylla				36%
Dampiera linearis				44%
Dasypogon bromeliifolius	61%		78%	
Desmocladus flexuosus		34%	59%	
Gompholobium tomentosum		57%	73%	
Jacksonia furcellata				30%
Lobelia tenuior				32%
Patersonia occidentalis	73%		65%	
Phlebocarya ciliata	50%		71%	
Trachymene pilosa	76%		84%	
Xanthorrhoea preissii	53%			48%
Total	8	5	11	6

Typical species of FCTs 28 and 21a that were in common with Kwin01 are shown in Table 28. The percentage occurrence of these species in Gibson et al (1994) quadrats that represented FCTs 21a and 28 are also shown.

Table 28 Typical and common species of FCTs 28 and 21a that were recorded in Kwin01

Species	28		21a	
	Typical species	Common species	Typical species	Common species
Banksia attenuata	72%		82%	
Banksia menziesii		45%		
Briza maxima	75%		75%	
Burchardia congesta	77%		78%	
Chamaescilla corymbosa var. *corymbosa*			53%	
Conostylis aculeata subsp. *aculeata*	54%		51%	
Desmocladus flexuosus	72%		59%	
Drosera erythrorhiza	62%		57%	
Gladiolus caryophyllaceus	68%			
Gompholobium tomentosum	59%		73%	
Hibbertia hypericoides	93%		84%	
Jacksonia furcellata				30%
Lomandra caespitosa		42%	59%	
Lomandra hermaphrodita		44%	53%	
Mesomelaena pseudostygia	93%			
Scaevola canescens		37%		
Sowerbaea laxiflora	62%			

Species	28		21a	
	Typical species	**Common species**	**Typical species**	**Common species**
Trachymene pilosa	80%		84%	
Ursinia anthemoides	75%		61%	
Total	13	4	13	1

4.1.4 Vegetation condition

The remnant native vegetation and revegetation of the survey was variable and ranged from Very Good to Completely Degraded. Approximately 60% of the remnant native vegetation was in Degraded or poorer condition. The majority of the revegetated areas was in Completely Degraded condition.

Vegetation condition extent and percentage of the survey area and per vegetation type are quantified in Table 29, and mapped in Figure 7, Appendix A.

Several factors were attributed to degradation in the survey area:

– Weedy grasses, particularly **Ehrharta calycina, *E. longiflora* and **Eragrostis curvula* were recorded in the remnant *Banksia/ Eucalyptus* patches recorded throughout the survey area. Where these grasses dominated there was little to no native understorey, and the condition rating was Degraded or Completely Degraded
– Areas infested with Declared Pests and Weeds of National Significance, such as **Asparagus asparagoides* (bridal creeper) and **Zantedeschia aethiopica* were also rated as Degraded or Completely Degraded
– Areas in Good or Very Good condition were generally buffered by vegetation in poorer quality and were part of a larger patch that extended outside the survey area. These areas still recorded a number of weeds however the presence of these weeds either were not dominant or invasive. Also, basic strata structure of these areas was retained.

Table 29 Vegetation condition extent and percentage per vegetation type within the survey area

Vegetation Condition	Native vegetation type (ha)						Roadside revegetation / Cleared (ha)	% within the survey area
	BmBa	**EgBspp.**	**EmBspp**	**ErMr**	**Cc**	**Total**		
Very Good	0.17	0.67	-	0.65	0.17	**1.66**	0.27	0.7%
Good	0.91	1.40	0.18	0.49	0.25	**3.23**	0.46	1.3%
Good-Degraded	-	0.46	-	0.49	-	**0.95**	**-**	0.3%
Degraded	0.27	4.92	4.62	0.61	-	**10.42**	2.67	4.6%
Degraded to Completely Degraded	-	-	-	-	-	**-**	2.61	0.9%
Completely Degraded	0.67	-	0.29	1.70	-	**2.66**	86.64	31.3%
Cleared	-	-	-	-	-		173.87	60.9%
Total	**2.02**	**7.45**	**5.09**	**3.94**	**0.42**	**18.92**	**92.65 / 173.87**	100%

4.1.5 Significant ecological communities

Vegetation types EgBspp., EmBspp. and BmBa showed affinities to significant ecological communities *Banksia* Woodlands of the SCP TEC and PEC and Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC and PEC. However, not all extents of the above vegetation types mapped within the survey area met the key criteria set out by Threatened Species Scientific Committee (TSSC, 2016) and Department of Environment and Energy (DotEE, 2019). Table 30 breaks down the extent and representative vegetation type for the two significant ecological communities mapped within the survey area. Patches of vegetation type EgBspp. are considered to represent both communities (Table 30).

Table 30 Significant ecological communities and their extent mapped within the survey area

Vegetation type	Banksia Woodlands of the SCP TEC and PEC (ha)	Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC and PEC (ha)
EgBspp.	7.77	2.56
EmBspp.	1.71	-
BmBa	3.86	-
Total	**13.34**	**2.56**

Significant vegetation patch assessment is discussed below for each community.

Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain TEC and PEC

Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC was recorded within the survey area. As the description, area and condition thresholds that apply to the EPBC Act listed TEC, also apply to the 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' State listed PEC (DBCA 2023b), any areas considered to be the TEC are also inferred as the PEC.

Four patch assessments were completed for the survey area. Three of these assessments represented by vegetation type EgBspp were found to be representative of the ecological community and mapped within the survey area with a combined total of 2.56 ha. Patches 1 and 3 lie adjacent to Conservation Park R 53313, ESA site 3287 and Bush Forever site 270. Patch 2 lies adjacent to Conservation Park R 53313, ESA site 3290 and Bush Forever site 269. Tuart canopies can be seen from aerial imagery extending eastward and westward from the survey area and are mapped as >5ha for patches 1 and 2. It is noted that sections of the survey area patches contain revegetated areas. These revegetated areas had established (>15cm DBH) Tuart trees and between 10 – 32 native understorey species diversity. As they lay adjacent to Tuart communities >5ha they are therefore considered part of the Tuart woodlands and forests of the Swan Coastal Plain TEC and PEC as they play an important ecological function.

Patch 4 did not meet the key criteria listed by DotEE (2019) and was not representative of the Tuart ecological community.

A summary of the patch assessments are included in Table 31. Patch assessment site data is provided in Appendix D. Tuart patches are mapped in Figure 8, Appendix A.

Table 31 Patch assessment of Tuart woodland and forests of the SCP TEC within the survey area

Patch ID	Quadrat	Patch size within the survey area	TEC Condition Category	Criteria compliance	Total patch size (ha)	Comments
1	Kwin03	1.48	Poor.	Yes	Estimated to be 11.08 ha	Patches that are 0.5<2ha in Poor condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (11.08 ha) represented by Conservation Park R 53313, ESA 3287 and Bush Forever site 270, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending eastward

Patch ID	Quadrat	Patch size within the survey area	TEC Condition Category	Criteria compliance	Total patch size (ha)	Comments
						from the survey area. The Conservation Park R 53313, ESA 3287 and Bush Forever site 270, adjacent to Patch 1 is the same remnant that lies adjacent to Patch 3.
2	Kwin02	0.68	Poor	Yes	Estimated to be 8.12 ha	Patches that are 0.5 ha in Poor condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (8.12 ha) represented by Conservation Park R 53313, ESA 3290 and Bush Forever site 269, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending westward from the survey area.
3	Kwin01	0.40	Moderate	Yes	Estimated to be 3.61 ha	Patches < 0.5 ha in Moderate condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (3.61 ha) represented by Conservation Park R 53313, ESA 3287 and Bush Forever site 270, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending eastward from the survey area. The Conservation Park R 53313, ESA 3287 and Bush Forever site 270, adjacent to Patch 1 is the same remnant that lies adjacent to Patch 3.
4	Field notes	0.11	Poor	No	0.22	The patch contained two Tuart trees; one tree (800 mm DBH) and one mallee (200 mm DBH). It was <0.5 ha and had <4 native understorey species per 0.1ha. This patch did not meet key criteria and is therefore not part of the nationally protected ecological community.

***Banksia* Woodlands of the SCP TEC and PEC**

The *Banksia* Woodlands of the SCP TEC and PEC are restricted to the SCP IBRA bioregion and immediately adjacent areas, including the Dandaragan Plateau, from Jurien Bay in the north, to Dunsborough in the south, and northwest on the Whicher and Darling escarpments (TSSC, 2016). The ecological community typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands (TSSC, 2016).

Three vegetation types, BmBa, EmBspp. and EgBspp. mapped within the survey area showed affinities to the *Banksia* Woodlands of the SCP TEC and PEC, as outlined in TSSC (2016). Specifically:

– The survey area occurs in the SCP IBRA bioregion
– The survey area occurs on sandplain landform, notably Spearwood and Bassendean sands
– The vegetation types have a low woodland structure and the upper sclerophyllous layer is dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. The understorey consists of a mid-ground sclerophyllous shrub layer and/or a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs that sometimes includes grasses.

However, due to minimum condition and patch size criteria outlined by TSSC (2016) not all areas mapped as BmBa, EgBspp. and EmBspp. are considered part of the TEC and PEC. Seven Banksia woodland patches were mapped within the survey area and are considered representative of the *Banksia* Woodland of the SCP TEC and PEC. The portions of these patches contained within the survey area would not normally meet the criteria for the

ecological community due to their size and or condition. However, all these patches lie adjacent to larger remnants (5< ha) that are likely to be in good or better condition due to their size and access restrictions. GHD mapped 13.34 ha of vegetation considered representative of the *Banksia* Woodland of the SCP TEC and PEC within the survey area.

Table 32 breaks down the condition and size of each patch from the *Banksia* Woodland of the SCP TEC and PEC patch assessment.

Table 32 Patch field assessment of Banksia Woodlands of the SCP TEC within the survey area

Patch number	Quadrat/ Relevé	Vegetation type	Condition within the survey area	Patch size within the survey area	Total patch size (ha)	Comments	Final determination
1	Kwin10	EgBspp.	Very Good	0.24	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to remnant bushland ~6.78ha that may be in Good or better condition.	**Yes**- It is assumed a remnant of this size would be in good or better condition, making the total patch size ~7.48 ha.
			Good to Degraded	0.46			
			Total	**0.70**			
2	Kwin02R Roe02, Roe10, Roe12[5]	EgBspp.	Good	0.43	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to remnant bushland ~11.62ha that is known to be in Good or better condition as it has been surveyed and mapped as part of the Roe Highway Widening (GHD 2025).	**Yes**- as part of the Roe highway widening scope (GHD 2025) this remnant was assessed, and the vegetation condition was Very Good. The total patch size is 12.34 ha.
			Degraded	0.30			
			Total	**0.72**			
3	Kwin05	BmBa	Very Good	0.35	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to remnant bushland ~15.08ha that may be in Good or better condition. A section rated as Completely Degraded (1.18 ha) at the time of the survey was burnt in 2024, its unknown what condition this area will regenerate to post fire.	**Yes**- It is assumed a remnant of this size would be in good or better condition. It is unknown if the burnt vegetation north will regenerate to good or better condition. However, even if this section does not recover the remnant patch would still be ~17.76 ha.
			Good	1.26			
			Degraded	1.06			
			Completely Degraded	1.18			
			Total	**3.86**			
4	Kwin01, Kwin03, Kwin05R, Kwin03R	EgBspp.	Very Good	0.52	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to Conservation Park R 53313, ESA 3287 and Bush Forever site 270. This bushland remnant is approximately ~58.41ha and is likely to be in Good or better condition.	**Yes-** It is assumed a remnant of this size that is fenced and therefore reduces access would be in good or better condition, making the total patch size ~62.59 ha.
			Good	0.61			
			Degraded	3.05			
			Total	**4.18**			
5	Kwin04, Kwin10R	EmBspp.	Good	0.18	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to remnant bushland that is	**Yes**- It is assumed a remnant of this size that is fenced and therefore reduces access would be in good or better condition, making the total patch size ~7.15 ha.
			Degraded	1.53			
			Total	**1.71**			

[5] Roe quadrats are from the Roe Highway Flora and Vegetation survey (GHD 2025). Banksia patch 2 is continuous and contains all sample sites

Patch number	Quadrat/ Relevé	Vegetation type	Condition within the survey area	Patch size within the survey area	Total patch size (ha)	Comments	Final determination
						~5.44ha, which may be in Good or better condition. The northern section of this remnant is Conservation Park R 53313.	
6		EgBspp.	Degraded	1.11	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to Conservation Park R 53313, ESA 3290 and Bush Forever site 269, which is ~49.96haha and may be in Good or better condition.	**Yes**- It is assumed a remnant of this size that is fenced and therefore reduces access would be in good or better condition, making the total patch size ~51.07 ha.
7	Kwin02	EgBspp.	Degraded	1.05	>5ha	Due to its condition the extent of vegetation within the survey area **does not** meet the criteria to be considered a TEC. However, it does lie adjacent to Conservation Park R 53313, ESA 3290 and Bush Forever site 269, which is ~49.96ha and may be in Good or better condition.	**Yes**- It is assumed a remnant of this size that is fenced and therefore reduces access would be in good or better condition, making the total patch size ~51.01 ha.

4.2 Flora

4.2.1 Flora diversity

Two hundred and twenty vascular flora taxa (including species, subspecies, varieties, forms and specimens not identified to species level) from 54 families and 153 genera, were recorded in the survey area. One-hundred and forty-eight of the flora recorded were native taxa, seven were naturalised[6] and 65 were introduced. The dominant families for the survey area included:

– Myrtaceae -18 species
– Fabaceae- 16 species
– Poaceae – 14 species.

The inventory of flora recorded within the survey area is provided in Appendix D.

A species accumulation curve was generated using PRIMER to assess adequacy of sampling effort within the survey area (Plate 2). The species accumulation curve for the survey area, based on flora recorded within quadrats and relevés is approaching an asymptote for UGE but still rising for bootstrap. The bootstrap estimate of species richness generated from this data indicates that 225 species could be expected from the survey area based on the diversity recorded within quadrats and relevés, UGE estimate is 189. The total taxa recorded within the quadrats and relevés was 189 however the total for the survey area including opportunistic species was 220 flora taxa. Therefore, the sampling effort for survey area is considered representative of the floristic diversity in the area.

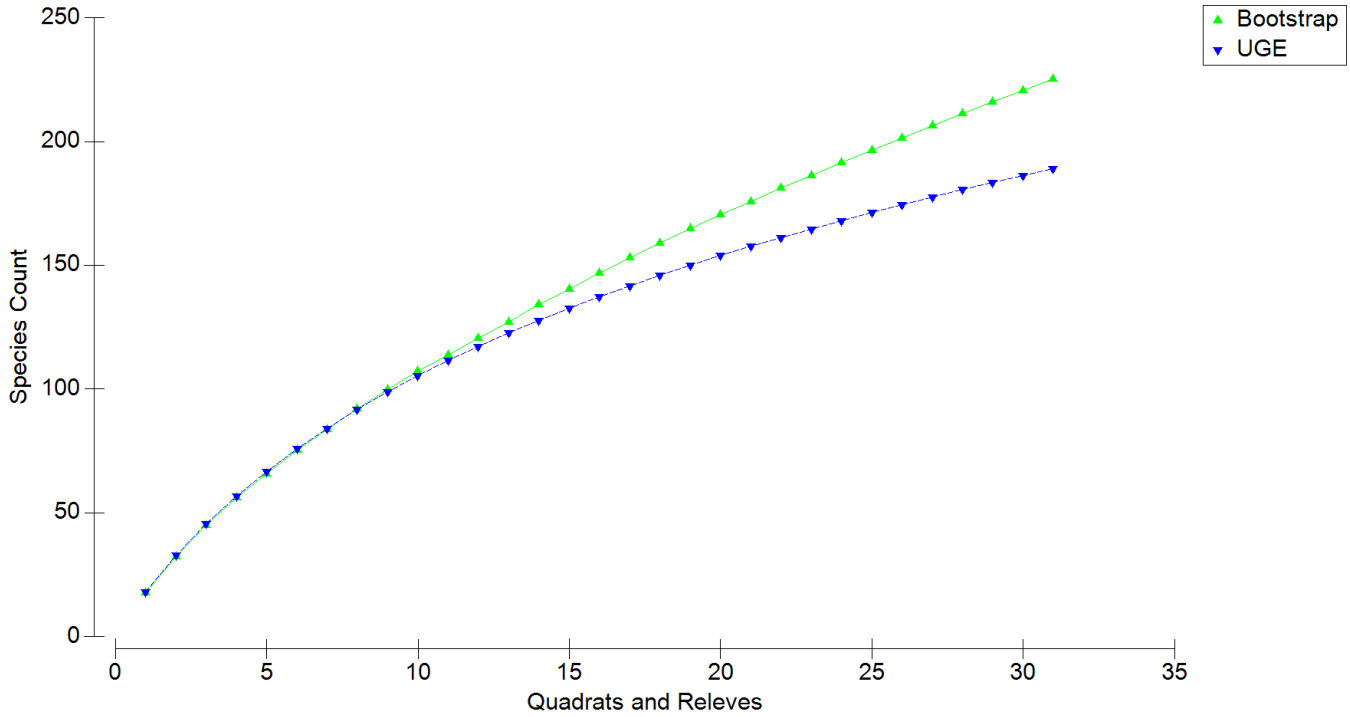

Plate 2 *Flora species accumulation curve for the Kwinana survey area*

Vegetation type EgBspp. was the most floristically diverse with 92 taxa, EmBspp. was the least diverse with 48 taxa. The most floristically diverse quadrat was Kwin04 from vegetation type BmBa with 42 taxa and the least was from the wetland quadrat Kwin06 with 11 taxa.

[6] Taxa that are native to WA however are not endemic to the survey area.

4.2.2 Significant flora

No EPBC Act listed flora were recorded within the survey area. Three significant flora species were recorded within the survey area, however two of these species are considered naturalised:

– *Jacksonia gracillima* (P3)
– *Grevillea curviloba* listed as Endangered under the BC Act (naturalised)
– *Grevillea olivacea* (P4) (naturalised).

The locations of these significant flora are shown in Figure 8, Appendix A and listed in Appendix D.

Jacksonia gracillima (P3) is a spreading shrub that produces pink to orange flowers in October and November (Plate 3). Generally found in low lying areas associated with sandy to loamy soils (Western Australian Herbarium (WAH) 1998–). The collected specimen was formerly identified at the WA Herbarium (accession number 11329). Three plants were recorded growing south of Kwin08 within an isolated pocket of Cc vegetation, which was restricted to 0.42 ha. Vegetation extending beyond the boundary of the survey area was vegetation type ErMr. This area was searched and no further records of *J. gracillima* were located.

Plate 3 Stock photo of Jacksonia gracillima (P3) (WA Herbarium 1998-)

Although *Grevillea curviloba* and *Grevillea olivacea* are significant flora they are both considered to be planted within the survey area and outside their natural range and habitat. The natural range of *Grevillea curviloba* is north of the survey area around Bullsbrook and Muchea and is found growing in winter wet heaths (Western Australian Herbarium (WAH) 1998–). Several plants were recorded at Kwin17R (5% coverage) in an area of roadside vegetation mapped as Isolated *Banksia* spp. (roadside revegetation).

The natural range of *G. olivacea* (P4) is north of the survey area in the Geraldton Sandplains and northern part of the Swan Coastal Plain (Dandaragan Plateau) IBRA regions, however it is commonly used around the Perth metropolitan area as a horticultural species (Western Australian Herbarium (WAH) 1998–). *Grevillea olivacea* was recorded in multiple locations along the roadside (within roadside revegetation).

Likelihood of occurrence

A likelihood of occurrence assessment was conducted post-field survey for significant flora taxa identified in the desktop assessment (Appendix D). The assessment took into account previous records, habitat requirements, efficacy of the survey, intensity of the survey, flowering times and the cryptic nature of species.

The likelihood of occurrence assessment post-field survey concluded one taxon was known and recorded in the survey area during the survey, *Jacksonia gracillima* (P4) and two taxa were considered possibly to occur. *Poranthera moorokatta* (P2) was considered possible as it's a very small cryptic annual species that may also have been missed. *Dodonaea hackettiana* (P4) was possibly observed on the edge of a slip lane. However, the area was too dangerous to pull over and so the plant was unable to be collected for identification.

Threatened orchid species were identified by the pre-survey likelihood of occurrence as likely or possibly occurring within the survey area including *Caladenia huegelii, Diuris drummondii, Diuris micrantha, Diuris purdiei* and *Drakaea elastica.* Post-survey all were considered unlikely to occur due to the fragmentation and degradation of potential habitats that occur within the survey area and/or sufficient survey effort during the optimal season for identification.

There is a record of *Caladenia huegelii* from 2006 within 20 m of the survey area near Beeliar Drive, therefore pre-survey this species was considered likely to occur. Searches were undertaken within suitable habitat (such as *Banksia* woodland vegetation types) within the survey area during September. The species was recorded in the nearby Roe Highway and offset survey areas during the survey (GHD, 2025), so it was known that the seasonal timing was suitable to identify the species if present within the survey area. *Caladenia huegelii* occurs in areas of mixed *Banksia – Jarrah* woodland over dense shrubs such as *Stirlingia latifolia, Hypocalymma robustum, Hibbertia hypericoides, Xanthorrhoea preissii* and *Conostylis* spp. (DEC, 2009a). As areas of suitable habitat become more degraded (weed invasion, changes to structure caused by *Phytophthora* dieback, increased fires) they may not be able to support the orchids associated mycorrhizal fungus or pollinating wasp (DEC, 2009a). Some areas of *Banksia* woodland, although disturbed were considered to provide suitable habitat, such as areas south of the Roe Highway interchange where the *Banksia* woodland was still somewhat structurally intact (Plate 5), however many of the areas which may have provided suitable habitat in the past, were considered to have become too degraded to support *Caladenia huegelii* due to loss of understorey and structural changes to canopy (Plate 4).

Plate 4 Banksia woodland of the east side of Kwinana Freeway, just south of Thomas Road. High disturbance, lack of native understorey, dominated by weedy grasses. Unlikely to provide suitable habitat for Caladenia huegelii

Plate 5 Banksia woodland on the east side of Kwinana Freeway, south of Roe Highway interchange. Vegetation is disturbed, however still considered to be suitable habitat for Caladenia huegelii

Drakaea elastica was considered likely to occur pre-survey due to presence of records in study area and potential areas of habitat between specifically south of Anketell Road to Thomas Road. Targeted survey was conducted during July, specifically to target the habitat of this species when the leaf (identifying feature) is visible. It was found that the vegetation through this area consisted of narrow bands of remnant vegetation/potential habitat lying between the northbound Principal Shared Pathway (PSP) and firebreak along the boundary of land parcels east of Spectacles Road, and on the eastern side of Kwinana Freeway, there was a narrow band of vegetation occurring between the south bound lanes and firebreak and fenceline of adjacent blocks. Due to the edge effects on these narrow remnants and interface with planted vegetation, the areas potentially supporting this species were found to be significantly disturbed (Plate 6 and Plate 7). *D. elastica* is known to be sensitive to disturbance as it requires sufficient canopy structure to prevent the desiccation of the orchid and associated mycorrhizal fungus, as well as the negative effect of weed invasion on the species which has a preference for bare sand lens habitats (DEC,

2009b). Based on the high levels of disturbance in areas of suitable habitat and survey effort, this species was considered unlikely to occur within the survey area post survey.

***Plate 6 Vegetation on the east side of Kwinana Freeway, north of Sandy Lake and 800 m south west of previous Drakaea elastica* records. Previously cleared with mixture of native and revegetation species. Understorey dominated by weedy grasses.**

Plate 7 Vegetation on the west side of Kwinana Freeway east of Spectacles Drive. Remnant vegetation with disturbed understorey dominated by weedy grasses.

There are historic records of *Diuris drummondii* within the study area, the closest records are approximately 1.5 km east of the survey area (Jandakot, 1959) and 4 km west (Banganup Swamp, 1959) (WAH, 1998-). Habitat includes low-lying depressions in peaty and sandy clay swamps, often in several centimetres of water (DEWHA, 2008). Wetland areas that occur within the survey area represent highly modified areas which are tied in with road drainage resulting in areas which would not provide suitable habitat for this species (Plate 8 and Plate 9) due to changes to hydrology and landform (such as deep standing water) and/or dominance by invasive species and *Typha* spp. and/or *Pteridium esculentum.*

Plate 8 Wetland on the east side of Kwinana Freeway, north of Mortimer Road showing deep water and modified landform.

Plate 9 Wetland on the east side of Kwinana Freeway, north of Mortimer Road, less modified but still impacted by road drainage.

Diuris micrantha has been previously recorded within a winter wet swamp, approximately 300 m west of the survey area along Johnson Road, in an area of dense herbs such as *Wurmbea dioica* and *Tribonanthes* sp. and sedges bordered by *Melaleuca rhaphiophylla* (WAH 1998-). There is a continuation of these wetlands east of Johnson Road and intersecting the survey area. There is mixed planted shrubland immediately adjacent to the northbound freeway lanes, the footprint of the northbound PSP and then west of the PSP there is remnant vegetation (Plate 10) of which a section of approximately 19 m wide intersects the survey area. This area was not considered to

provide suitable habitat for *D. micrantha* due to presence of dense *Pteridium esculentum* (approximately 90% cover) (Plate 11).

Plate 10 Looking west across PSP to remnant vegetation on west side of Kwinana Freeway, area bounded by Karakin Place in the north and Sanctuary Drive in the south

Plate 11 Dense Pteridium esculentum on west side of Kwinana Freeway, area bounded by Karakin Place in the north and Sanctuary Drive in the south.

Previous records of *Diuris purdiei* occur to the east of the survey area, with the nearest approximately 5.6 km east of the survey area. Previous records occur in a north to south corridor to the east of the survey indicating that the survey area falls outside the currently known distribution of the species. *Diuris purdiei* grows on sand to sandy clay soils in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent *Melaleuca preissiana, Corymbia calophylla, Eucalyptus marginata* and *Nuytsia floribunda* (DEWHA, 2008). Flowering is only known occurs after a summer or early autumn fire (DEWHA, 2008). No suitable habitat for this species was identified within the survey area. All remaining significant flora identified by the desktop assessment are unlikely or highly unlikely to occur. This is due to a combination of distance from the survey area, visibility of the taxa during the field survey, intensity of the field survey and most significantly the high level of disturbance and clearing throughout the survey area.

4.2.3 Introduced flora

Sixty-four introduced flora species were recorded within the survey area representing 29.4% of the total flora species recorded. Of the 64 introduced species five species are listed as Declared Pest (DP) plants in WA under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), two are also listed as Weeds of National Significance (WoNS) (Australian Weeds Commitee, 2012):

- **Asparagus asparagoides* (DP and WoNS)
- **Opuntia stricta* (DP and WoNS)
- **Gomphocarpus fruticosus* (DP)
- **Moraea flaccida* (DP)
- **Solanum linnaeanum* (DP)
- **Zantedeschia aethiopica* (DP)

The locations of significant weeds within the survey area are presented in Figure 7, Appendix A.

4.3 Fauna

4.3.1 Fauna habitat types

Eight broad fauna habitat types including Cleared areas have been delineated and described (Table 33) and mapped in Figure 9A, Appendix A. Each fauna habitat type aligns with at least one vegetation community types (VCT) described during the flora and vegetation survey and listed in section 4.2.1.

Table 33 Habitat types identified in the survey area

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Banksia woodland</td><td>This habitat type corresponds with vegetation types BmBa, and Isolated Banksia spp. It is present as several small areas and includes isolated scattered patches. Floristically characterised by Banksia attenuata, B.menziesii and scattered areas of B.ilicifolia woodland over Hibbertia species, Scholtzia involucrata Styphelia conostephioides over, Patersonia occidentalis Desmocladus flexuosus Lyginia barbata. Patches of understory include Xanthorrhoea preissii and Hibbertia subvaginata over Dasypogon bromeliifolius, Phlebocarya ciliata, Schoenus caespititius shrub layer. Substrate is pale grey deep sand. Habitat condition varies widely from degraded to very good. But retention of upper stratum Banksia maintains high foraging value for Black Cockatoos.

Where this habitat is in good or better condition, it supports a wide range of woodland birds and reptiles that continue to persist in sandplain Banksia woodland remnant patches including New Holland and White-cheeked Honeyeater and Grey Shrike-thrush, Splendid Fairy-wren and Rufous Whistler. Reptile examples include Burton’s Legless Lizard and Sandplain Worm Lizard.

Significant fauna species: Moderate to high quality foraging habitat for Carnaby’s Cockatoo (Zanda latirostris), Quenda (Isoodon fusciventer), Perth Slider (Lerista lineata), Black-striped Snake (Neelaps calolotus), Swan Coastal Plain Shield-back Spider (Idiosoma sigilatum), Short-tongued Bee (Leioproctus contrarius), and Bush Stylet Cricket (Throscodectes xiphos).
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>6 mod-high</td><td>2 low</td></tr>
</table>
</td><td>10.30 ha
(3.6%)</td><td> </td></tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Eucalyptus woodland over Banksia</td><td>This habitat type corresponds with vegetation types EgBspp and EmBspp. It is characterised as emergent sparse to open Tuart or Jarrah and occasional patches of Allocasuarina over Banksia attenuata and B.menziesii woodland over Acacia, Xanthorrhoea and Hibbertia low shrubland over weedy sedgeland/ grassland. Substrate is deep pale grey sandy soil. Habitat condition varies widely from degraded to very good. But retention of upper emergent eucalypts and mid-story Banksia maintains high foraging value for Black Cockatoo. It comprises a relatively small and scattered proportion of the survey area. Where this habitat is in good or better condition, it supports a wide range of woodland birds and reptiles that continue to persist in remnant patches including Crested Pigeon, Striated Pardalote, and Weebil. Reptile examples include Bobtail, Western Bearded Dragon, and Marbled Gecko.
Significant fauna species: Moderate to high quality foraging habitat for Carnaby’s Cockatoo (Zanda latirostris), moderate value for Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) and represents breeding habitat for both species. Habitat for Quenda (Isoodon fusciventer), Perth Slider (Lerista lineata), Black-striped Snake (Neelaps calolotus), Swan Coastal Plain Shield-back Spider (Idiosoma sigilatum), Short-tongued Bee (Leioproctus contrarius), and Bush Stylet Cricket (Throscodectes xiphos).
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>6 mod-high</td><td>4 mod</td></tr>
</table></td><td>14.40 ha
(5.0%)</td><td> </td></tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr>
<td>Melaleuca dampland and sparse flooded gum</td>
<td>This habitat type corresponds with vegetation type ErMr and is comprised of occasional to sparse Flooded Gum over Melaleuca rhaphiophylla and / or M. preissiana over Kunzea glabrescens, Xanthorrhoea preissii and Lepidosperma longitudinale. Soil is sandy grey Bassendean formation but tends to be poor draining and relatively low elevation. Habitat condition varies from degraded to very good however the lower stratum vegetation tends to retain high density although tends to be weedy. Total extent area is low and limited to few patches. Due to the degraded condition and small area of this habitat, fauna species present are limited to those with a degree of resilience and habitat generality such as Brown Honeyeater, Silvereye, and frogs such as Glauert’s Froglet, and Gunther’s False Toadlet

Significant fauna species: Preferred foraging and shelter / refuge habitat for Quenda (Isoodon fusciventer). Low quality habitat for remaining significant fauna.
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>1 Negligible to low</td><td>1 Negligible to low</td></tr>
</table>
</td>
<td>3.94 ha
(1.4%)</td>
<td> </td>
</tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Marri woodland</td><td>This habitat type corresponds with the Isolated Corymbia calophylla and C. calophylla woodland vegetation types and comprises relatively small remnant patches and isolated stands of tall Corymbia calophylla over scattered natives such as occasional Grass trees and weeds. The lower strata understory and shrub layers are highly degraded to absent. The retained canopy provides habitat for a range of locally occurring woodland birds including Black Cockatoos. Due to the degraded condition and small area of this habitat, fauna species present are limited to those with a degree of resilience and habitat generality that persist in fragmented Marri woodland patches such as Pied Butcherbird, Australian Magpie, Red-wattlebird, and Singing Honeyeater.
Significant fauna species: High quality foraging habitat and breeding habitat Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso), and moderate to high for Carnaby’s Cockatoo (Zanda latirostris).
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>5 mod-high</td><td>7 high</td></tr>
</table></td><td>1.97 ha
(0.7%)</td><td> </td></tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr>
<td>Naturalised and native trees</td>
<td>This habitat type corresponds with the Isolated Eucalyptus spp vegetation type and comprises a range of Eucalyptus species. over scattered natives and weeds and is considered highly degraded. Trees include River Red-Gum, Spotted Gum, Lemon-scented Gum, occasional Tuart, Marri and Jarrah. Usually associated with disturbed areas along road verges and cycle path embankments. The lower strata are absent, replaced by weed grasses and annual herb species.

The habitat provides foraging and nesting habitat for a wide range of common native nectivore insectivore bird species such as honeyeaters and Weebill.

Significant fauna species: The canopy provides seasonal nectar for all three species of Threatened Black Cockatoo and potentially suitable night roosts. There is relatively low density of Marri and Jarrah as foraging.
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>1 Negligible to low</td><td>1 Negligible to low</td></tr>
</table>
</td>
<td>13.29 ha
(4.7%)</td>
<td> </td>
</tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Native and introduced shrubs</td><td>This habitat type corresponds with Mixed shrubland vegetation type and comprises a range of naturalised, introduced and native planted shrubs, with weed grasses and herbaceous weeds, and usually associated with disturbed areas along road verges and cycle path embankments, often planted or regenerated vegetation in disturbed areas post-road construction. It is comprised of Acacia and myrtaceous shrubs and relatively low density to patchy proteaceous shrubs including banksia, hakea and grevillea. Vegetation condition is highly degraded. Due to the degraded condition of this habitat, fauna species present are limited to those with resilience and habitat generality that persist in highly disturbed and modified vegetation structure such as Singing Honeyeater, Rainbow Bee-eater, and Willie Wagtail.
Significant fauna species: Suitable to marginal foraging habitat for Quenda (Isoodon fusciventer), and low quality foraging habitat for all three species of Threatened Black Cockatoo.
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>1 Negligible to low</td><td>1 Negligible to low</td></tr>
</table></td><td>61.27 ha
(21.5%)</td><td> </td></tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Modified wetland drainage area</td><td>This habitat corresponds with Modified wetland drainage area vegetation type. It includes small artificial lakes and sumps and associated fringing trees, shrubs, and Typha rushes. Vegetation of these areas is generally highly degraded. The water bodies are seasonal and fluctuate providing temporary habitat for water birds. Patches of dense low vegetation provide some refuge habitat, and fringing scattered trees provide habitat for woodland birds. Marri and Jarrah are absent to very low density. Due to the degraded condition of this habitat, fauna species present are limited to those with resilience and habitat generality that persist in highly disturbed or artificial wetlands. Species such waterbirds such as Ducks and Egrets.

Significant fauna species: Water body provides seasonal feeding habitat for Blue-billed Duck (Oxyura australis). Fringing vegetation is suitable shelter and forage habitat for Quenda (Isoodon fusciventer). Fringing trees provide some seasonal nectar for all three species of Threatened Black Cockatoo and potentially suitable night roosts.
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>1 Negligible to low</td><td>1 Negligible to low</td></tr>
</table>
</td><td>6.40 ha
(2.2%)</td><td> </td></tr>
</table>

<table>
<tr><th>Habitat Type</th><th>Description</th><th>Extent (ha) and proportion (%) of survey area</th><th>Representative photograph</th></tr>
<tr><td>Cleared area</td><td>These areas include areas of road and other infrastructure with no vegetation and also completely degraded cleared land along road verges often with dense ground cover of colonising broad-leaf annual weed and naturalised grasses, and occasional planted or native tree or shrub. The density of native species is negligible. Cleared areas cover most of the survey area and there is minimal habitat value for native species.
Bird species that utilise disturbed areas are limited and include feral doves and pigeons, Australia Magpie, and Magpie Lark.
Significant fauna species: No notable habitat value for any significant species.
<table>
<tr><th></th><th>Carnaby’s Cockatoo</th><th>FRTB Cockatoo</th></tr>
<tr><td>Foraging score</td><td>0 nil</td><td>0 nil</td></tr>
</table>
</td><td>173.87 ha
(60.91%)</td><td> </td></tr>
</table>

4.3.2 Significant fauna

During the field survey three significant species were recorded, including:

– Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) – Vulnerable under EPBC and BC Acts
– Carnaby's Cockatoo (*Zanda latirostris*) – Endangered under EPBC and BC Acts
– Quenda (*Isoodon fusciventer*) – listed Priority 4 under DBCA.

A likelihood of occurrence assessment of significant fauna presented in the desktop assessment was revised following the field survey. This assessment was refined with consideration to the ecological field observations. Most of the 54 species are assessed post-survey as unlikely to occur based on unsuitable or marginal habitat or species' distribution. Apart from the above-mentioned three recorded species, eight additional species are considered likely to occur within the survey area as shown in Table 34.

Table 34 Significant fauna present or likely to occur within the survey area

Common name	Status		Likelihood of occurrence
	BC Act/ DBCA	EPBC Act	
Birds			
Carnaby's Cockatoo (*Zanda latirostris*)	EN	EN	**Present.** Recorded during the survey from bird sightings and extensive foraging evidence (chewed banksia pods) multiple locations.
Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)	VU	VU	**Present.** Recorded during the survey from bird sightings and extensive foraging evidence (chewed marri pods) in multiple locations.
Blue-billed Duck (*Oxyura australis*)	P4	-	**Likely.** Suitable wetland habitat and occurs locally even though not recorded during the survey.
Peregrine Falcon (*Falco peregrinus*)	OS	-	**Likely.** Trees within the survey area represent marginal nesting habitat. Likely to hunt on at least an occasional to regular basis.
Mammals			
Quenda (*Isoodon fusciventer*)	P4	-	**Present**. Recorded during the survey from foraging signs (diggings) at one location.
Reptiles			
Perth Slider (*Lerista lineata*)	P3	-	**Likely.** Several database records in close proximity to survey area (within 1-3 km) and suitable remnant bushland habitat present.\
Black Striped Snake (*Neelaps calonotos*)	P3	-	**Likely.** Locally recorded and suitable habitat occurs within the survey area such as The Spectacles bushland reserve.
Invertebrates			
Swan Coastal Plain Shield-backed Spider (*Idiosoma sigillatum*)	P3	-	**Likely.** The survey area intersects with suitable banksia woodland habitat in Anketell in the vicinity of the Spectacles Wetland area. Even though it was not detected during the field survey, it is likely to occur in remnant patches of Banksia woodland of good or better condition.
Short-tongued bee species (*Leioproctus contrarius*)	P3	-	**Likely.** Based on field assessment host plants *Scaevola repens* is present, and *Leschenaultia spp* also present within the survey area.
Graceful Sun Moth (*Synemon gratiosa*)	P4	-	**Likely.** Host plants species namely Lomandra hermaphrodita recorded within the survey area, therefore species is likely to occur.
Stylet Bush Cricket (*Throscodectes xiphos*)	P1	-	**Likely.** Potentially suitable Banksia woodland habitat within the survey area.

Further information on each recorded and likely to occur significant species is described below.

Carnaby's Cockatoo (*Zanda latirostris*)

The Carnaby's Cockatoo is listed as Endangered under the EPBC Act and BC Act. This species is endemic to the south-west of WA from near Cape Arid on the south coast through the eastern Wheat Belt and north to about Kalbarri (Saunders 1979). Carnaby's Cockatoo nest in hollows of live or dead eucalyptus, primarily smooth-barked salmon gum (*Eucalyptus salmonophloia*) and Wandoo (*E. wandoo*) (Saunders 1979, 1982) though breeding has been reported in other Wheatbelt tree species and some tree species on the Swan Coastal Plain and Jarrah forest (Saunders 1979, 1982, Storr 1991, Johnstone & Storr 1998). Success in breeding is dependent on sufficient high quality foraging habitat located in proximity of nesting and is nominally a radius of up to 12km of nesting sites (Saunders 1979, 1982, Saunders and Ingram 1987). High quality foraging habitat include Kwongan heathlands and Banksia woodlands having abundant Banksia species and other proteaceous plants.

This species was recorded during the field survey at several locations including birds sighted and extensive foraging evidence in *Banksia* woodland and *Eucalyptus* woodland over *Banksia* habitats. Suitable breeding trees (Figure 10) and potential roosting habitat includes Naturalised and Native trees, and Modified wetland drainage areas.

The full assessment for Black Cockatoo habitat is provided in section 4.3.3.

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

The Forest Red-tailed Black Cockatoo is listed as Vulnerable under the EPBC Act and BC Act. It inhabits the dense jarrah, karri, and marri forests receiving more than 600 mm annual average rainfall but also occurs in a range of other forest and woodland types, including Blackbutt (*E.patens*), Wandoo (*E.wandoo*), Tuart (*E.gomphocephala*), Albany Blackbutt (*E.staeri*), Yate (*E.cornuta*), and Flooded Gum (E. rudis) (DEE 2017). Habitats tend to have an understorey or snottygobble (*Persoonia* spp.), holly-leaved mirbelia (*Mirbelia dilatata*), bullich (*Taxandria spp.*) and sheoak (*Allocasuraina fraseriana*). They are most common in the jarrah forest region of the northern Darling Range from Collie north to Mundaring and are very local throughout the lower south-west. They can be found on the Swan Coastal Plain, mainly in search of food the exotic white cedar (*Melia azedarach*). There are also several small, isolated populations in the eastern parts of its range (DAWE 2022).

Birds were observed and heard calling at several locations and foraging evidence (chewed Marri pods) was recorded at several locations across the survey area. Suitable breeding trees (Figure 10) and potential roosting habitat includes Naturalised and Native trees, and Modified wetland drainage areas.

A Tuart tree was assessed as Category 2 within the Roe Hwy survey area approximately 350 metres northeast of the survey area within Road offset area D. A pair of Forest Red-tailed Black Cockatoos were observed perching on a trunk spout hollow, and subsequent assessment using pole camera identified extensive fresh chew marks, and this hollow was assessed as a potentially suitable hollow (breeding not confirmed).

The full assessment for Black Cockatoo habitat is provided in section 4.3.3.

Quenda (*Isoodon fusciventer*)

The Quenda is listed by DBCA as a Priority 4 species. Its preferred habitat is low dense scrubby, often swampy, vegetation with dense cover up to one metre high. It also occurs in woodlands, and also known to utilise weedy low condition habitat adjacent higher quality bushland. The species often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland close to dense cover (Van Dyck & Strahan 2008). Persists in semi-rural areas such as Swan Valley and occurs in some Perth urban areas. Signs of diggings were recorded during the field survey in one location, confirming species' presence within the survey area. Populations of Quenda are likely to be persisting in small, fragmented bushland areas within and around the survey area, especially where there is suitable vegetation outside and adjacent to the survey area.

Blue-billed Duck (*Oxyura australis*)

The Blue-billed Duck Is listed by DBCA as Priority 4. It is endemic to Australia's temperate regions, ranging from the South-West of WA, extending to southern Queensland, through New South Wales and Victoria, to Tasmania. The species is readily seen on freshwater lakes and billabongs where deep fresh water is present (Morcombe 2004). Not recorded during the field survey, however based on the site field assessment, the survey area has suitable habitat, namely modified wetland drainage areas that have either permanent or seasonal ponds of at least moderate depth that provide foraging habitat. Not recorded, but occurs locally including Thomsons, Yangebup and Bibra lakes, and is likely to visit this habitat on at least an occasional or seasonal basis.

Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is listed under the BC Act as 'Other specially protected fauna'. It is uncommon but wide ranging across Australia. Found everywhere from woodlands to open grasslands and coastal cliffs, though less frequently in desert regions. It feeds almost exclusively on other birds. It also eats rabbits and other moderate sized mammals, bats and reptiles. The Peregrine Falcon is very territorial during breeding season (DEE 2019b, Morcombe 2004). Not recorded during the field survey, however trees within the survey area potentially suitable to marginal nesting habitat, and it is likely to hunt within survey area on occasional to regular basis.

Perth Slider (*Lerista lineata*)

This small cryptic lizard is listed by DBCA as Priority 3. It is endemic to the Swan Coastal Plain preferring sandy, coastal heath and shrubland, particularly between Perth and Mandurah (Wilson & Swan, 2013). It also occurs in remnant bushland areas and recorded in disturbed areas such as residential land. Not recorded within the survey area but occurs locally based on database records within 3 km of the survey area and suitable remnant bushland habitat such as *Banksia* woodland.

Black-striped Snake (*Neelaps calolotus*)

This small cryptic reptile is listed by DBCA as Priority 3. Not recorded but occurs locally and suitable habitat such as *Banksia* woodland occurs within the survey area such as The Spectacles bushland reserve where area native vegetation is of adequate size to support this species.

Swan Coastal Plain Shield-back Trapdoor Spider (*Idiosoma sigilatum*)

This spider is listed by DBCA as Priority 3. It was recently described as part of a revision of Shield-back Trapdoor spider group (Rix et.at 2018). It has a relatively widespread distribution along the Swan Coastal Plain of south-western Western Australia, from Dalyellup north to at least Ledge Point (including Rottnest Island and Garden Island. The eastern limit of its range along the sandy foothills of the Darling Escarpment, from Boyanup north to at least Gingin. Preferred habitat appears to be *Banksia* woodland and heathland on sandy soils. The vertical burrows are enhanced with a typical 'moustache-like' arrangement of twig-lines (Figs 16, 17). There are several historical records from the Swan Coastal Plain attributed to the WA Museum but the expansion of Perth has significantly reduced and fragmented its former habitat area. Even thought it was not detected during the field survey, it is likely to occur in remnant patches of *Banksia* woodland such as in the vicinity of the Spectacles Wetland area in Anketell.

Short-tongued Bee (*Leioproctus contrarius*)

This bee is listed by DBCA as Priority 3. The ecology is not well documented. It is known to be associated with *Scaevola repens* and *Lechenaultia* spp. (Houston 2000). Not recorded during the survey however this species is likely to occur based on host plants *Scaevola repens* and *Leschenaultia* species present within the survey area in *Banksia* woodland habitat.

Graceful Sun Moth (*Synemon gratiosa*)

This moth is listed by DBCA as Priority 4 and is endemic to the Swan Coastal Plain. Its range extends from Bunbury to Kalbarri. Host plants include *Lomandra species* found in *Banksia* woodlands of Bassendean Dunes, and *Lomandra matitima* which is common on coastal Quindalup Dunes. The moth completes its metamorphosis and emerges as adult moth in early Autumn (early March) and is active for several weeks to mate and complete life cycle before mortality. Eggs are laid on host plants, and the larvae (grubs) remain in the plant for several years before reaching maturity. Several local records from Perth-Peel region in areas of remnant Banksia woodland. Host plants species namely *Lomandra hermaphrodita* was recorded within the survey area, therefore the species is likely to occur.

Bush Stylet Cricket (*Throscodectes xiphos*)

The ecology of this species is poorly known but is thought to be endemic to the Swan Coastal Plain. Known from very few specimens: the holotype was collected from *Banksia* woodland located at Cutler Road, Jandakot on the Bassendean complex where it was collected from a grass tree. It is a Confirmed SRE species and is currently classified by DBCA as a Priority 1 species (Rentz.1993). Potentially suitable *Banksia* woodland habitat occurs within the survey area.

4.3.3 Black Cockatoo Assessment

Field results are mapped in Figure 9A-C and Figure 10, Appendix A, with the detailed field assessment data presented in Appendix E.

Foraging habitat

Baudin's Cockatoo was not recorded during the survey. Although foraging plant species occur within two fauna habitats, namely Marri woodland, and Eucalypt woodland over *Banksia*, however foraging value is considered low to moderate at best due the local context of this species' distribution.

Carnaby's Cockatoo was recorded via sightings of birds present, and foraging evidence (chewed *Banksia* pods) found at several locations. Three habitat types: *Banksia* woodland, Eucalypt woodland over *Banksia*, and Marri woodland are considered as moderate to high value foraging habitat for this species. There is a total of 26.67 ha of moderate to high foraging value habitat present in the survey area.

Forest Red-tailed Black Cockatoo was recorded via several observations, calls heard, and foraging residue (chewed Marri pods) from numerous point locations across the survey area. All foraging evidence associated with this species was found in areas of Marri woodland, or in isolated Marri indicating that birds were foraging on single trees across the broader landscape. Marri woodland was assessed as high value foraging habitat for this species. For Forest Red-tailed Black Cockatoo there is 1.97 ha of high value, 14.40 ha of moderate value and 10.30 ha of low value foraging habitat present in the survey area.

Foraging values for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo by survey area habitat type are summarised in Table 35, with the detailed assessment based on the Bamford (2020) method presented in Appendix E.

Table 35 Summary of Black Cockatoo habitat assessment

Fauna habitat	Area (ha)	Carnaby's Cockatoo	FRTB Cockatoo	No. DBH Trees for all three BC Species	DBH Tree Species	Potential Roosting Trees
Banksia woodland	10.30	6 (mod-high)	2 (low)	0	-	0
Eucalypt woodland over Banksia	14.40	6 (mod-high)	4 (mod)	8	*Eucalyptus gomphocephala* (5) *Corymbia calophylla* (3)	6
Melaleuca Dampland	3.94	1 (neg-low)	1 (neg-low)	2	*Corymbia calophylla* (2)	0
Marri woodland	1.97	5 (mod-high)	7 (high)	15	*Corymbia calophylla* (14) *Eucalyptus gomphocephala* (1)	15
Naturalised and native trees	13.29	1 (neg-low)	1 (neg-low)	6	*Eucalyptus camaldulensis* (4) *Corymbia calophylla* (1) *Eucalyptus camaldulensis* (1)	6
Native and introduced shrubs	61.27	1 (neg-low)	1 (neg-low)	1	*Corymbia calophylla* (1)	1
Modified wetland drainage area	6.40	1(neg-low)	1 (neg-low)	12	*Eucalyptus rudis* (10) *Corymbia calophylla* (1) *Eucalyptus gomphocephala* (1)	12
Cleared land	173.87	0 (nil)	0 (nil)	0	-	0

It is to be noted that all scores 1 or below are not considered to be habitats that provide foraging habitat, with Bamford describing a score of 1 as a “Negligible to Low”, with “Low” being 2 and above, and scores of 0 representing “Nil” foraging habitat value,

Breeding habitat

The survey area is located within the modelled breeding distribution of the Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo which is supported by regular and frequent confirmed local records of both these cockatoos. The location of the survey area is beyond the Baudin's Cockatoo modelled breeding distribution (DAWE, 2022), with this species occurring more frequently towards the eastern edge of the Swan Coastal Plain.

A total of 44 suitable DBH trees nesting trees were recorded and mapped (Figure 10) across the survey area. These are trees with DBH greater than the specific threshold of 500mm. The majority of trees were Marri (50%), Flooded Gum (23%) and Tuart (14%). All suitable nesting trees were assessed according to MRWA (2023) breeding tree assessment method (Appendix E). All suitable DBH trees were categorised as Tree Category 7. These trees meet the 500mm DBH criteria but lack hollows based on ground-based assessment.

Of relevance is the recording of a Tuart tree assessed as Category 2 - suitable DBH tree with a potentially suitable hollow with signs of use (not confirmed) within the MRWA Roe Hwy survey area (GHD, 2025) approximately 350 m northeast of the survey area within Road offset area D. A pair of Forest Red-tailed Black Cockatoos were observed perching on a trunk spout hollow, and subsequent assessment using pole camera identified extensive fresh chew marks, and this hollow was assessed as a suitable hollow and likely breeding tree. This represents the nearest potentially suitable hollow to the survey area.

Roosting habitat

No confirmed Black Cockatoo roosts were recorded within the survey area during the field survey. Potential roost habitat was identified as 40 individual tree groupings of suitable height, species type and location. These trees are presented in Figure 9C, Appendix A. As these potential roosting trees are adjacent to major road infrastructure, the roost suitability is expected to be reduced.

4.4 Wetlands

Preliminary evaluation

The preliminary evaluation criteria (outlined in DBCA 2017 section 5.4 and Table 3) provide the first step in determining the management category for a wetland. This initial assessment is used to determine whether a wetland or a portion of a wetland should be considered high conservation value. If a 'Yes' can be answered to any of the seven preliminary evaluation criteria then the wetland is considered to support the highest level of attributes, values and functions and automatically assigned to a Conservation category. Nine wetlands have been evaluated, based on both desktop information and the site assessment: UFI 6664, 12981, 14663[3], 15397, 15399[4], 15584, 15968, 15970 and 15973 (Figure 11, Appendix A).

All nine wetlands assessed were assigned to a Conservation category, on the basis that equal to or greater than 90% of each wetland supported vegetation in a Good or better condition, and therefore Criterion 6 was met. None of the remaining criteria were met for any of the wetlands assessed. Full results of the evaluation are provided in Appendix F.

Secondary evaluation

A secondary evaluation provides additional information on the wetlands attributes, functions and values. In a secondary evaluation, the information collected through the desktop and site assessment is used to assess against the 42 criteria outlined in Table 4 of the DBCA wetland evaluation guidelines (2017) wetland evaluation guidelines.

Further secondary evaluation has not been undertaken for the Geomorphic Wetlands intersected by the survey area as the onsite assessment information has been used to inform the preliminary evaluation, as the Geomorphic wetlands UFI 6664, 12981, 14663, 15397, 15399, 15584, 15968, 15970 and 15973 satisfactorily fit into the Conservation category.

Therefore, it is considered that a further secondary evaluation of the Geomorphic Wetlands within the survey area is not warranted.

Resulting categories

Based on the current evaluation, all wetlands fall into the Conservation category due to the condition of their associated vegetation.

For UFI 6664, this would mean an upgrade from a Resource Enhancement wetland. However, due to access restrictions, a full inspection was not possible, resulting in insufficient data to request a category modification. The portion of the wetland intersecting the survey area was fully inspected, however the majority of the wetland was fenced off. Despite the access restriction, it was confidently determined that the wetland was in Excellent condition within the fence, and that criterion 6 of the evaluation guidelines, which states that 'equal to or greater than 90% of the wetland supports vegetation in Good or better condition', was met.

While the wetland as a whole meets the criteria to be upgraded to Conservation category, only the perimeter intersects the survey area. This part of the wetland was subject to considerable disturbance and is of lower value than the centre of the wetland.

5. Discussion

The survey area consisted of a linear corridor separated into three sections with a combined length of 285.44 ha, approximately 27 km extending north to south and intersecting four land systems. The survey area runs along the boundaries of three DBCA managed lands, six ESA's and one Bush Forever site.

5.1 Vegetation

The vegetation of the survey area occurs either side of the Kwinana Freeway and consists of remnant patches of native vegetation intermittently divided by roadside revegetation and infrastructure. Five native vegetation types were mapped within the survey area including a *Banksia* woodland, *Eucalyptus gomphocephala* and *Banksia* woodland, *E. marginata* and *Banksia* woodland, *Corymbia calophylla* woodland and *E. rudis* and *Melaleuca rhaphiophylla* in wetland areas. Some areas of revegetation integrated with adjacent remnant bushland, these sections were mapped using the relevant native vegetation type description. The remaining revegetation was typically more Degraded and modified, so was grouped together as roadside revegetation. Roadside revegetation was mapped as seven different types to assist with Black Cockatoo foraging habitat mapping. This included modified wetland and drainage areas, mixed shrubland of native and introduced shrubs, isolated planted *Banksia* spp., isolated stands of planted *Corymbia calophylla* and naturalised *Eucalyptus* spp, in addition to *Banksia menziesii* B. *attenuata* woodland and *Eucalyptus gomphocephala* and *Banksia* spp. woodland. Infrastructure such as roads and houses were mapped as Cleared.

Cleared areas made up the largest portion of the survey area, covering 173.87 ha (60.9%). Roadside revegetation accounted for 92.65 ha (32.5%) and native vegetation was mapped for 18.92 ha (6.6%). Native vegetation typically occurred as a fragmented narrow band within the survey area. Across much of the survey area there was planted vegetation along the immediate roadside and then a narrow band of remnant vegetation. The native vegetation was either restricted to the road reserve due to adjacent clearing, or if the vegetation extended beyond the survey area it was broken up by the PSP or other linear disturbance such as firebreaks and fencelines.

Floristic Community Type analysis was carried out on 10 Kwinana quadrats and 17 Roe Highway quadrats (GHD, 2025). Roe Highway quadrats were used to supplement the Kwinana data as it was difficult to locate vegetation in good or better condition to enable a three-sample site representation for each vegetation type. From the analysis four FCTs were determined, wetland community 11 and *Banksia/ Eucalyptus* communities 21a, 23a and 28. By using the Roe quadrats in conjunction with the Kwinana Highway quadrats it is anticipated a more robust statistical analysis would be achieved. However, in several instances the statistical results were inconclusive and so the final FCT determination was based on not only the statistical result but also landform, dominant species, botanist field notes and local experience.

None of the FCTs identified in the survey area are listed as TECs under the EPBC Act or BC Act, nor are they listed as PECs by DBCA. However, remnant patches of FCTs/ vegetation types that met the key criteria for *Banksia* Woodlands of the SCP TEC and PEC (TSSC, 2016) and Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC and PEC (DotEE, 2019) are considered TECs under the EPBC Act and listed as PECs by DBCA.

The survey area occurred in the relevant IBRA region and intersected the land systems associated with these two significant ecological communities. Patch and condition thresholds were applied to patches of remnant vegetation considered representative of one or both of these communities. The results of the patch assessment concluded 13.34 ha of the *Banksia* woodlands of the SCP TEC and PEC and 2.56 ha of the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC and PEC occur within the survey area. It should be noted the portions of the Banksia woodlands TEC and PEC mapped within the survey area would not normally meet the key criteria for the ecological community due to their size and or condition. However, all these patches lie adjacent to larger remnants (>5ha) that are likely to be in good or better condition due to their size and access restrictions.

Remnant vegetation in good or better condition which does not meet the criteria to be considered a TEC or PEC may still be considered significant in the context of the SCP subregion due to extensive clearing that has occurred. Three vegetation associations were mapped across the survey area, 6, 968 and 1001. The extents of each association within the survey area were 3.8 ha, 16.3 ha and 265.6 ha respectively. All associations have been

subject to a high proportion of historic clearing. Two of the three vegetation associations within the survey area have > 21% of their extents remaining within the State, IBRA region, subregion, LGA extents. Vegetation association 968 has 6.62% of its extent remaining within the SCP bioregion and Perth subregion and only 3.69% remaining within the City of Rockingham LGA according to data last updated in 2019 (DPIRD 2019). Remnant vegetation within Bush Forever Site 270 (Sandy Lake and Adjacent Bushland) is considered to be regionally significant and the vegetation adjacent to reserves east of Spectacles Swamp and Bush Forever Site 270 (this encompasses most of the survey area south of Anketell Road to Thomas Road) have significance as a buffer to the reserves and Bush Forever site.

Vegetation type Cc (*Corymbia calophylla* woodland) is considered to be locally significant due to a restricted extent across the survey area and wider context area, also as supporting Priority flora species (*Jacksonia gracillima* (P3)). This vegetation type occurred in a low-lying area, adjacent to *Eucalyptus rudis* and *Melaleuca rhaphiophylla* woodland and was mapped across 0.42 ha of the survey area. It was not mapped within the context area.

Some vegetation types mapped within the survey area are significant due to representing moderate to high-value foraging habitat for Threatened fauna species. Vegetation types Cc, Isolated *Corymbia calophylla*, BmBa, EgBspp and EmBspp are moderate to high-value foraging habitat for Carnaby's Cockatoo) and vegetation types Cc, and Isolated *Corymbia calophylla* represent moderate to high-value foraging habitat for Forest Red-tailed Black Cockatoo.

5.2 Flora

Two hundred and twenty vascular flora species were recorded in the survey area. A species accumulation curve was generated based on flora recorded within quadrats and relevés. The results concluded the sampling effort was considered representative of the floristic diversity in the area. The most diverse quadrat, Kwin04 from vegetation type BmBa (FCT 23a) had 42 species recorded. Gibson et al. (1994) reports that species richness for FCT 23a is usually very high with an average of 62.8. Considering the proximity to the freeway and other anthropogenic disturbances this species count is reasonable.

No EPBC Act listed flora were recorded within the survey area. Three significant flora species were recorded within the survey area, however in the context of this project only one is considered to be significant as the other two species have been planted:

– *Jacksonia gracillima* (P3)
– *Grevillea curviloba* listed as Endangered under the BC Act (planted)
– *Grevillea olivacea* (P4) (planted).

Although *Grevillea curviloba* and *Grevillea olivacea* are significant flora they are both considered to be planted within the survey area and outside their natural range and habitat. Therefore, they are not bound by the regulatory requirements for significant species as listed by the EPBC Act and/ or BC Act or by the DBCA as they are not an approved translocation site. No other species of local or regional significance were recorded within the survey area.

The likelihood of occurrence assessment conducted post-field concluded one taxon was known and recorded in the survey area (*Jacksonia gracillima*) during the survey and two taxa were considered possibly to occur. The possible significant flora consisted of *Poranthera moorokatta* (P2) and *Dodonaea hackettiana* (P4) species. The possibility of their occurrence in the survey area was due to *P. moorokatta* being a very small cryptic annual that may have been missed and *Dodonaea hackettiana* (P4) was possibly observed on the edge of a slip lane. However, the area was too dangerous to pull over and so the plant was unable to be collected for identification.

Sixty-four introduced flora species were recorded within the survey area representing 29.4% of the total flora species recorded. Of the 64 introduced species five species are listed as Declared Pest (DP) plants in Western Australia under the BAM Act, two are also listed as Weeds of National Significance (WoNS) (Australian Weeds Commitee, 2012). **Asparagus asparagoides* (DP and WoNS) and **Zantedeschia aethiopica* (DP) were recorded throughout the survey area and in some areas were blanketing the vegetation. The other four significant weeds were recorded in spot locations but were not dominant in the landscape.

5.3 Fauna Habitat and Species Assessment

Eight broad fauna habitat types were identified across the survey, including cleared areas that accounts for approximately 60% of the total area. Habitats are generally highly degraded in most areas due to survey area location in an extensively urbanised landscape. Habitat remnants are highly fragmented and subject the long-term degradation due to the effects of weed invasion, landscape modification, and vegetation loss. Habitat present does provide suitable foraging and shelter for several locally occurring significant fauna.

The regional scale setting of the survey area is within the SCP, which is known for its high fauna biodiversity. This is reflected in the desktop assessment database list showing a diverse assemblage totalling 54 species including migratory shorebirds, and a range of mammals, reptiles and invertebrates occurring within the region. Even though this list is comprehensive, the characteristics, quality and extent within the survey area limit the types of species likely to occur and potentially use the habitat. For example, there are approximately 20 Migratory shore birds occurring locally due to proximity of the survey area to Ramsar, coastal and estuarine wetlands, therefore locally occurrence is well documented and frequent, however habitat within the survey area is marginal to unsuitable.

Carnaby's Cockatoo was recorded during the field survey at several locations from sightings and extensive foraging evidence in Banksia woodland habitats. Forest Red-tailed Black Cockatoo was also observed and heard calling at several locations and foraging evidence recorded at several locations across the survey area. Potential breeding trees (suitable DBH, all without hollows) and potential roosting habitat includes Naturalised and native trees, and Modified wetland drainage areas.

Baudin's Cockatoo was not recorded during the survey but is known to occasionally forage and roost in the region. However the survey area is located on the western edge of current known foraging distribution and lies outside the known breeding range of this species, which has a bearing on the habitat suitability and value for this cockatoo.

The Black Cockatoo foraging assessment indicates the northern and central sections of the survey area contain the highest density and proportion of higher scoring foraging habitat based on the Bamford scoring system, particularly in reference to Banksia Woodland, Eucalyptus over Banksia Woodland and Marri Woodland habitats. It is important to note the survey area extends approximately 27 km north to south, as a relatively thin corridor when considering potential impacts to Black Cockatoos. As a highly mobile species the clearing of the native vegetation and roadside revegetation may not be as significant as a larger contiguous area of habitat. Furthermore, while 44 suitable DBH trees were recorded across the survey area, It is noteworthy that many of these are replanted trees and while ultimately carry the potential as future breeding trees, this is unlikely to be the case for at least another 50 to 100 years in some cases.

The Quenda was recorded from signs of diggings during the field survey at one location. Numerous local records (DBCA, 2024f) indicate populations persisting in small, fragmented bushland areas within and around the survey area. Dense remnant and modified vegetation provides habitat for this species.

Several species of vertebrate and invertebrate occurring locally were not recorded during the survey but are likely to occur based on habitat and proximity of records. They include Blue-billed Duck (*Oxyura australis*), Peregrine Falcon (*Falco peregrinus)*, Perth Slider (*Lerista lineata*), Black Striped Snake (*Neelaps calonotos*) Swan Coastal Plain Shield-backed Spider (*Idiosoma sigillatum*) Short-tongued bee species (*Leioproctus contrarius*) Graceful Sun Moth (*Synemon gratiosa*) and Stylet Bush Cricket (*Throscodectes xiphos*).

5.4 Wetlands

Approximately 25% of the survey area has been mapped as geomorphic wetlands by DBCA (2024c), totalling 73.2 ha across 34 wetlands. These wetlands occur primarily within the Jandakot Consanguineous suite, however a small sliver of the survey area between Anketell Road and Thomas Road intersects the Bibra suite, and the Safety Bay Road and Mundijong Road sections fall within the Keysbrook suite. A wetland evaluation was carried out on eight Conservation category and one Resource Enhancement wetland, in accordance with DBCA methodology (2017a). The remaining 27 wetlands were not evaluated, as they comprised predominantly cleared land or highly disturbed road verges, were categorised as a Dryland by DBCA and assigned a management category of 'not applicable', or did not represent functioning wetlands where they intersected the survey area, due to fragmentation, degradation or clearing.

A preliminary evaluation using the of the eight Conservation category and one Resource Enhancement wetland was conducted in accordance with DBCA methodology. Upon completion it was determined that a secondary evaluation was not required as all nine wetlands fell into the Conservation category.

UFI 6664, which is currently assigned a Resource Enhancement management category, met the criteria to be upgraded to Conservation category, however a full inspection was not possible due to access restrictions, resulting in insufficient data to request a category modification with DBCA. It should be noted that the survey only intersects the western perimeter of the wetland, which is subject to considerable disturbance, and the proportion of the wetland that is of the highest value lies outside the survey area.

Remnant wetland vegetation within the survey area ranged from Very Good (0.65 ha) to Completely Degraded (1.70 ha) and made up 3.94 ha (1.4%) of the survey area. Wetland vegetation was assigned to FCT 11 and described as *Eucalyptus rudis* over *Melaleuca rhaphiophylla* +/- *M. preissiana* over *Kunzea glabrescens* tall sparse shrubland over *Xanthorrhoea preissii* low shrubland over *Lepidosperma longitudinale* sedgeland. Areas of Very Good and Good condition had floristic diversity of the mid and understorey, poorer condition wetlands were either dominated by *Pteridium esculentum* (bracken), which although native can be invasive in disturbed wetter areas (Hussey et al. 1997), or smothered by significant weeds.

6. Conclusion

The conclusions drawn from the results of the field survey and report are detailed below

Vegetation and flora

- The vegetation of the survey area consisted of patches of native vegetation (18.92 ha, 6.6%) intermittently divided by roadside revegetation (92.65 ha, 32.5%) and infrastructure/cleared areas (173.87 ha, 60.9%). Five vegetation types were mapped for remnant native vegetation and seven vegetation types were mapped for roadside revegetation to assist with Black Cockatoo foraging habitat mapping
- The FCTs identified in the survey area are not listed as TECs under the EPBC Act or BC Act, nor are they listed as PECs by DBCA. The FCTs identified within the survey area included 11, 21a, 23a and 28
- The remnant native vegetation and revegetation of the survey was variable and ranged from Very Good to Completely Degraded. Approximately 60% of the remnant native vegetation was in Degraded or poorer condition. The majority of the revegetated areas were in Completely Degraded condition
- Two significant ecological communities were mapped within the survey area Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain TEC and PEC and Banksia Woodlands of the SCP TEC and PEC. Three Tuart patches represented by vegetation type EgBspp. were mapped within the survey area with a combined total of 2.56 ha. Seven patches of Banksia Woodlands of the SCP TEC and PEC were mapped with a combined total extent of 13.34 ha in the survey area
- Two hundred and twenty vascular flora taxa were recorded during the field survey. A species accumulation curve to assess sampling effort showed adequate sampling and diversity for the survey area
- No EPBC Act listed flora were recorded within the survey area. Three significant flora species were recorded within the survey area, however two of these species are considered naturalised
- The likelihood of occurrence assessment post-field survey concluded one taxon was known and recorded in the survey area during the survey and two taxa were considered possibly to occur
- Sixty-four introduced flora species were recorded within the survey area, five of these species are listed as DP plants in Western Australia under the BAM Act, two are also listed as WoNS
- Nine wetlands that intersected the survey area were evaluated, based on both desktop information and the site assessment. All were assessed and assigned to a Conservation category, on the basis that equal to or greater than 90% of each wetland supported vegetation in a Good or better condition.

Fauna and Habitat

- Fauna habitats are generally highly degraded and fragmented in most areas due to survey area location in an extensively urbanised landscape
- Some areas of good quality habitat present provide suitable foraging and shelter for several locally occurring significant fauna, particularly in the vicinity of The Spectacles bushland that intersects with the survey area
- There is 26.67 ha of moderate to high value Carnaby's Cockatoo foraging habitat, which includes Banksia woodland, Eucalyptus over Banksia Woodland and Marri Woodland
- There is 1.97 ha of high, 14.40 ha of moderate and 10.30 ha of low value Forest Red-tailed Black Cockatoo foraging habitat, which includes remnant Marri trees and Eucalyptus over Banskia Woodland
- A total of 44 suitable Black Cockatoo DBH trees were recorded across the survey area. The majority of trees were Marri (50%), Flooded Gum (23%) and Tuart (14%). None of the trees contained suitable hollows for Black Cockatoos
- A total of 40 individual Black Cockatoo potential roosting sites were identified across the survey area based on DAWE (2022) tree height, species type and proximity to nearby water sources and significant feeding habitat in surrounding areas
- Quenda habitat includes dense remnant and modified vegetation.

7. Glossary and Abbreviations

Term	Definition
Threatened Ecological Community (TEC)	An ecological community that is listed as critically endangered, endangered, or vulnerable under Part 2, Division 2 of the *Biodiversity Conservation Act 2016*
Priority Ecological Community (PEC)	Ecological communities with insufficient information to be considered a TEC, or which are rare but not currently threatened.
Environmentally Sensitive Area (ESA)	ESAs are declared by the Minister under section 51B of the Environmental Protection Act 1986. Impacts on ESAs are considered by the EPA during the EIA process. A clearing permit is required for clearing within an ESA unless Schedule 6 exemptions apply.
Conservation Codes (DBCA 2023)	
Threatened	Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection. Threatened taxa are further ranked according to their level of threat into Critically Endangered, Endangered, or Vulnerable based on IUCN (2013) definitions.
Threatened fauna	Species of fauna that are listed as Critically Endangered, Endangered or Vulnerable Threatened species.
Threatened flora	Species of flora that are listed as Critically Endangered, Endangered or Vulnerable Threatened species.
Critically Endangered (CR)	Taxon is facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxon is facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxon is facing a high risk of extinction in the wild.
Priority 1 (P1)	Taxon is known from one or a few collections or sight records, all on lands not managed for conservation.
Priority 2 (P2)	Taxon is known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation.
Priority 3 (P3)	Taxon is known from collections or sight records from several locations not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.
Priority 4 (P4)	Taxon is Rare, Near Threatened, or otherwise in need of monitoring. • Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. • Near Threatened: Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. • Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Migratory	Fauna that periodically or occasionally visit Australia and are subject to an international agreement relating to the protection of migratory species.
Other Specially Protected (OS)	Species in need of special protection to ensure their conservation.

Abbreviation	Definition
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BoM	Bureau of Meteorology
DBCA	Department of Biodiversity, Conservation and Attractions

Abbreviation	Definition
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DotEE	Department of the Environment and Energy
DP	Declared Pest plants in Western Australia under the *Biosecurity and Agriculture Management Act 2007*
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environmental Protection, Biodiversity and Conservations Act 1999*
ESA	Environmentally Sensitive Area
FCT	Floristic Community Type
GHD	GHD Pty Ltd
ha	hectare
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometer
LGA	Local government authority
MNES	Matters of National Environmental Significance
NVIS	National Vegetation Information System
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
PSP	Principal Shared Pathway
RiWI Act	*Rights in Water and Irrigation Act 1914*
SCP	Swan Coastal Plain
SSI	Single Site Insertion
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
WA	Western Australia
WoNS	Weeds of National Significance

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Appendices

Appendix A

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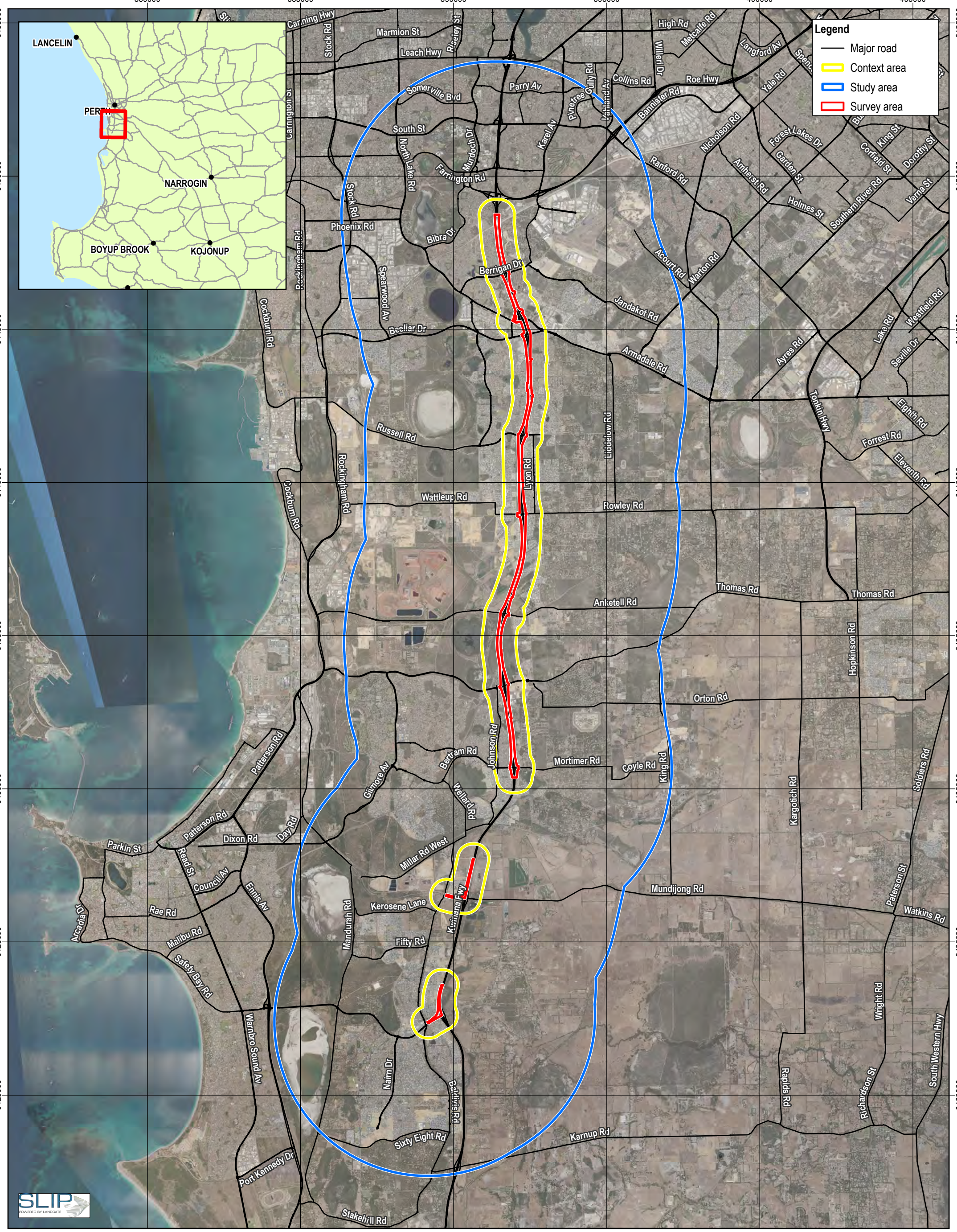
Figure 2	Survey effort
Figure 3	Land use constraints
Figure 4	Hydrology constraints
Figure 5	Biological constraints
Figure 6	Vegetation types and sample sites
Figure 7	Vegetation condition and significant weeds
Figure 8	Significant vegetation and flora
Figure 9A	Fauna habitats and Significant fauna
Figure 9B	Black cockatoo foraging habitat
Figure 9C	Black cockatoo potential night roost habitat
Figure 10	Black Cockatoo breeding habitat
Figure 11	Wetland assessment



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **0**
Date **29/05/2025**

Project Location

FIGURE 1

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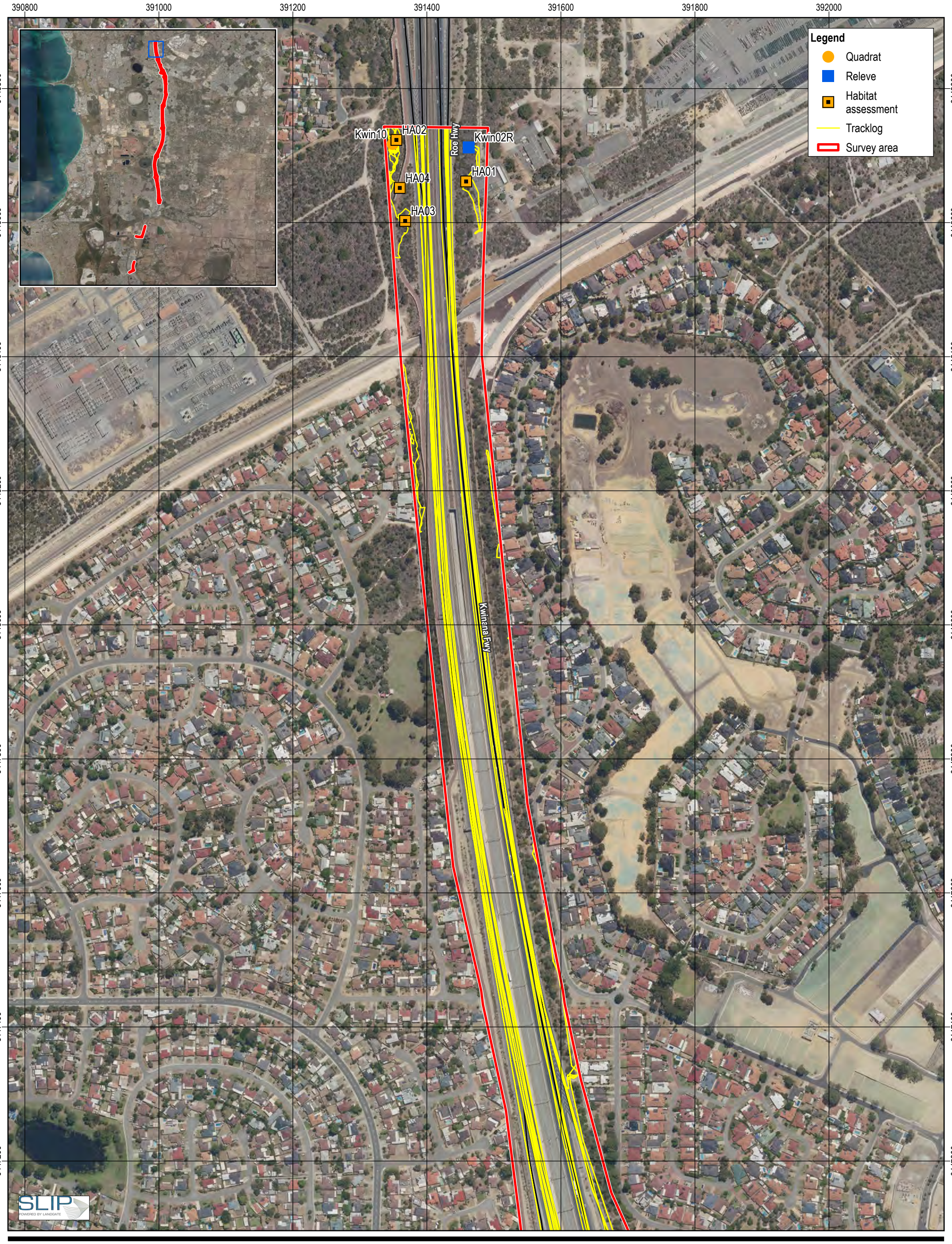

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
Revision No. **0**
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FIGURE 2

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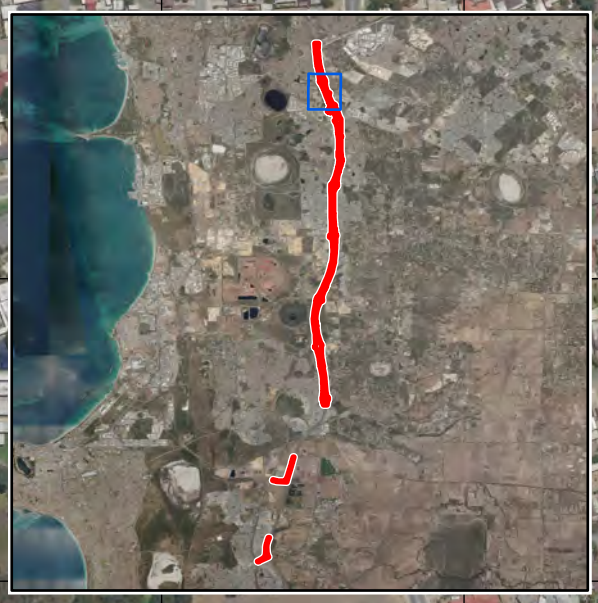

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

Berrigan Dr

Kwinana Fwy

North Lake Rd

HA05

Kwin06R

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

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HA05
Kwin06R
HA06

Armadale Rd
Midgegooroo Av
Beeliar Dr
Kwinana Fwy
Beeliar Dr

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
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Legend

- Releve
- Habitat assessment
- Tracklog
- Survey area

Kwinana Fwy

HA13

HA07

Kwin04R

HA08

HA14

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Map Projection: Transverse Mercator
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

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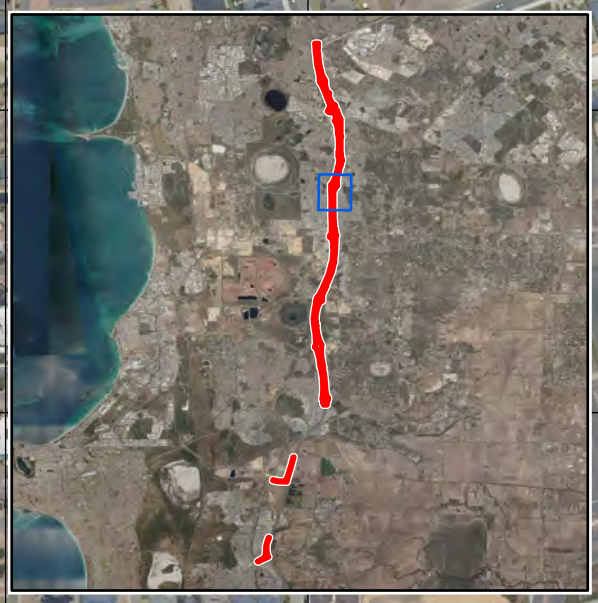

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

Russell Rd

Gibbs Rd

HA47

HA46

HA64

HA65

Kwinana Fwy

HA66

HA48

Kwin12R

Lyon Rd

HA70

HA15

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Map Projection: Transverse Mercator
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

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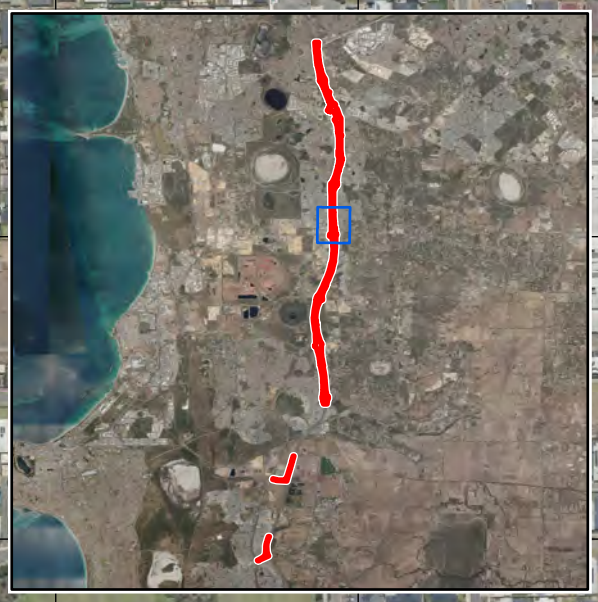

Legend

- Quadrat
- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

HA15
HA70
HA67
HA49
HA69
HA55
Kwin17R
HA68
HA51
HA50
HA53
HA45
HA63
HA44
HA43
HA52
HA42
HA41
HA40
HA62
Kwin05
HA54
HA39
HA38
HA61
HA60
HA59

Kwinana Fwy
Lyon Rd
Rowley Rd

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

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Legend

- Releve
- Habitat assessment
- Tracklog
- Survey area

HA58
HA37
HA57
Kwin19R
Kwin14R
Kwinana Fwy

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Paper Size ISO A3

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
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Date **29/05/2025**

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Legend

- Quadrat
- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

Kwin06

Kwinana Fwy

Anketell Rd

HA09

HA16

Kwin01

HA17

HA18

Kwin01R

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

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Legend

- Quadrat
- Releve
- Habitat assessment
- Tracklog
- Survey area

Kwin08R
Kwin03
Kwin02
Kwin03R
Kwinana Fwy
Kwin05R
HA33
HA36
Kwin04
Kwin07R
Kwin10R
HA34
HA35
Thomas Rd

SLIP POWERED BY LANDGATE

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
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6433400 6433200 6433000 6432800 6432600 6432400 6432200 6432000 6431800

Legend

- Quadrat
- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

HA34
HA35
Thomas Rd
HA19
Kwin09R
Kwin21R
HA28
Kwinana Fwy
HA20
HA56
HA32
HA10
HA21
Kwin07
Kwin09
HA31
HA11
HA22
Johnson Rd
Kwin08
HA30
Kwin18R
HA29
Kwin16R

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
Revision No. **0**
Date **29/05/2025**

FIGURE 2

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_02_SurveyEffort_Rev0
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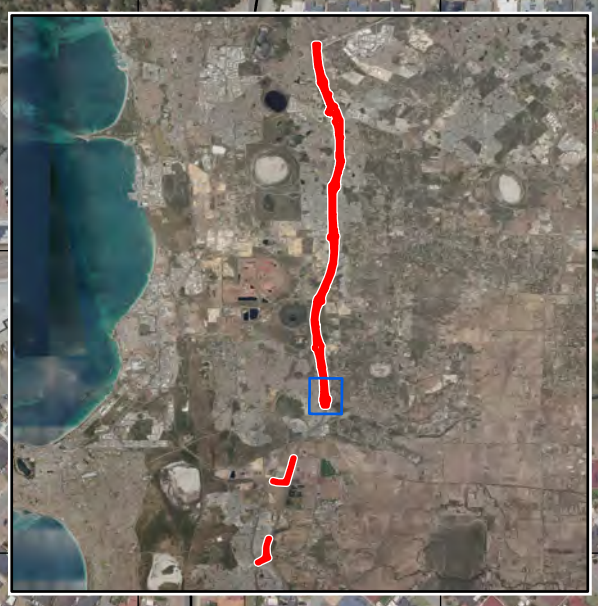

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

Kwin16R
HA12
HA26
HA23
HA27
HA25
HA24
Kwin11R
Johnson Rd
Bertram Rd
Mortimer Rd
Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
Revision No. **0**
Date **29/05/2025**

FIGURE 2

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_02_SurveyEffort_Rev0
Print date: 29 May 2025 - 10:05

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Landgate_Subscription_Imagery\WANow: . Created by: klabez

389600 389800 390000 390200 390400 390600 390800

6427800 6427600 6427400 6427200 6427000 6426800 6426600 6426400 6426200

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

HA78
HA77
HA79
Kwin15R
Kwin20R
Baldivis Rd
Kwinana Fwy
Kulija Rd
Mundijong Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
Revision No. **0**
Date **29/05/2025**

FIGURE 2

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_02_SurveyEffort_Rev0
Print date: 29 May 2025 - 10:05

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388800 389000 389200 389400 389600 389800 390000

6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200

Legend

- Releve
- Habitat assessment
- Major road
- Tracklog
- Survey area

HA76
HA75
HA74
Kwin13R
HA73
HA72
HA71

Baldivis Rd
Kwinana Fwy
Safety Bay Rd
Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Survey Effort

Project No. **12634226**
Revision No. **0**
Date **29/05/2025**

FIGURE 2

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_02_SurveyEffort_Rev0
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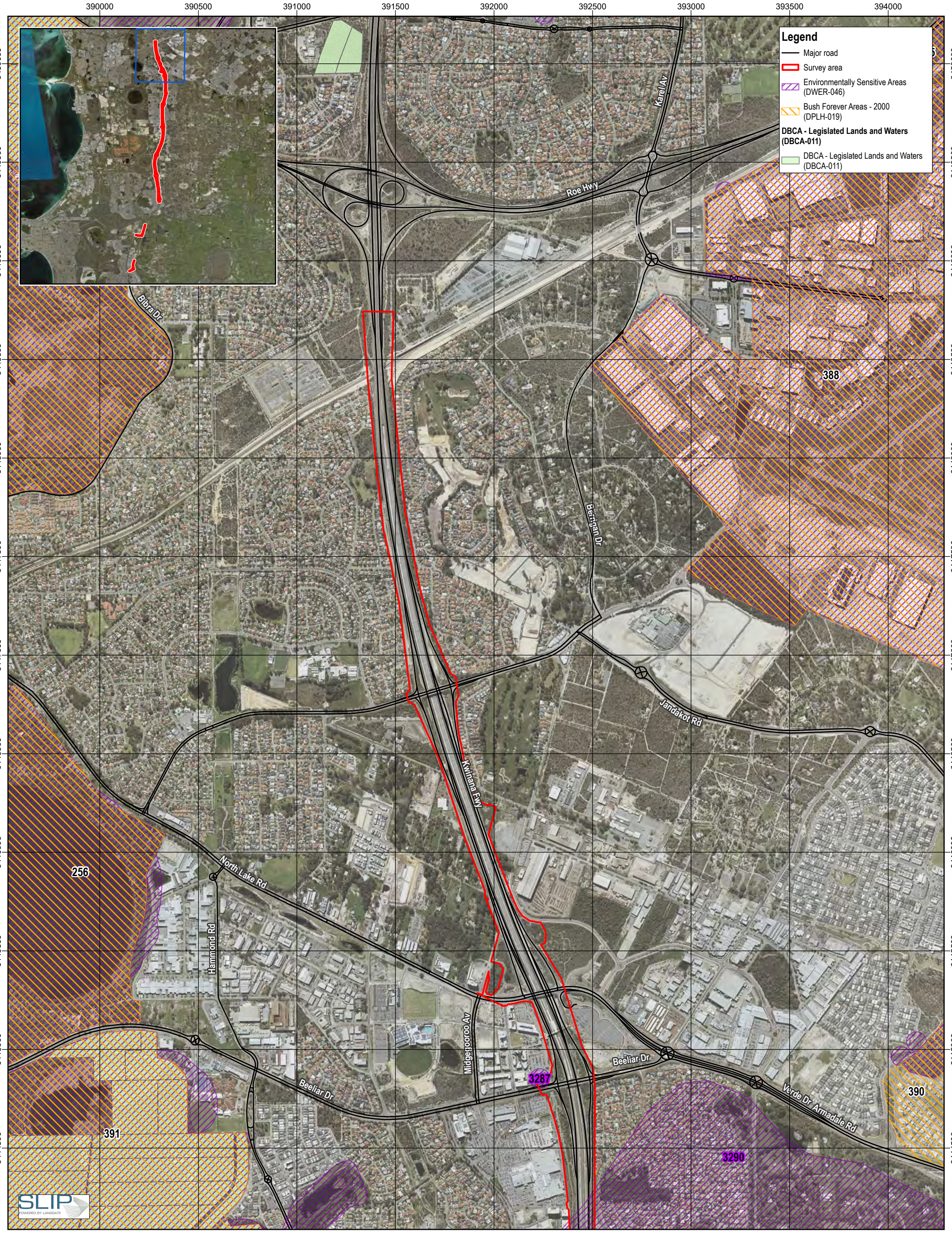

Paper Size ISO A3

0 100 200 300 400 500

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

Land Use Constraints

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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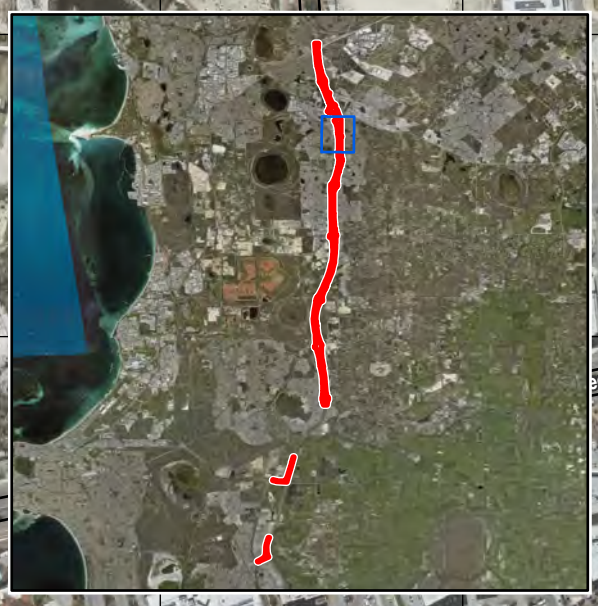

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)

3287

3290

eeliar Dr

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
Print date: 10 Mar 2025 - 16:46

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Landgate_Subscription_Imagery\WANow: . Created by: cbataller

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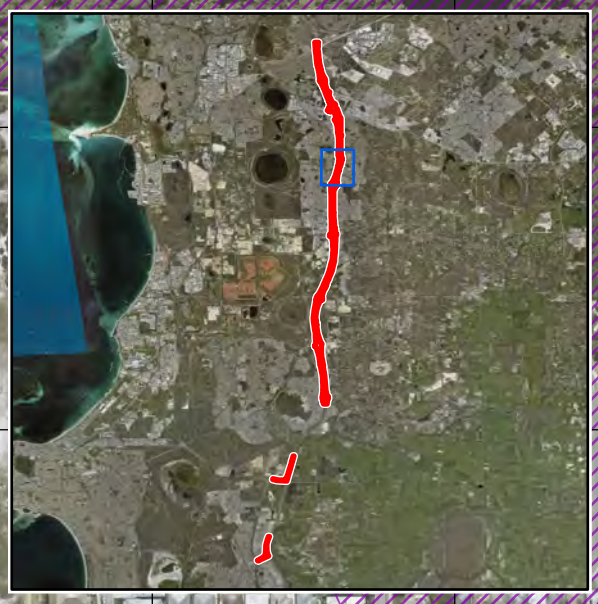
6443200 6443000 6442800 6442600 6442400 6442200 6442000 6441800 6441600



Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

3290

Kwinana Fwy

492

Russell Rd

Gibbs Rd

Lyon Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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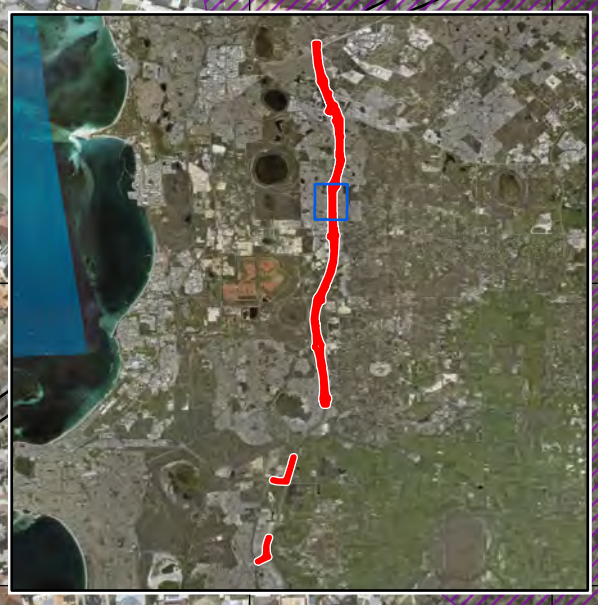

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

3290

492

Kwinana Fwy

Lyon Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

Land Use Constraints

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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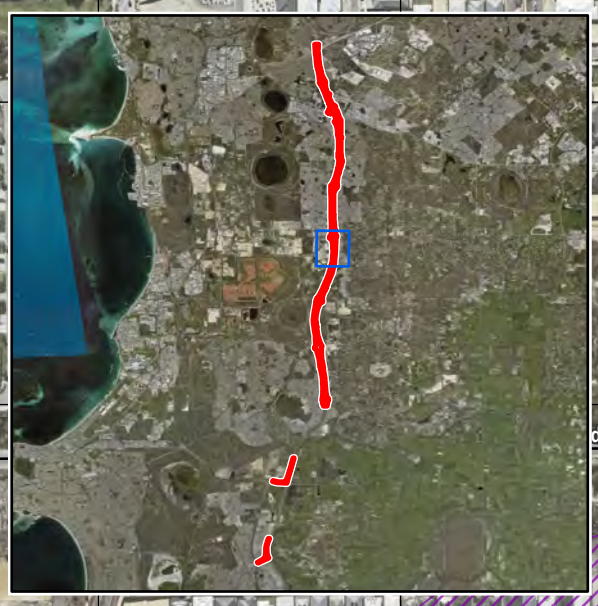

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)

3290

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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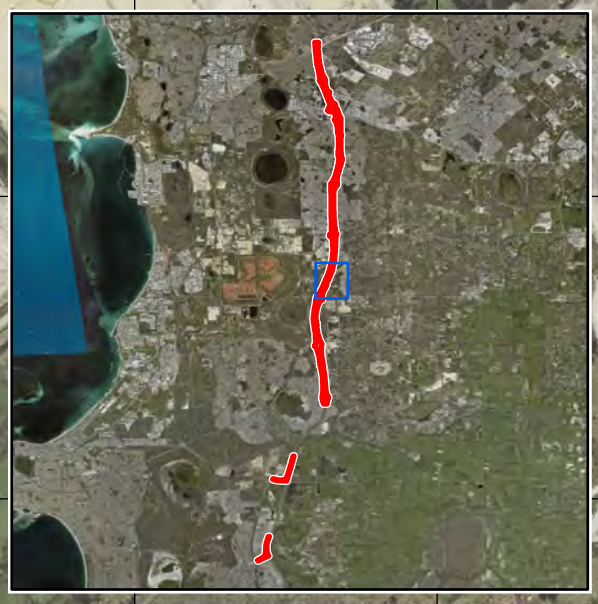

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

3296

3299

347

Kwinana Fwy

Anketell Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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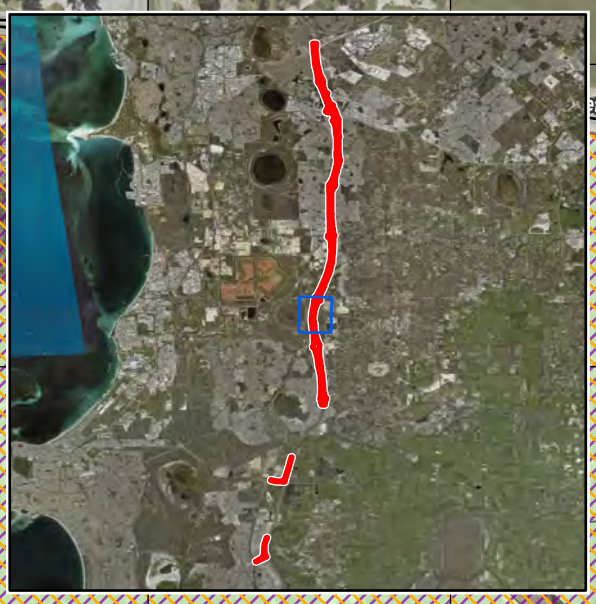

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

DBCA - Legislated Lands and Waters (DBCA-011)

- DBCA - Legislated Lands and Waters (DBCA-011)

Anketell Rd

Kwinana Fwy

269 The Spectacles

3349

270 Sandy Lake and Adjacent Bushland, Anketell

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

Land Use Constraints

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
Print date: 10 Mar 2025 - 16:48

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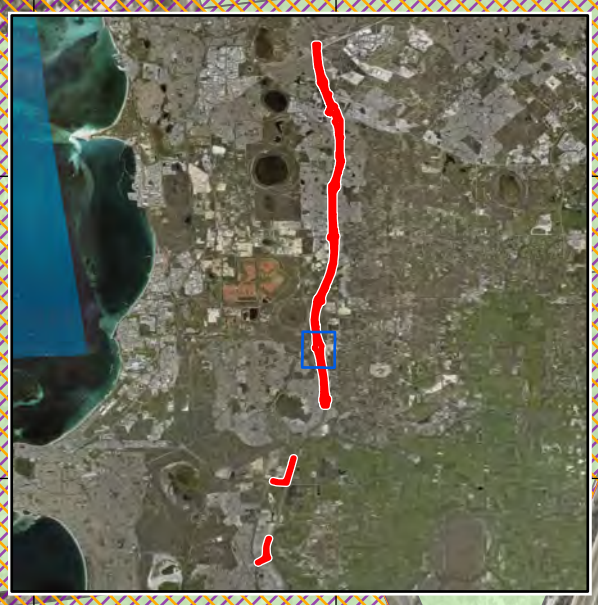

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

DBCA - Legislated Lands and Waters (DBCA-011)

- DBCA - Legislated Lands and Waters (DBCA-011)

270
Sandy Lake and Adjacent Bushland, Anketell

3349

Thomas Rd

Kwinana Fwy

272

Johnson Rd

3393

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

Land Use Constraints

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
Print date: 10 Mar 2025 - 16:48

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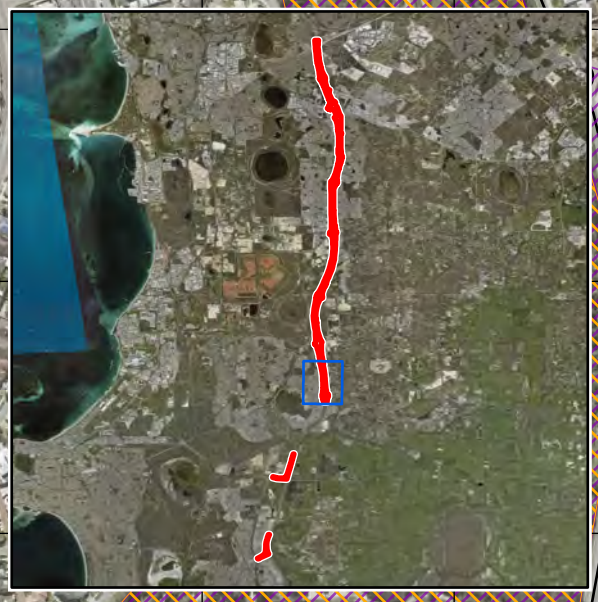

Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

3393

Johnson Rd

Kwinana Fwy

Bertram Rd

Mortimer Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 30 60 90 120 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
Print date: 10 Mar 2025 - 16:48

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Paper Size ISO A3

0 40 80 120 160 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

Land Use Constraints

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
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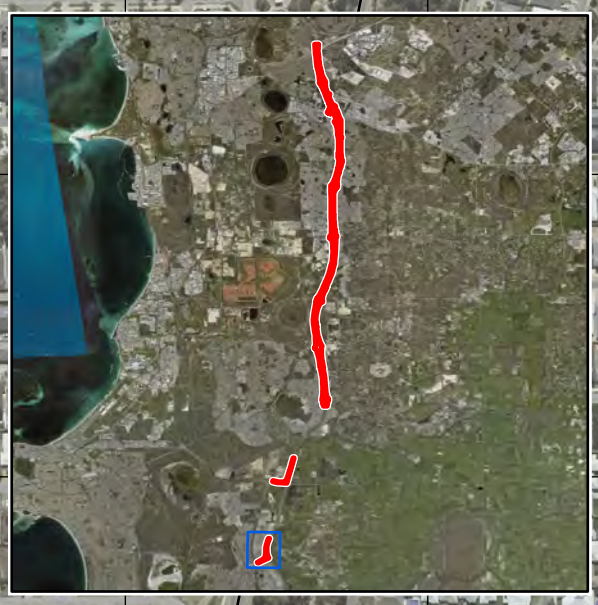
6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200



Legend

- Major road
- Survey area
- Environmentally Sensitive Areas (DWER-046)
- Bush Forever Areas - 2000 (DPLH-019)

418

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 25 50 75 100 125

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Land Use Constraints

Project No. **12634226**
Revision No. **C**
Date **10/03/2025**

FIGURE 3

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_03_LandUseConstraints_revA
Print date: 10 Mar 2025 - 16:49

Data source: WANow: Landgate / SLIP
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390800 391000 391200 391400 391600 391800 392000 392200

6449000 6448800 6448600 6448400 6448200 6448000 6447800 6447600 6447400 6447200 6447000

Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Multiple Use

RIWI Act, Groundwater Areas (DWER-034)

- Final

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
Print date: 24 Jul 2025 - 18:45

Data source: WANow: Landgate / SLIP Landgate_Subscription_Imagery\WANow: . Created by: dmontoya

391000 391200 391400 391600 391800 392000 392200 392400 392600

6447200 6447000 6446800 6446600 6446400 6446200 6446000 6445800 6445600 6445400

Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Multiple Use
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

Hydrology Constraints

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
Print date: 24 Jul 2025 - 18:45

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Landgate_Subscription_Imagery\WANow: . Created by: dmontoya

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6445600 6445400 6445200 6445000 6444800 6444600 6444400 6444200 6444000 6443800 6443600

Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Multiple Use
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

Hydrology Constraints

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
Print date: 24 Jul 2025 - 18:46

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6443800 6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000 6441800

Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

Hydrology Constraints

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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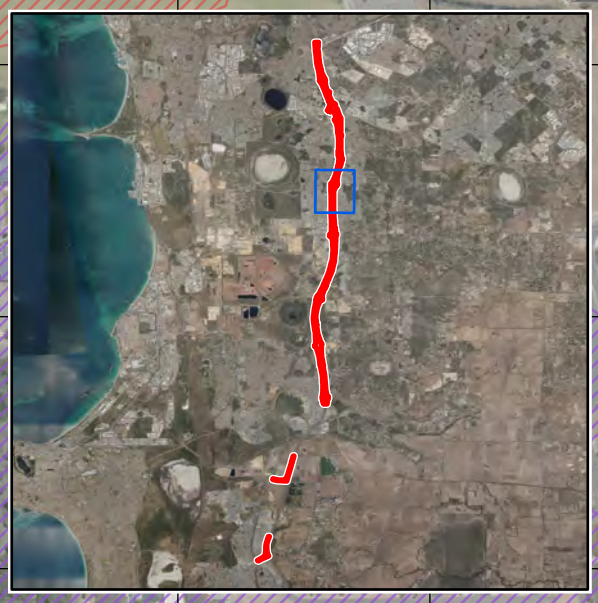

Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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Legend

- Survey area
- Public Drinking Water Source Areas (DWER-033)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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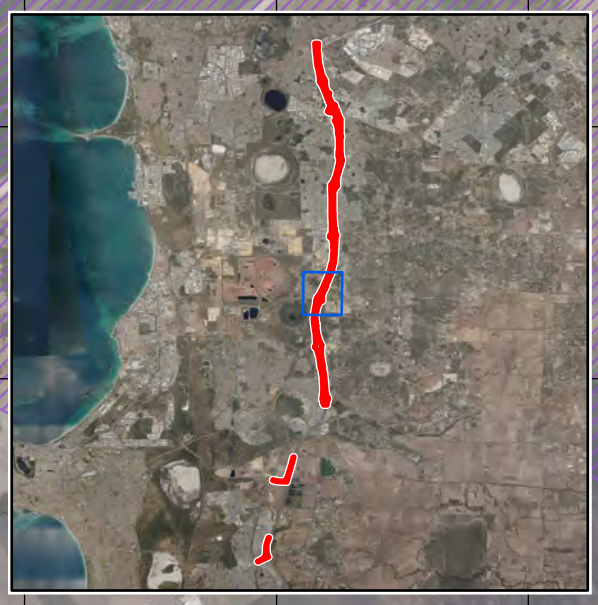

Legend

- Survey area

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Directory of Important Wetlands in Australia (DBCA-045)

RIWI Act, Groundwater Areas (DWER-034)

- To be developed

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

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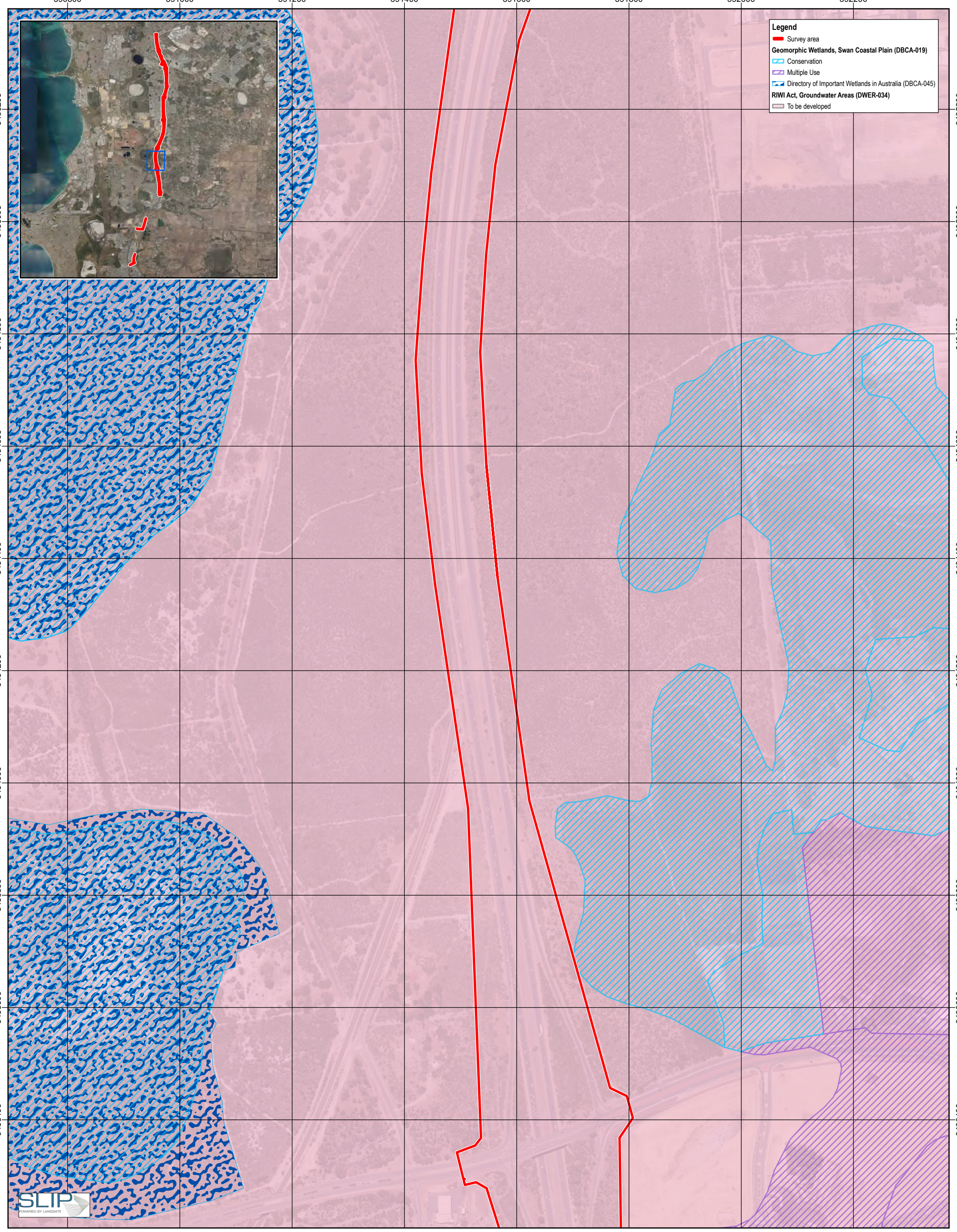

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

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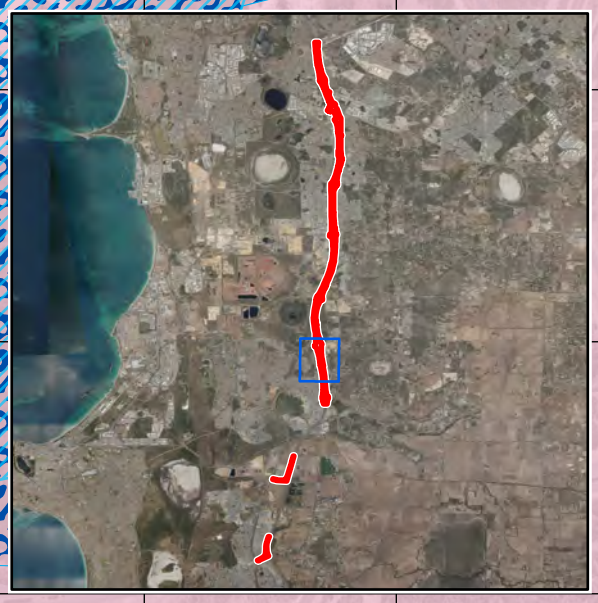

Legend

- Survey area

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

Directory of Important Wetlands in Australia (DBCA-045)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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Legend
- Survey area
- Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)
- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement
- RIWI Act, Groundwater Areas (DWER-034)

391200 391400 391600 391800 392000 392200 392400 392600 392800

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SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

Hydrology Constraints

FIGURE 4

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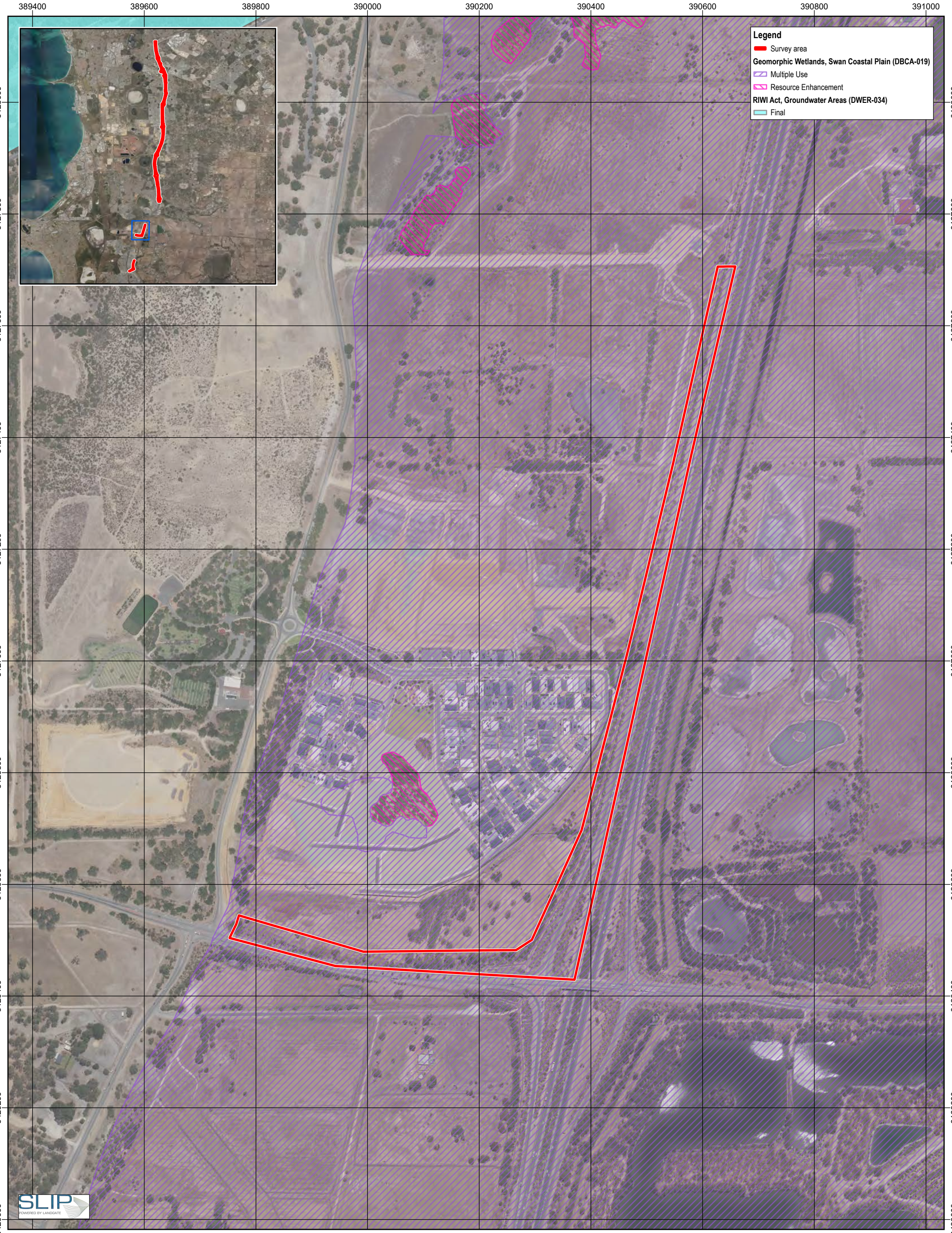

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Hydrology Constraints

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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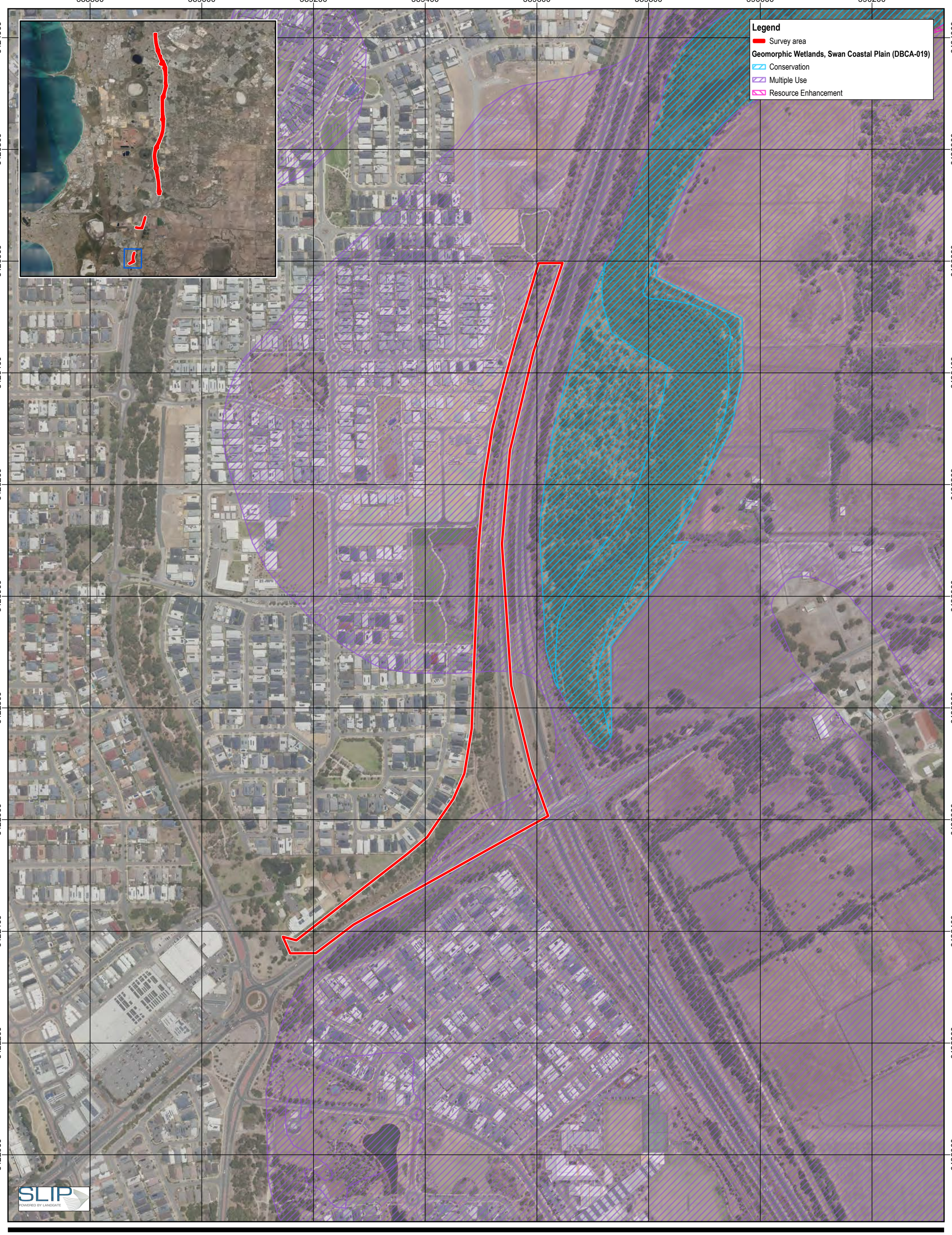

Paper Size ISO A3

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **24/07/2025**

Hydrology Constraints

FIGURE 4

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_04_HydrologyConstraints_revB
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Roe Hwy

Kwinana Fwy

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Critically Endangered Species (CR)
- Endangered Species (EN)
- Migratory Species Protected under International Agreement (MI)
- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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6447000 6446800 6446600 6446400 6446200 6446000 6445800 6445600 6445400

Berrigan Dr

Kwinana Fwy

North Lake Rd

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Endangered Species (EN)
- Vulnerable Species (VU)
- Priority 1 (P1)
- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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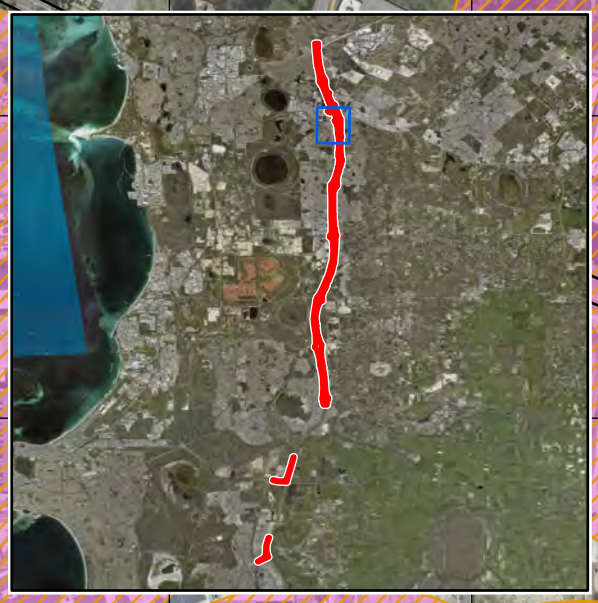

Armadale Rd

Midgegooroo Av

Beeliar Dr

Kwinana Fwy

Legend

Major road

Survey area

Context area

State listing

Priority Ecological Communities

Federal listing

Threatened Ecological Communities

DBCA flora Database search

Threatened

Priority 1

Priority 2

Priority 3

Priority 4

Fauna Conservation Categories

Endangered Species (EN)

Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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Kwinana Fwy

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Priority 3 (P3)
- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

Biological Constraints

FIGURE 5

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Russell Rd

Gibbs Rd

Kwinana Fwy

Lyon Rd

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Endangered Species (EN)
- Priority 3 (P3)
- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_05_BiologicalConstraints_revA
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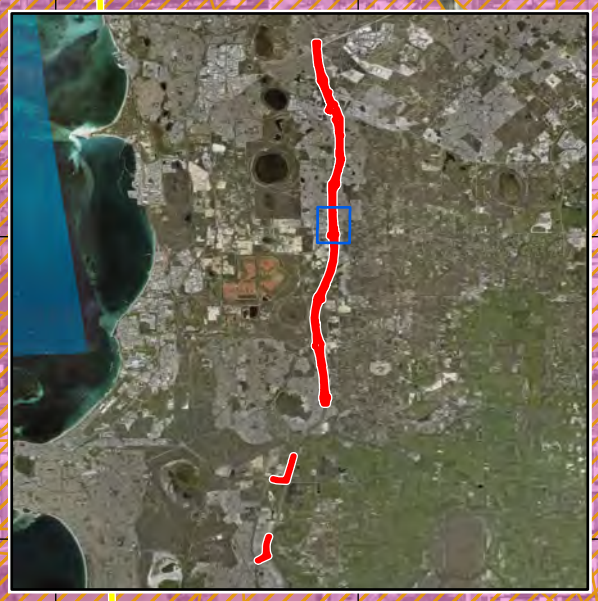

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Endangered Species (EN)
- Priority 4 (P4)

Kwinana Fwy

Lyon Rd

Rowley Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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Kwinana Fwy

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities
- Threatened Ecological Communites

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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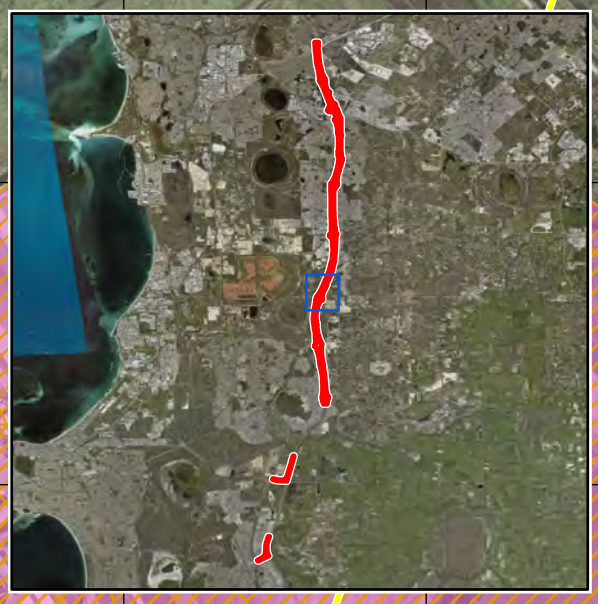

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities
- Threatened Ecological Communites

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Vulnerable Species (VU)
- Priority 4 (P4)

Kwinana Fwy

Anketell Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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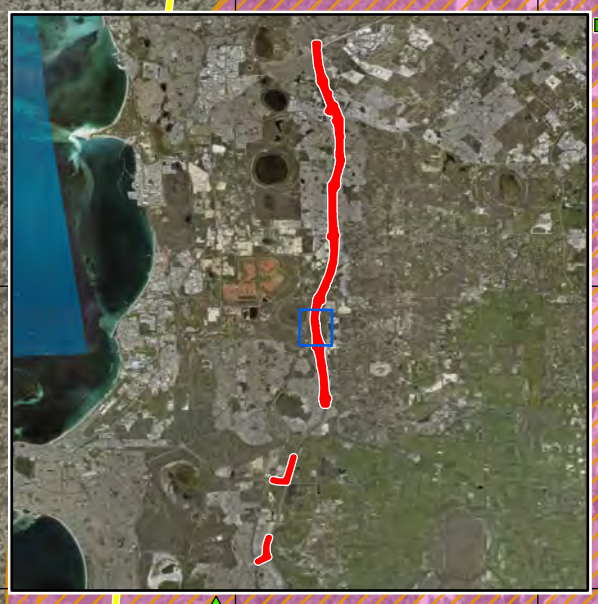

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Vulnerable Species (VU)
- Priority 4 (P4)

Kwinana Fwy

Thomas Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

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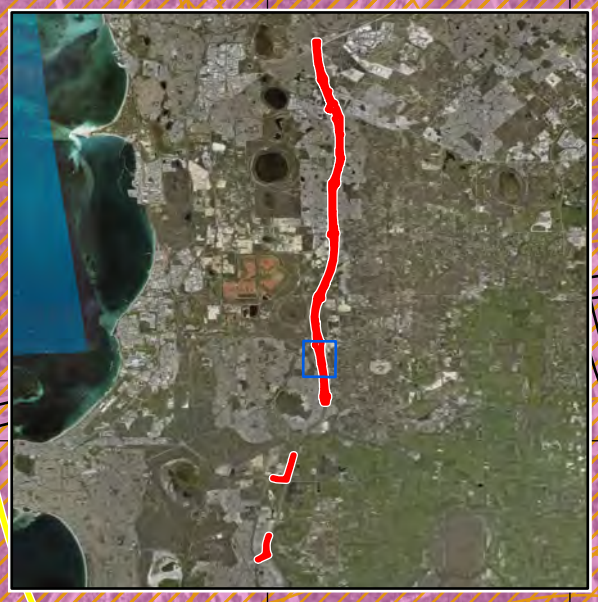

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Priority 4 (P4)

Johnson Rd

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_05_BiologicalConstraints_revA
Print date: 10 Mar 2025 - 11:46

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: cbataller

391400 391600 391800 392000 392200 392400 392600

6431600 6431400 6431200 6431000 6430800 6430600 6430400 6430200 6430000

Johnson Rd
Kwinana Fwy
Bertram Rd
Mortimer Rd

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Priority 4 (P4)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_05_BiologicalConstraints_revA
Print date: 10 Mar 2025 - 11:47

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: cbataller

389600 389800 390000 390200 390400 390600 390800

6427800 6427600 6427400 6427200 6427000 6426800 6426600 6426400 6426200

Baldivis Rd

Kwinana Fwy

Kulija Rd

Mundijong Rd

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_05_BiologicalConstraints_revA
Print date: 10 Mar 2025 - 11:47

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: cbataller

388800 389000 389200 389400 389600 389800 390000

6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP POWERED BY LANDGATE

Legend

- Major road
- Survey area
- Context area

State listing

- Priority Ecological Communities

Federal listing

- Threatened Ecological Communities

DBCA flora Database search

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Fauna Conservation Categories

- Critically Endangered Species (CR)
- Vulnerable Species (VU)
- Species of Special Conservation Interest (CD)
- Migratory Species Protected under International Agreement (MI)
- Priority 4 (P4)

Paper Size ISO A3

0 40 80 120

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Biological Constraints

Project No. **12634226**
Revision No. **B**
Date **10/03/2025**

FIGURE 5

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_05_BiologicalConstraints_revA
Print date: 10 Mar 2025 - 11:47

Data source: WANow: Landgate / SLIP
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6449400 6449200 6449000 6448800 6448600 6448400 6448200 6448000 6447800 6447600 6447400 6447200 6447000

Roe Hwy

Kwinana Fwy

Berrigan Dr

Jandakot Rd

Kwin10

Kwin02R

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Corymbia calophylla
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- EgBspp
- EmBspp

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:15

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: shart2

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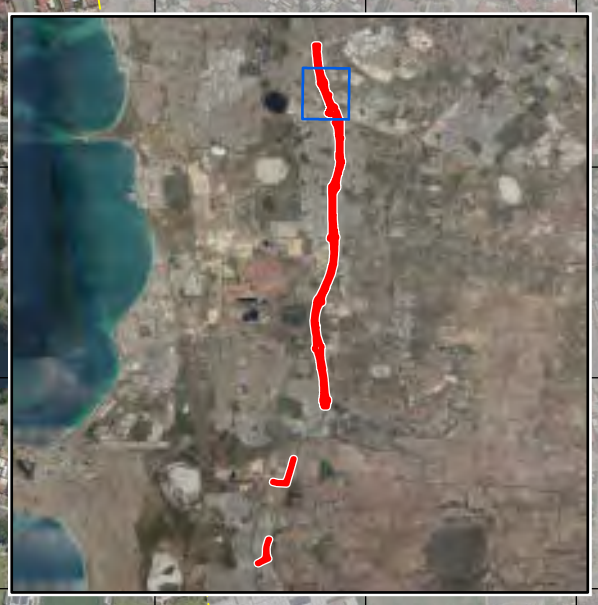

Legend

- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- EmBspp
- ErMr

Vegetation Type (Context Area)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Berrigan Dr
Jandakot Rd
Kwinana Fwy
North Lake Rd
Kwin06R
Midgegooroo Av
Armadale Rd
SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

Vegetation Types and Sample Sites

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:15

Data source: WANow: Landgate / SLIP
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6445800 6445600 6445400 6445200 6445000 6444800 6444600 6444400 6444200 6444000 6443800 6443600 6443400

Kwin06R

Armadale Rd

Beeliar Dr

Kwinana Fwy

Midgegooroo Av

Legend

- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- ErMr

Vegetation Type (Context Area)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

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Print date: 01 Jul 2025 - 13:16

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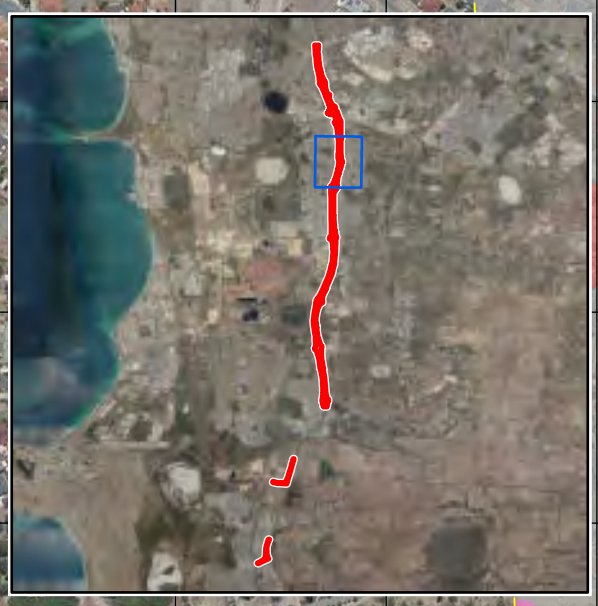
6444000 6443800 6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000 6441800 6441600



Legend

- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- ErMr
- Pinus sp.

Vegetation Type (Context Area)

- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Kwinana Fwy

Kwin04R

Russell Rd

Gibbs Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

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Print date: 01 Jul 2025 - 13:17

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: shart2

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6442400 6442200 6442000 6441800 6441600 6441400 6441200 6441000 6440800 6440600 6440400 6440200 6440000

Legend

- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- BmBa
- EgBspp.
- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- EgBspp
- EmBspp
- ErMr
- Pinus sp.

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Gibbs Rd

Kwinana Fwy

Lyon Rd

Kwin12R

Kwin17R

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:17

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: shart2

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6440600 6440400 6440200 6440000 6439800 6439600 6439400 6439200 6439000 6438800 6438600 6438400 6438200

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- BmBa
- EgBspp.
- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- EgBspp
- EmBspp
- ErMr
- Pinus sp.

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Kwin17R

Kwin05

Kwinana Fwy

Lyon Rd

Rowley Rd

Wattleup

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:18

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6438800 6438600 6438400 6438200 6438000 6437800 6437600 6437400 6437200 6437000 6436800 6436600

Rowley Rd

Kwinana Fwy

Kwin19R

Kwin14R

Kwin06

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- BmBa
- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- EmBspp
- ErMr

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

Vegetation Types and Sample Sites

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
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6437200 6437000 6436800 6436600 6436400 6436200 6436000 6435800 6435600 6435400 6435200 6435000 6434800

Kwin14R

Kwin06

Kwin01

Kwin01R

Kwin08R

Kwin03

Kwin02

Kwinana Fwy

Anketell Rd

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- EgBspp.
- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- EgBspp
- EmBspp
- ErMr

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:19

Data source: WANow: Landgate / SLIP
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6435600 6435400 6435200 6435000 6434800 6434600 6434400 6434200 6434000 6433800 6433600 6433400 6433200

Anketell Rd

Kwin01

Kwin01R

Kwin08R

Kwin03

Kwin02

Kwin03R

Kwinana Fwy

Kwin05R

Kwin04

Kwin07R

Kwin10R

Thomas Rd

Johnson Rd

Kwin09R

Kwin21R

SLIP POWERED BY LANDGATE

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- EgBspp.
- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland

Vegetation Type (Remnant Native Vegetation)

- EgBspp
- EmBspp
- ErMr

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

Vegetation Types and Sample Sites

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:20

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6433800 6433600 6433400 6433200 6433000 6432800 6432600 6432400 6432200 6432000 6431800 6431600 6431400

Kwin04
Kwin07R
Kwin10R
Kwin09R
Kwin21R
Kwin09
Kwin07
Kwin08
Kwin18R
Kwin16R

Bombay Blvd
Kwinana Fwy
Johnson Rd

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- Cc
- EmBspp
- ErMr

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:21

Data source: WANow: Landgate / SLIP
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6432000 6431800 6431600 6431400 6431200 6431000 6430800 6430600 6430400 6430200 6430000 6429800 6429600 6429400 6429200

Kwin08
Kwin18R
Kwin16R
Kwin11R
Mortimer Rd
Kwinana Fwy
Irasburg Pde
Mc Whirter Prom

Legend

- Quadrat
- Releve
- Major road
- Survey area
- Context Area

Vegetation Type (Roadside Revegetation)

- Isolated Banksia spp.
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Remnant Native Vegetation)

- BmBa
- Cc
- EmBspp
- ErMr
- Pinus sp.

Vegetation Type (Context Area)

- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
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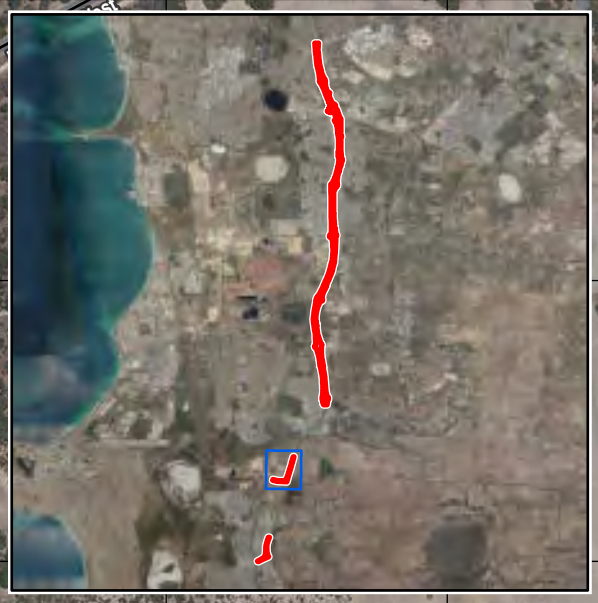
6428000 6427800 6427600 6427400 6427200 6427000 6426800 6426600 6426400 6426200



Legend

- Releve
- Major road
- Survey area

Vegetation Type (Roadside Revegetation)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Context Area)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Vegetation Type

- Cleared
- ErMr
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area; Mod. Wetland

Baldivis Rd

Kwinana Fwy

Kulija Rd

Kwin15R

Kwin20R

Kulija Rd

Mundijong Rd

Mundijong Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280 N

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

Vegetation Types and Sample Sites

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
Print date: 01 Jul 2025 - 13:23

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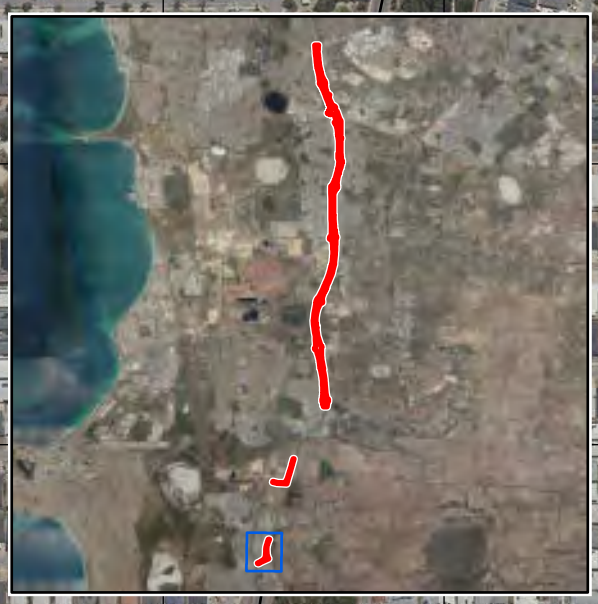
6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200 6422000



Legend

- Releve
- Major road
- Survey area

Vegetation Type (Roadside Revegetation)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Context Area)

- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area

Vegetation Type (Cleared)

- Cleared

Vegetation Type (Remnant Native Vegetation)

- EmBspp.
- ErMr
- Isolated Banksia spp.
- Isolated Corymbia calophylla
- Isolated Euca spp.
- Mixed Shrubland
- Modified wetland drainage area; Mod. Wetland

Vegetation Type (Cleared)

- Cleared

Kwinana Fwy

Safety Bay Rd

Kwin13R

Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 70 140 210 280 Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Types and Sample Sites

Project No. **12634226**
Revision No. **2**
Date **01/07/2025**

FIGURE 6

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_06_VegType_Rev2
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6448800 6448600 6448400 6448200 6448000 6447800 6447600 6447400 6447200

Roe Hwy

Kwinana Fwy

Legend

Survey area

Vegetation Condition

- Very Good
- Good
- Good to Degraded
- Degraded
- Completely Degraded
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_07_VegCondition_Rev0
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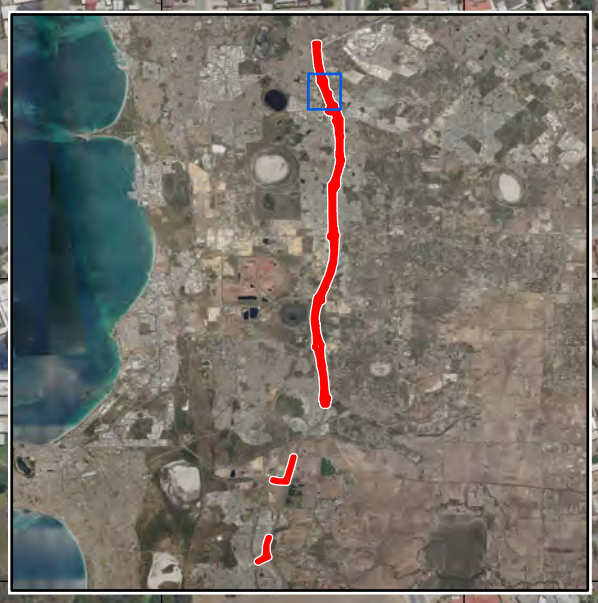

Legend

- Major road
- Survey area

Significant Weed

- **Asparagus asparagoides* (DP and WoNS)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Completely Degraded
- Cleared

Berrigan Dr

Kwinana Fwy

North Lake Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 7

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_07_VegCondition_Rev0
Print date: 28 May 2025 - 17:43

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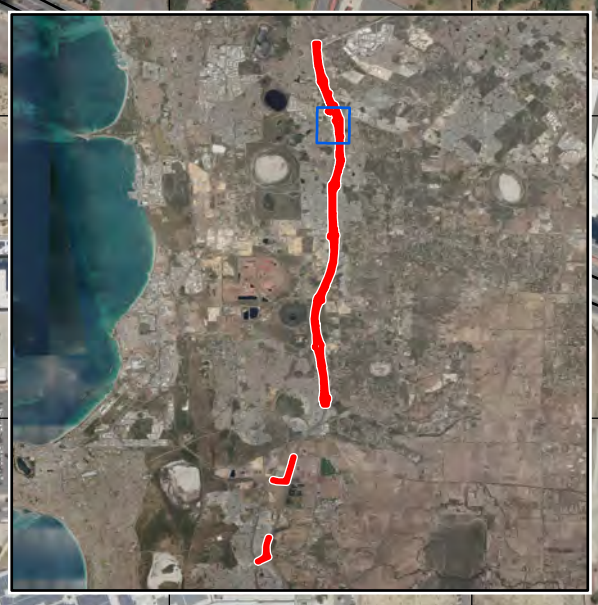

Legend

- Major road
- Survey area

Significant Weed

- **Asparagus asparagoides* (DP and WoNS)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Completely Degraded
- Cleared

Midgegooroo Av

Beeliar Dr

Kwinana Fwy

Beeliar Dr

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000

Legend

Survey area

Significant Weed

**Zantedeschia aethiopica* (DP)

Vegetation Condition

Completely Degraded

Cleared

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_07_VegCondition_Rev0
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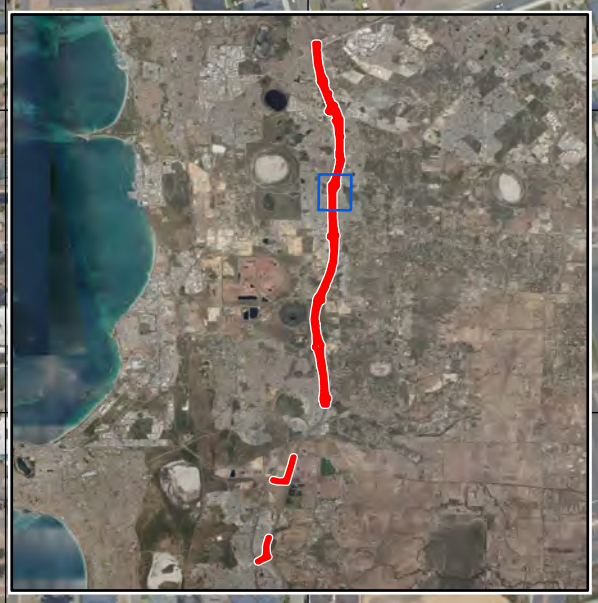

Legend

- Major road
- Survey area

Vegetation Condition

- Degraded
- Completely Degraded
- Cleared

Russell Rd

Gibbs Rd

Kwinana Fwy

Lyon Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 7

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_07_VegCondition_Rev0
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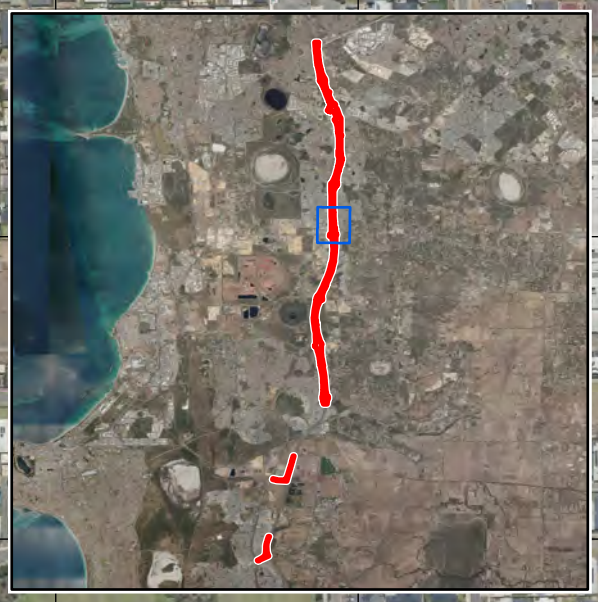

Legend

- Major road
- Survey area

Vegetation Condition

- Very Good
- Good
- Degraded
- Completely Degraded
- Cleared

Kwinana Fwy

Lyon Rd

Rowley Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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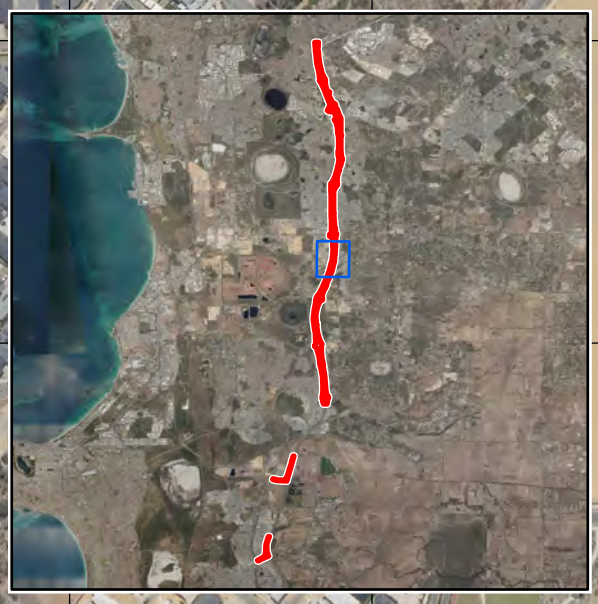

Legend

- Survey area

Significant Weed

- **Gomphocarpus fruticosus* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Degraded
- Completely Degraded
- Cleared

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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Print date: 28 May 2025 - 17:44

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6436800 6436600 6436400 6436200 6436000 6435800 6435600 6435400 6435200

Legend

- Major road
- Survey area

Significant Weed

- **Asparagus asparagoides* (DP and WoNS)
- **Gomphocarpus fruticosus* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Very Good
- Good
- Good to Degraded
- Degraded
- Completely Degraded
- Cleared

Kwinana Fwy

Anketell Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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391000 391200 391400 391600 391800 392000 392200

6435000 6434800 6434600 6434400 6434200 6434000 6433800 6433600 6433400

Legend

Survey area

Significant Weed

- **Asparagus asparagoides* (DP and WoNS)
- **Opuntia stricta* (DP and WoNS)
- **Solanum linnaeanum* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Very Good
- Good
- Degraded
- Completely Degraded
- Cleared

Kwinana Fwy

Thomas Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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6433400 6433200 6433000 6432800 6432600 6432400 6432200 6432000 6431800

Legend

- Major road
- Survey area

Significant Weed

- **Gomphocarpus fruticosus* (DP)
- **Moraea flaccida* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Very Good
- Good
- Good to Degraded
- Degraded
- Completely Degraded
- Cleared

Kwinana Fwy

Johnson Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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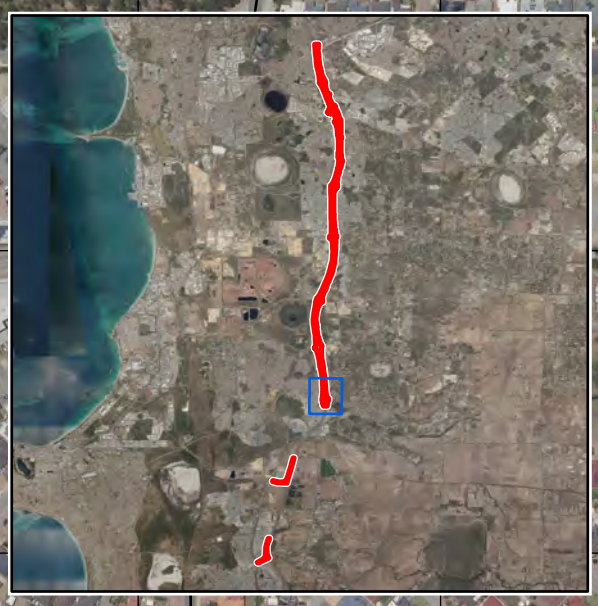

Legend

- Major road
- Survey area

Vegetation Condition

- Good
- Degraded
- Completely Degraded
- Cleared

Johnson Rd

Kwinana Fwy

Bertram Rd

Mortimer Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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6427800 6427600 6427400 6427200 6427000 6426800 6426600 6426400 6426200

Baldivis Rd

Kwinana Fwy

Kulija Rd

Kulija Rd

Kulija Rd

Wundijong Rd

Legend

- Major road
- Survey area

Significant Weed

- **Gomphocarpus fruticosus* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Degraded to Completely Degraded
- Completely Degraded
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

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Legend

- Major road
- Survey area

Significant Weed

- **Gomphocarpus fruticosus* (DP)
- **Zantedeschia aethiopica* (DP)

Vegetation Condition

- Degraded to Completely Degraded
- Completely Degraded
- Cleared

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

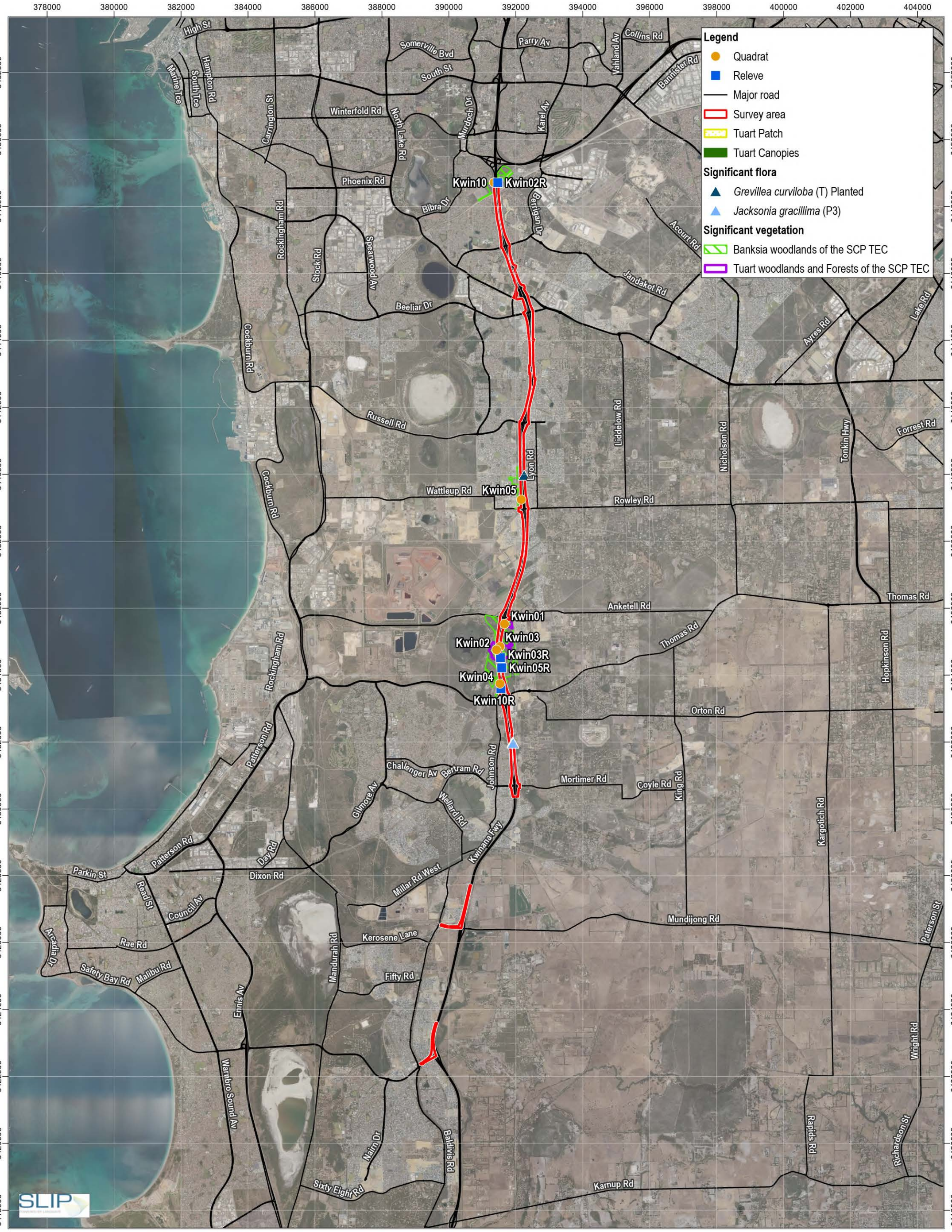
Vegetation Condition and Significant Weeds

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 7

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_07_VegCondition_Rev0
Print date: 28 May 2025 - 17:46

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: klabez


Legend
Quadrat
Releve
Major road
Survey area
Tuart Patch
Tuart Canopies
Significant flora
Grevillea curviloba (T) Planted
Jacksonia gracillima (P3)
Significant vegetation
Banksia woodlands of the SCP TEC
Tuart woodlands and Forests of the SCP TEC
Kwin10
Kwin02R
Kwin05
Kwin01
Kwin02
Kwin03
Kwin03R
Kwin05R
Kwin04
Kwin10R
High St
Maine Tce
South Tce
Hampton Rd
Carrington St
Somerville Blvd
South St
Parry Av
Vahland Av
Collins Rd
Bannister Rd
Winterfold Rd
North Lake Rd
Murdoch Dr
Karel Av
Phoenix Rd
Bibra Dr
Berrigan Dr
Acourt Rd
Rockingham Rd
Stock Rd
Spearwood Av
Jandakot Rd
Beeliar Dr
Lake Rd
Ayres Rd
Cockburn Rd
Russell Rd
Liddelow Rd
Nicholson Rd
Tonkin Hwy
Forrest Rd
Lyon Rd
Wattleup Rd
Rowley Rd
Anketell Rd
Thomas Rd
Hopkinson Rd
Orton Rd
Patterson Rd
Challenger Av
Bertram Rd
Johnson Rd
Mortimer Rd
Coyle Rd
King Rd
Gilmore Av
Nellard Rd
Kwinana Fwy
Kargotich Rd
Parkin St
Day Rd
Dixon Rd
Millar Rd West
Read St
Council Av
Arcadia Dr
Rae Rd
Kerosene Lane
Mundijong Rd
Paterson St
Safety Bay Rd
Malibu Rd
Mandurah Rd
Fifty Rd
Ennis Av
Warnbro Sound Av
Nairn Dr
Baldivis Rd
Sixty Eight Rd
Karnup Rd
Rapids Rd
Richardson St
Wright Rd
SLIP
Paper Size ISO A3
0 1,000 2,000 3,000 4,000
Meters
N
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50
GHD
Main Roads
Roe Hwy Widening Flora and Fauna Assessment
Significant Vegetation and Flora
(Note: Figure has been scaled due to presence of species on the WA Sensitive Species List)
Project No. 12634226
Revision No. 1
Date 01/09/2025
FIGURE 8
G:\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_08_SignificantFlora_Rev1_ScaledForSensitivity
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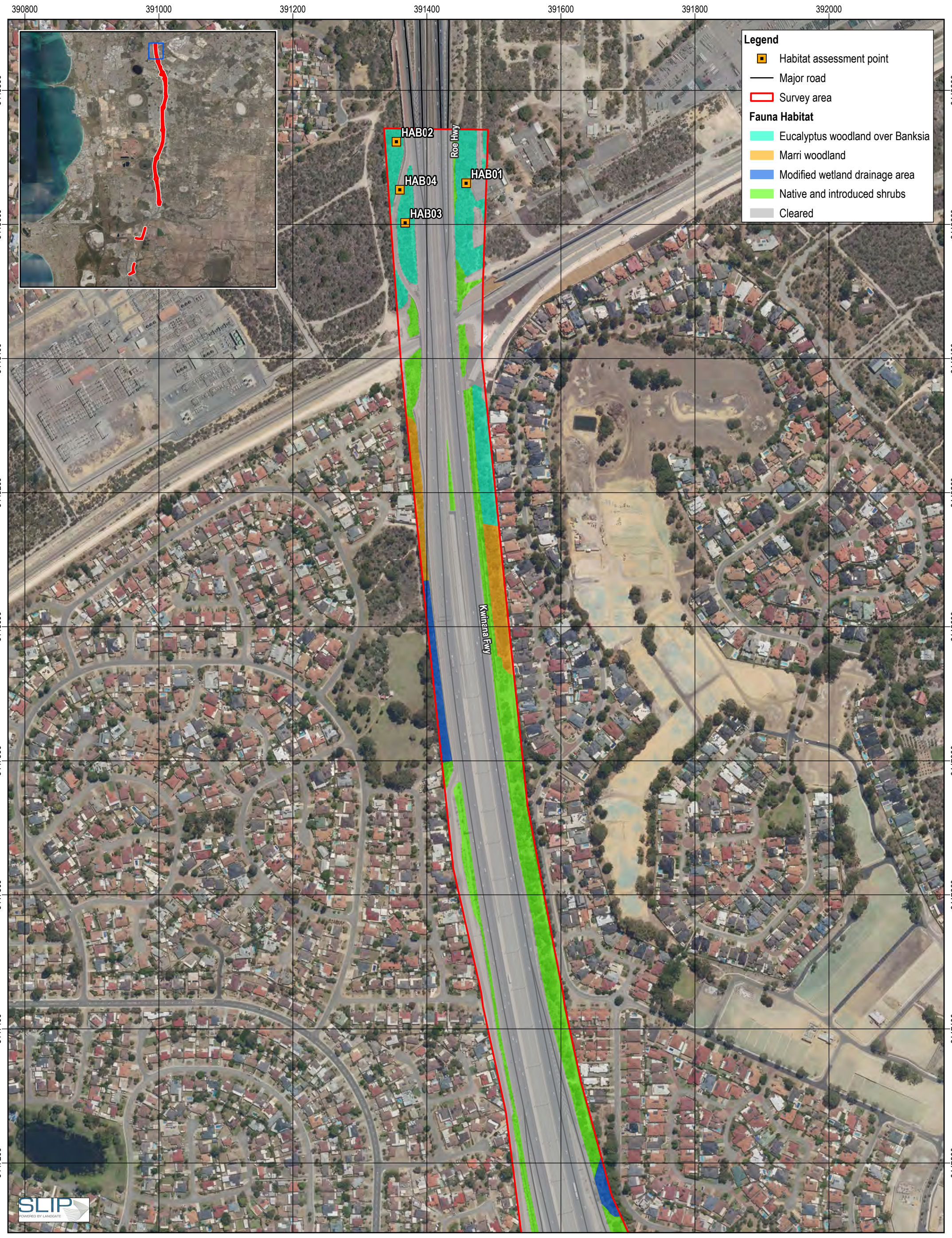

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
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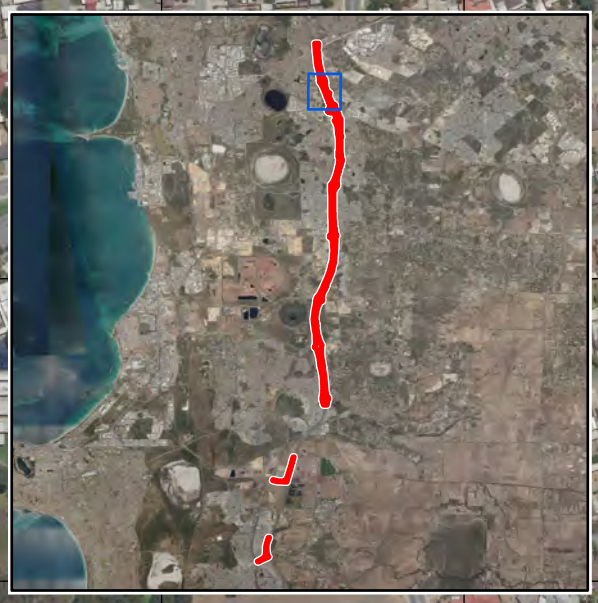

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Berrigan Dr

Kwinana Fwy

North Lake Rd

HAB05

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
Print date: 28 May 2025 - 17:12

Data source: WANow: Landgate / SLIP Landgate_Subscription_Imagery\WANow: . Created by: klabez

391600 391800 392000 392200 392400 392600 392800

6445400 6445200 6445000 6444800 6444600 6444400 6444200 6444000 6443800

HAB05
HAB06

Armadale Rd
Midgegooroo Av
Beeliar Dr
Kwinana Fwy
Beeliar Dr

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

Page 3 of 13
FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
Print date: 28 May 2025 - 17:12

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391800 392000 392200 392400 392600 392800 393000

6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Marri woodland
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Kwinana Fwy

HAB013

HAB07

HAB08

HAB014

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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Landgate_Subscription_Imagery\WANow: . Created by: klabez

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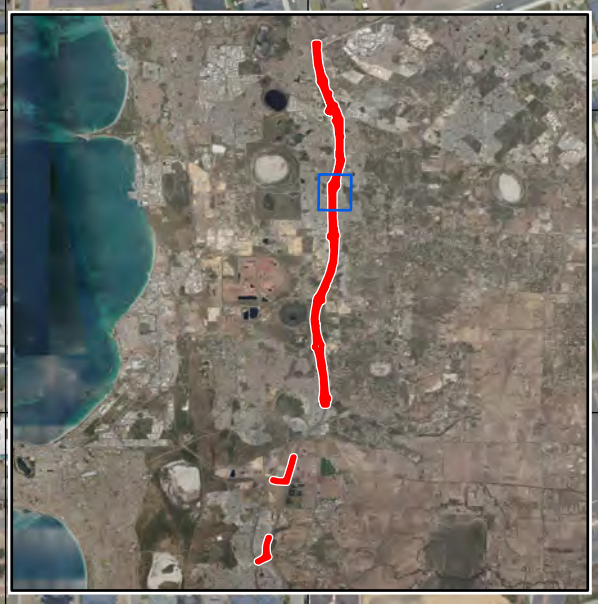

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Eucalyptus woodland over Banksia
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Russell Rd

Gibbs Rd

Kwinana Fwy

Lyon Rd

HAB047

HAB046

HAB064

HAB065

HAB066

HAB048

HAB015

HAB070

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
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391600 391800 392000 392200 392400 392600 392800

6440200 6440000 6439800 6439600 6439400 6439200 6439000 6438800 6438600

HAB015
HAB070
HAB067
HAB049
HAB055
HAB069
HAB068
HAB051
HAB050
HAB053
HAB045
HAB063
HAB044
HAB043
HAB052
HAB042
HAB041
HAB040
HAB062
HAB054
HAB039
HAB038
HAB061
HAB060
HAB059

Kwinana Fwy
Lyon Rd
Rowley Rd

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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Print date: 28 May 2025 - 17:13

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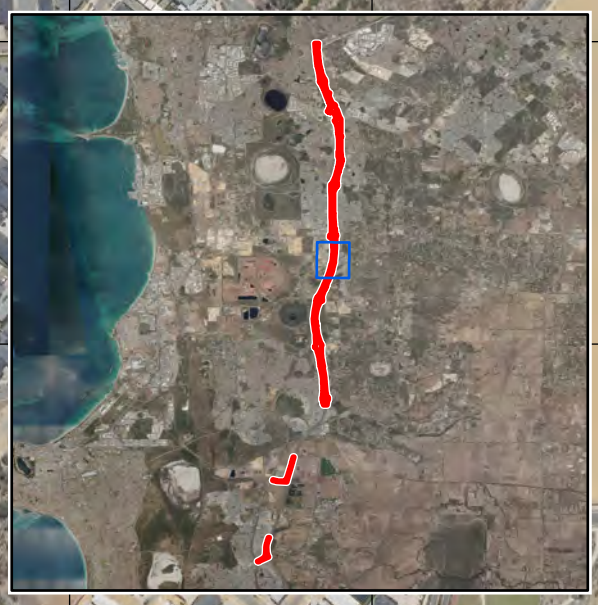

HAB037 HAB058 HAB057

Kwinana Fwy

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
Print date: 28 May 2025 - 17:13

Data source: WANow: Landgate / SLIP Landgate_Subscription_Imagery\WANow: . Created by: klabez

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6436800 6436600 6436400 6436200 6436000 6435800 6435600 6435400 6435200

Kwinana Fwy

Anketell Rd

HAB09

HAB016

HAB017

HAB018

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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6435000 6434800 6434600 6434400 6434200 6434000 6433800 6433600 6433400

Legend

- Habitat assessment point
- Quenda (P4) (Diggings)
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Native and introduced shrubs
- Cleared

Kwinana Fwy

HAB033

HAB036

HAB034

HAB035

Thomas Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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HAE034
HAB035
HAB019
HAB028
HAB020
HAB032
HAB056
HAB010
HAB021
HAB031
HAB011
HAB022
HAB030
HAB029

Thomas Rd
Kwinana Fwy
Johnson Rd

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Marri woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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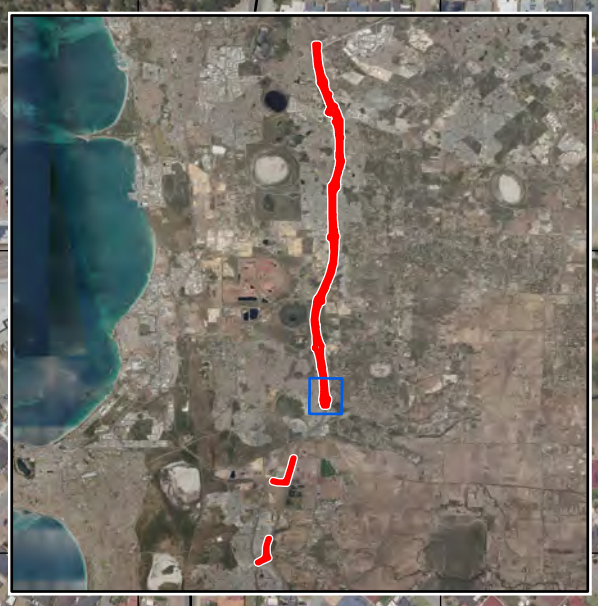

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

HAB012
HAB026
HAB023
HAB027
HAB025
HAB024

Johnson Rd
Kwinana Fwy
Bertram Rd
Mortimer Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

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Data source: WANow: Landgate / SLIP Landgate_Subscription_Imagery\WANow: . Created by: klabez

389600 389800 390000 390200 390400 390600 390800

6427800 6427600 6427400 6427200 6427000 6426800 6426600 6426400 6426200

Baldivis Rd

HAB078

HAB077

HAB079

Kwinana Fwy

Kulija Rd

Mundijong Rd

Mundijong Rd

Kulija Rd

SLIP POWERED BY LANDGATE

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
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388800 389000 389200 389400 389600 389800 390000

6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200

Legend

- Habitat assessment point
- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

HAB076
HAB075
HAB074
HAB073
HAB072
HAB071

Baldivis Rd
Kwinana Fwy
Safety Bay Rd
Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Fauna Habitats and Significant Fauna

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9A

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09A_FaunaHabitat&SignificantFauna_Rev0
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6448800 6448600 6448400 6448200 6448000 6447800 6447600 6447400 6447200

Roe Hwy

Kwinana Fwy

Legend

- Major road
- Survey area

Fauna Habitat

- Eucalyptus woodland over Banksia
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)
- Carnaby's Cockatoo - 5 (Mod-High) and FRTBC - 7 (High)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:29

Data source: WANow: Landgate / SLIP. Created by: dchan3

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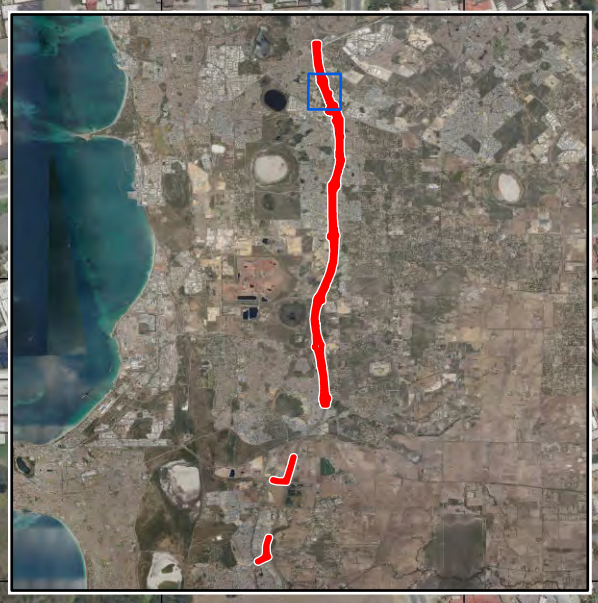

Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Berrigan Dr

Kwinana Fwy

North Lake Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
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Data source: WANow: Landgate / SLIP. Created by: dchan3

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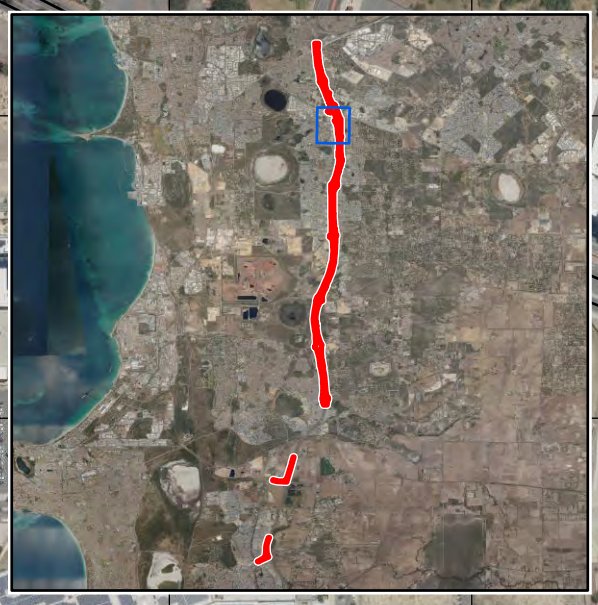

Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Cleared

Midgegooroo Av

Beeliar Dr

Kwinana Fwy

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:29

Data source: WANow: Landgate / SLIP. Created by: dchan3

391800 392000 392200 392400 392600 392800 393000

6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000

Legend

- Major road
- Survey area

Fauna Habitat

- Marri woodland
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 5 (Mod-High) and FRTBC - 7 (High)

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
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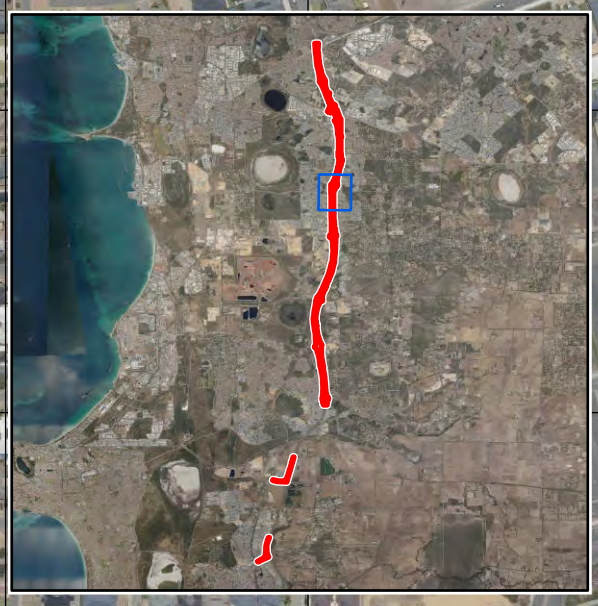

Legend

- Major road
- Survey area

Fauna Habitat

- Eucalyptus woodland over Banksia
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)
- Carnaby's Cockatoo - 5 (Mod-High) and FRTBC - 7 (High)

Russell Rd

Gibbs Rd

Kwinana Fwy

Lyon Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:30

Data source: WANow: Landgate / SLIP. Created by: dchan3

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6440200 6440000 6439800 6439600 6439400 6439200 6439000 6438800 6438600

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)
- Carnaby's Cockatoo - 5 (Mod-High) and FRTBC - 7 (High)

Kwinana Fwy

Lyon Rd

Rowley Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:30

Data source: WANow: Landgate / SLIP. Created by: dchan3

391600 391800 392000 392200 392400 392600 392800

6438600 6438400 6438200 6438000 6437800 6437600 6437400 6437200 6437000

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:30

Data source: WANow: Landgate / SLIP. Created by: dchan3

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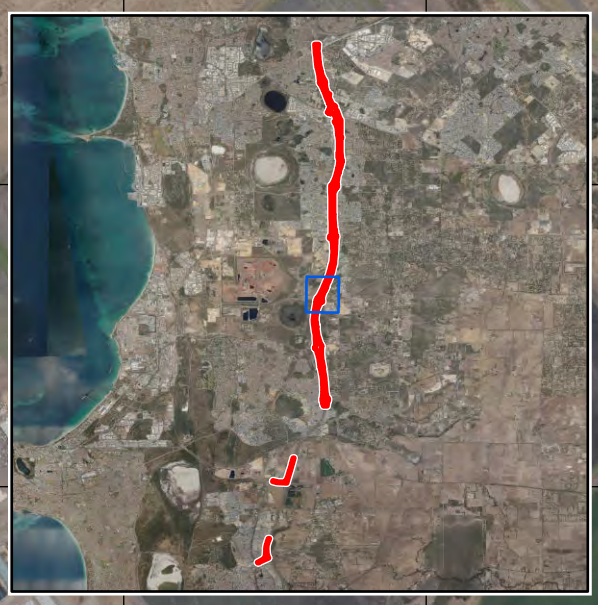

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)
- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)

Kwinana Fwy

Anketell Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

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Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Native and introduced shrubs
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)
- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)

Kwinana Fwy

Thomas Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
Print date: 24 Jun 2025 - 10:31

Data source: WANow: Landgate / SLIP. Created by: dchan3

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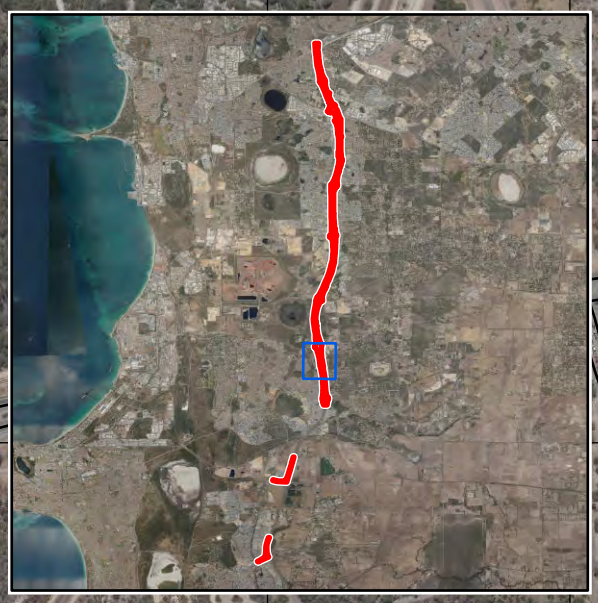

Thomas Rd

Kwinana Fwy

Johnson Rd

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Marri woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)
- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)
- Carnaby's Cockatoo - 5 (Mod-High) and FRTBC - 7 (High)

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

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6431600 6431400 6431200 6431000 6430800 6430600 6430400 6430200 6430000

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Foraging Value Score - Bamford (2020)

- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 2 (Low)
- Carnaby's Cockatoo - 6 (Mod-High) and FRTBC - 4 (Mod)

Johnson Rd

Kwinana Fwy

Bertram Rd

Mortimer Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
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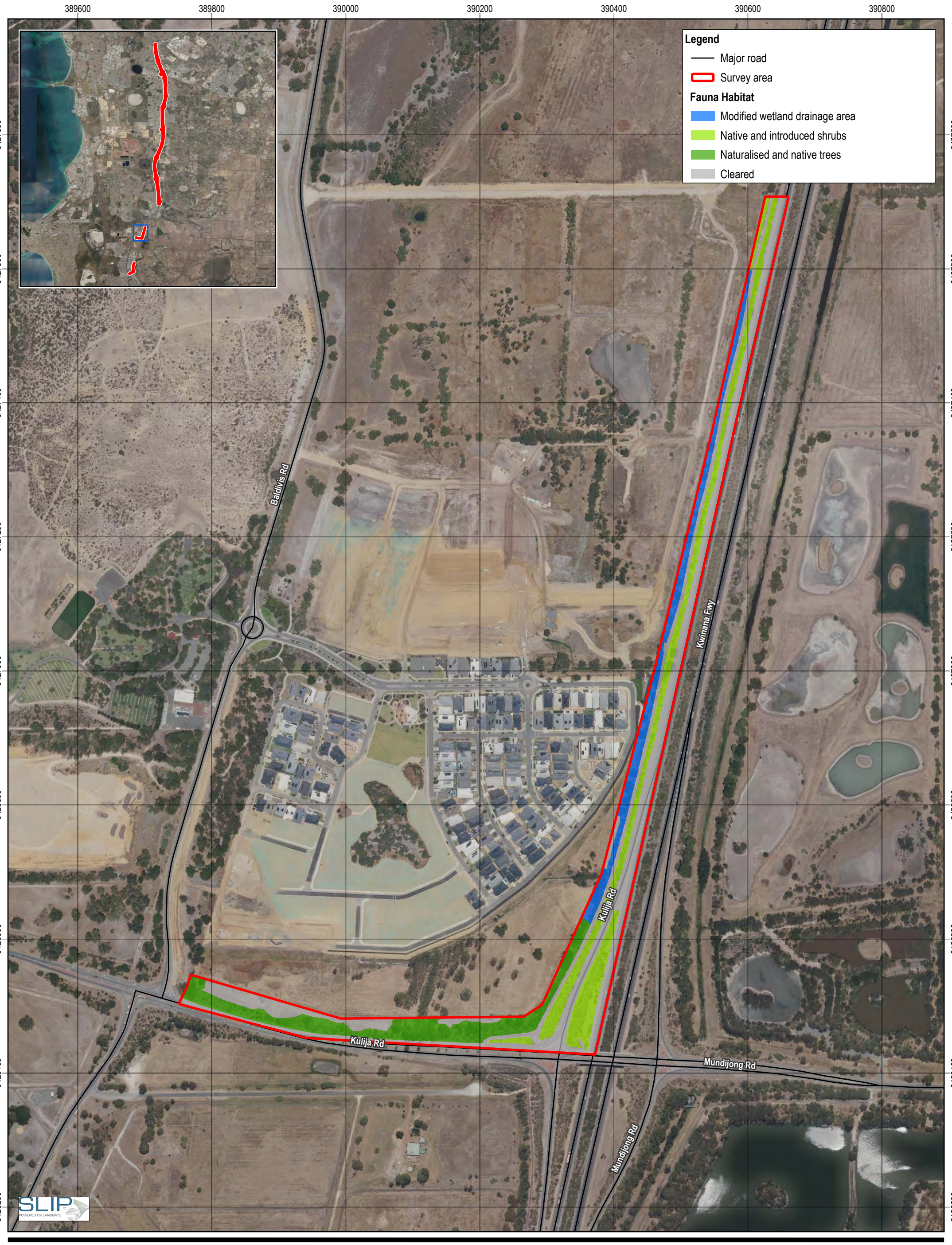

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
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Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Foraging Habitat

Project No. **12634226**
Revision No. **1**
Date **24/06/2025**

FIGURE 9B

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09B_BlackCockatooForagingHabitat_Rev1
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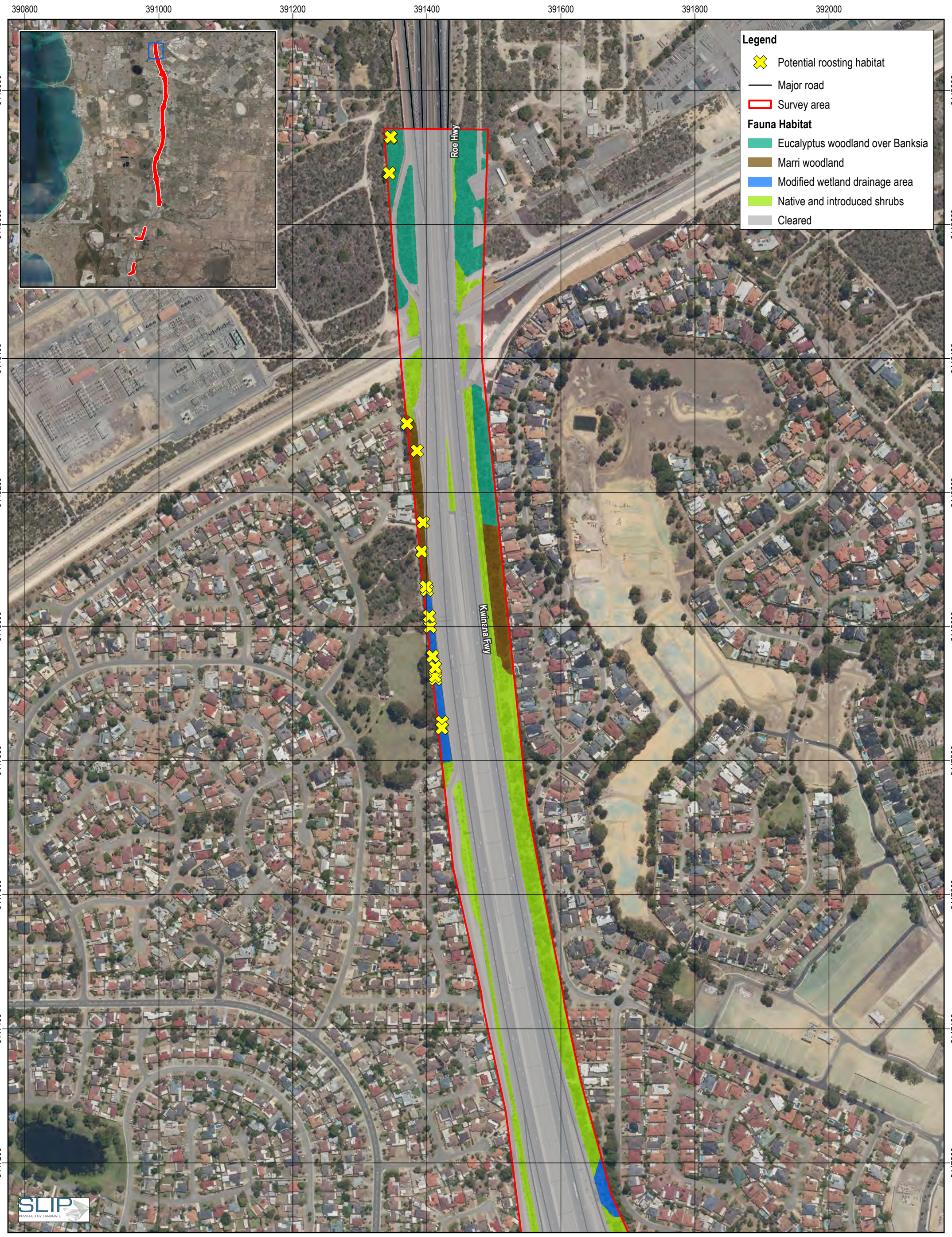

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Map Projection: Transverse Mercator
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Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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Data source: WANow: Landgate / SLIP. Created by: klabez

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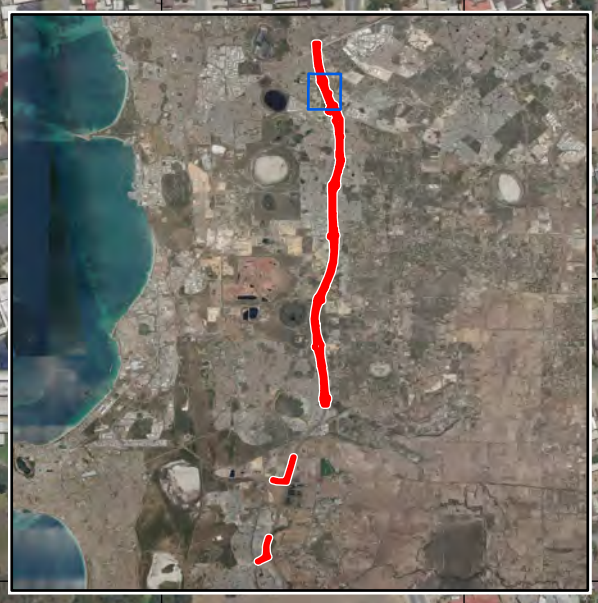

Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Berrigan Dr

Kwinana Fwy

North Lake Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
Print date: 28 May 2025 - 17:22

Data source: WANow: Landgate / SLIP. Created by: klabez

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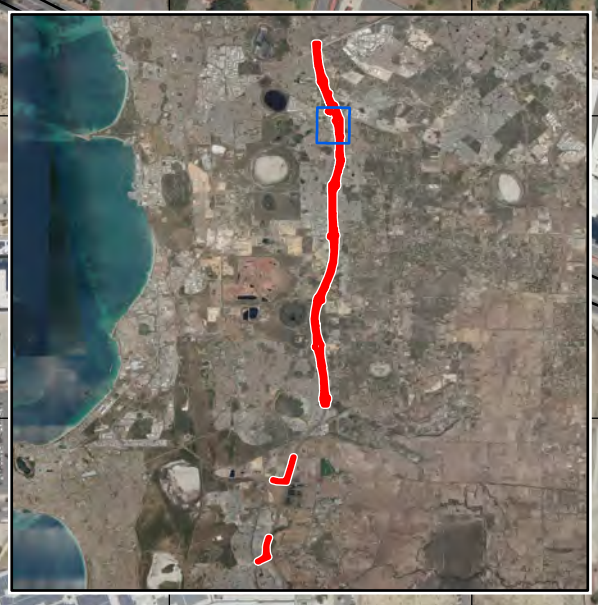

Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Cleared

Armadale Rd

Midgegooroo Av

Beeliar Dr

Kwinana Fwy

Beeliar Dr

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Paper Size ISO A3

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Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000

Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Marri woodland
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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6442000 6441800 6441600 6441400 6441200 6441000 6440800 6440600 6440400

Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Eucalyptus woodland over Banksia
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Russell Rd

Gibbs Rd

Kwinana Fwy

Lyon Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
Print date: 28 May 2025 - 17:23

Data source: WANow: Landgate / SLIP. Created by: klabez

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Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Marri woodland
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Kwinana Fwy

Lyon Rd

Rowley Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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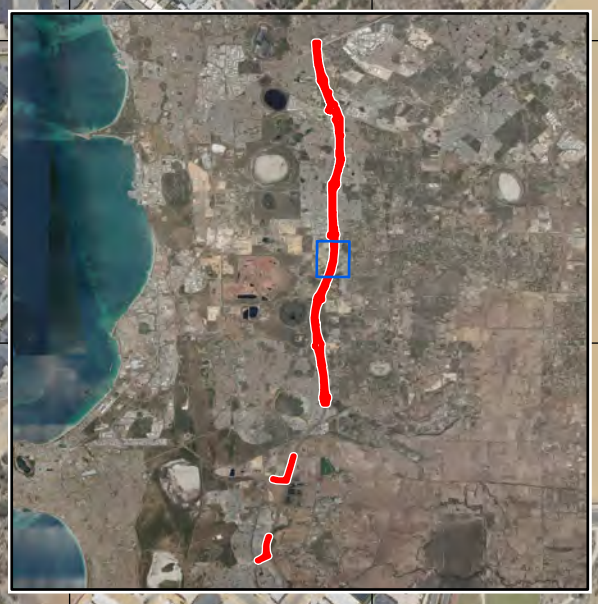

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Kwinana Fwy

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
Print date: 28 May 2025 - 17:24

Data source: WANow: Landgate / SLIP. Created by: klabez

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Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Kwinana Fwy

Anketell Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Native and introduced shrubs
- Cleared

Kwinana Fwy

Thomas Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

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Data source: WANow: Landgate / SLIP. Created by: klabez

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6433400 6433200 6433000 6432800 6432600 6432400 6432200 6432000 6431800

Thomas Rd

Kwinana Fwy

Johnson Rd

SLIP POWERED BY LANDGATE

Legend

- Potential roosting habitat
- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Marri woodland
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Paper Size ISO A3

0 50 100 150 200

Meters

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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6431600 6431400 6431200 6431000 6430800 6430600 6430400 6430200 6430000

Legend

- Major road
- Survey area

Fauna Habitat

- Banksia woodland
- Eucalyptus woodland over Banksia
- Melaleuca dampland and sparse flooded gum
- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Johnson Rd

Kwinana Fwy

Bertram Rd

Mortimer Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Baldivis Rd

Kwinana Fwy

Kulija Rd

Mundijong Rd

Mundijong Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
Print date: 28 May 2025 - 17:26

Data source: WANow: Landgate / SLIP. Created by: klabez

388800 389000 389200 389400 389600 389800 390000

6423800 6423600 6423400 6423200 6423000 6422800 6422600 6422400 6422200

Legend

- Major road
- Survey area

Fauna Habitat

- Modified wetland drainage area
- Native and introduced shrubs
- Naturalised and native trees
- Cleared

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Black Cockatoo Potential Night Roost Habitat

Project No. **12634226**
Revision No. **0**
Date **28/05/2025**

FIGURE 9C

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_09C_BlackCockatooPotentialNightRoostHabitat_Rev0
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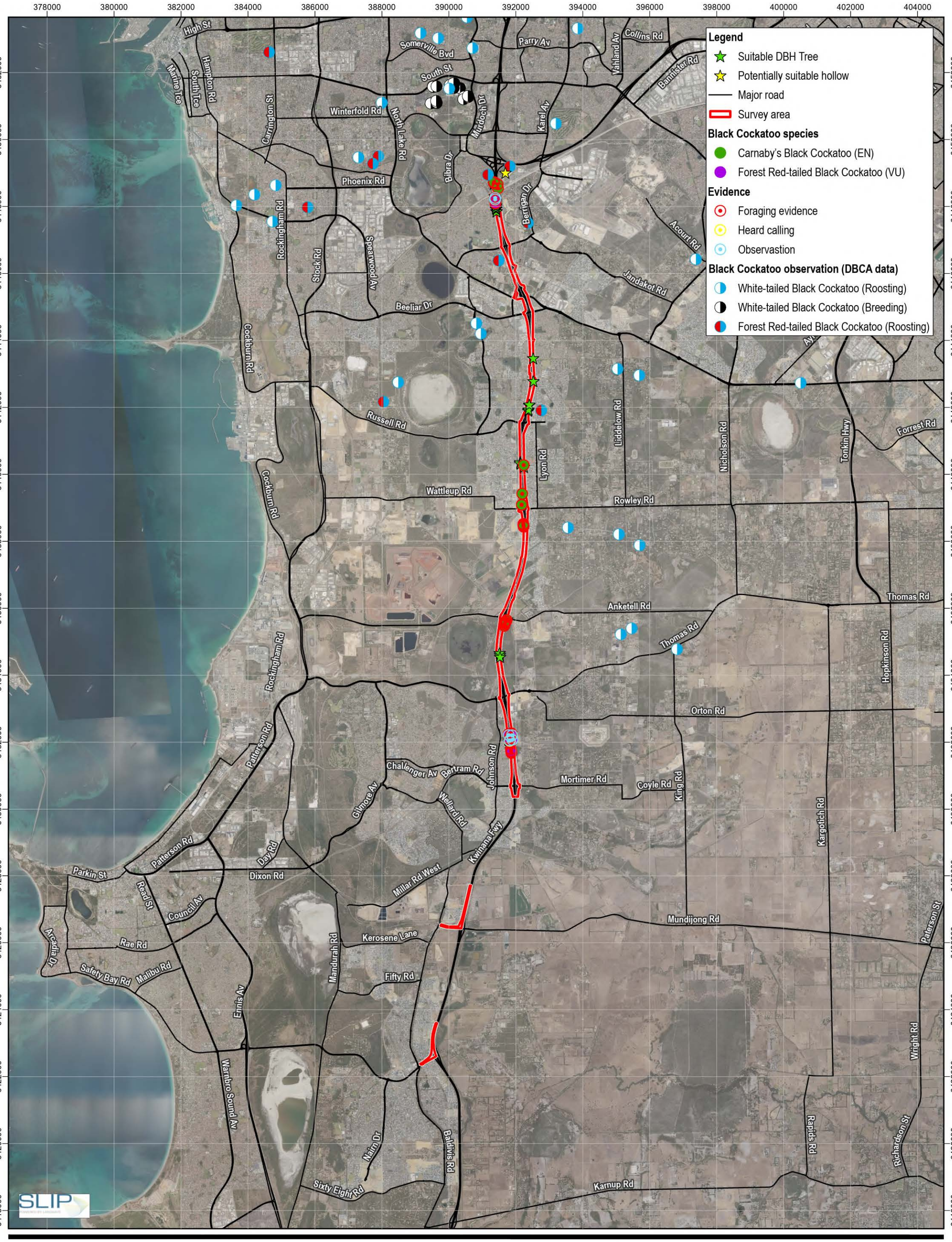
Data source: WANow: Landgate / SLIP. Created by: klabez



Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Project No.	**12634226**
Revision No.	**0**
Date	**01/09/2025**

Black Cockatoo Records

(Note: Figure has been scaled due to presence of species on the WA Sensitive Species List)

FIGURE 10

G:\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_10_BCHabitat_rev0_ScaledForSensitivity
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Roe Hwy

Kwinana Fwy

Berrigan Dr

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Multiple Use

6528 JANDAKOT

JANDAKOT 15716

6523 JANDAKOT

JANDAKOT 6654

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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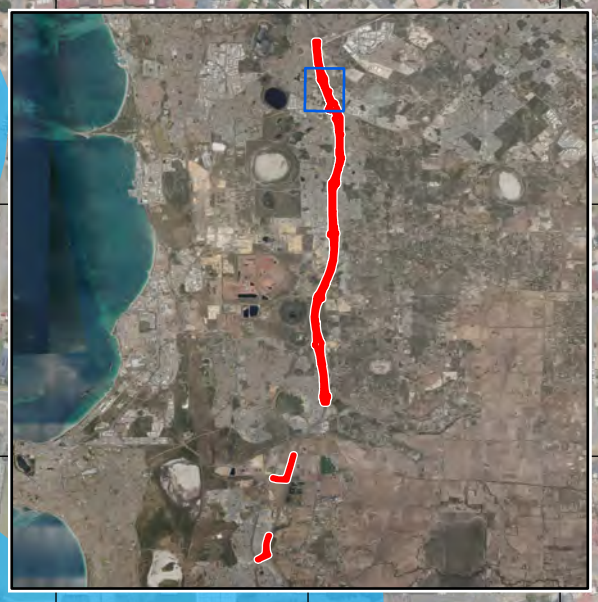

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Multiple Use
- Resource Enhancement

JANDAKOT 15716

JANDAKOT 6654

Berrigan Dr

JANDAKOT 6655

JANDAKOT 6520

JANDAKOT 6651

Kwinana Fwy

6521 JANDAKOT

North Lake Rd

JANDAKOT 6652

Armadale Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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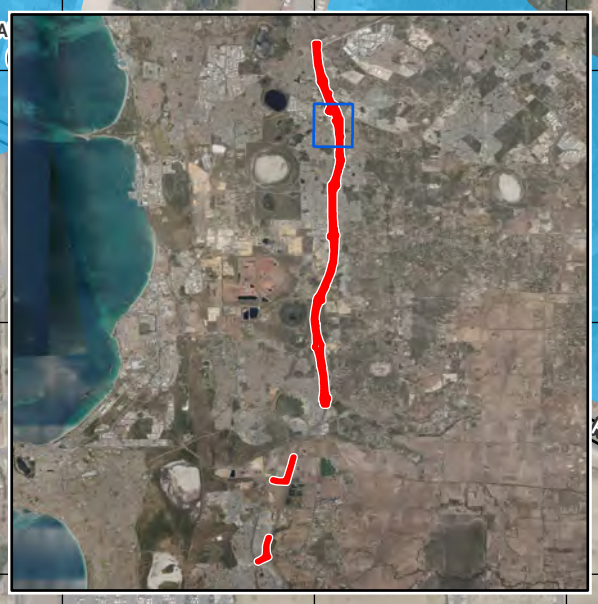

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Multiple Use
- Resource Enhancement

6652
JANDAKOT

JANDAKOT
6659

15741
JANDAKOT

15298
JANDAKOT

JANDAKOT
13546

JANDAKOT
15297

JANDAKOT
14661

Rd
Beeliar Dr
Midgegooroo Av
Armadale Rd
Kwinana Fwy
Beeliar Dr

SLIP
POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150
Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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6443800 6443600 6443400 6443200 6443000 6442800 6442600 6442400 6442200 6442000 6441800

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

JANDAKOT 15298

JANDAKOT 13546

JANDAKOT 15297

13841 JANDAKOT

14661 JANDAKOT

Kwinana Fwy

JANDAKOT 15289

13060 JANDAKOT

6656 JANDAKOT

13510 JANDAKOT

6657 JANDAKOT

15521 JANDAKOT

15408 JANDAKOT

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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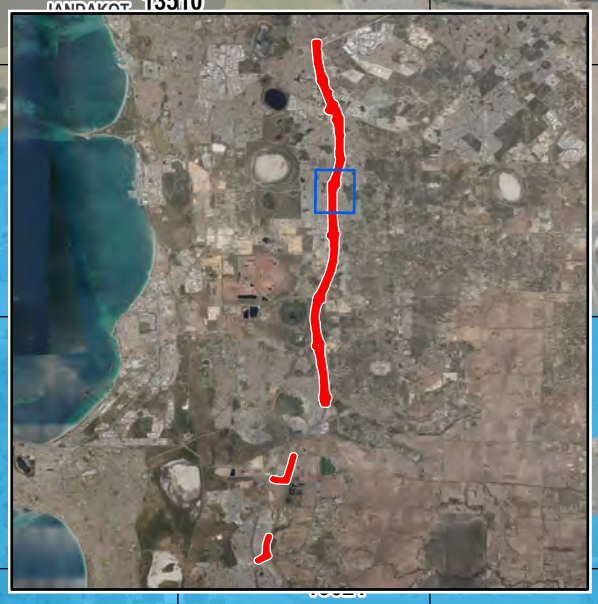

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

JANDAKOT 13510
JANDAKOT 6656
15408 JANDAKOT
Russell Rd
Gibbs Rd
JANDAKOT 15520
15519 JANDAKOT
15406 JANDAKOT
15412 JANDAKOT
JANDAKOT 15407
JANDAKOT 6665
Kwinana Fwy
14031 JANDAKOT
14029 JANDAKOT
JANDAKOT 13820
15411 JANDAKOT
Lyon Rd
JANDAKOT 14018

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Resource Enhancement

Kwinana Fwy

Lyon Rd

Rowley Rd

6716
JANDAKOT
JANDAKOT
6719

14662
JANDAKOT

JANDAKOT
6724

JANDAKOT
6530

6725
JANDAKOT

JANDAKOT
6726

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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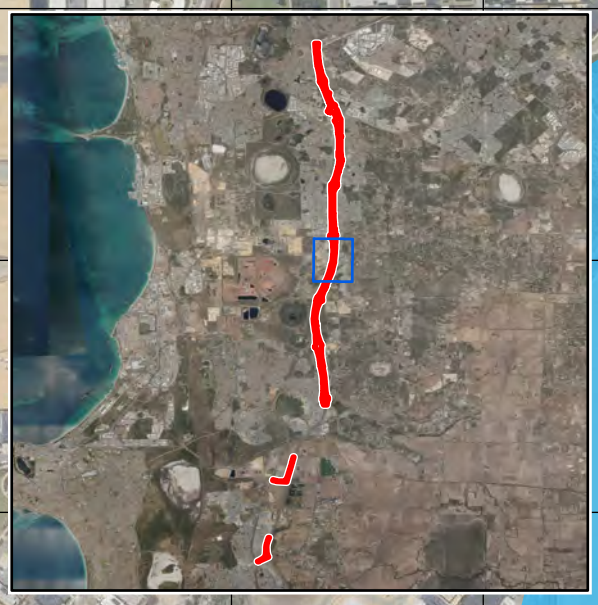

6716 JANDAKOT
6719 JANDAKOT
14662 JANDAKOT
6724 JANDAKOT
6726 JANDAKOT
6725 JANDAKOT
6664 JANDAKOT
6530 JANDAKOT
15584 JANDAKOT
14663 JANDAKOT
15585 JANDAKOT
15583 JANDAKOT
14064 JANDAKOT
12980 JANDAKOT
14063 JANDAKOT
12981 JANDAKOT

Kwinana Fwy

Legend

- Major road
- Survey area
- Evaluated wetlands

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Resource Enhancement

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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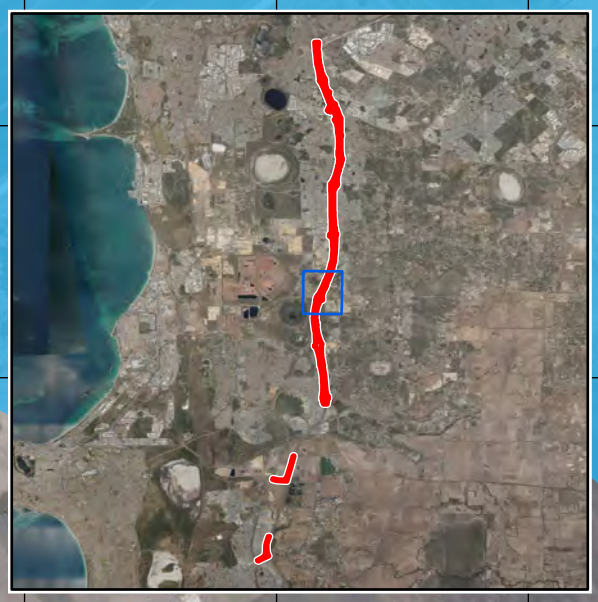

15583

JANDAKOT

JANDAKOT

JANDAKOT

JAN

1298

JANDAKOT

JANDAKOT

12981

6530

Kwinana Fwy

Anketell Rd

BIBRA

6538

6539

BIBRA

SLIP
POWERED BY LANDGATE

Legend

- Major road
- Survey area
- Evaluated wetlands

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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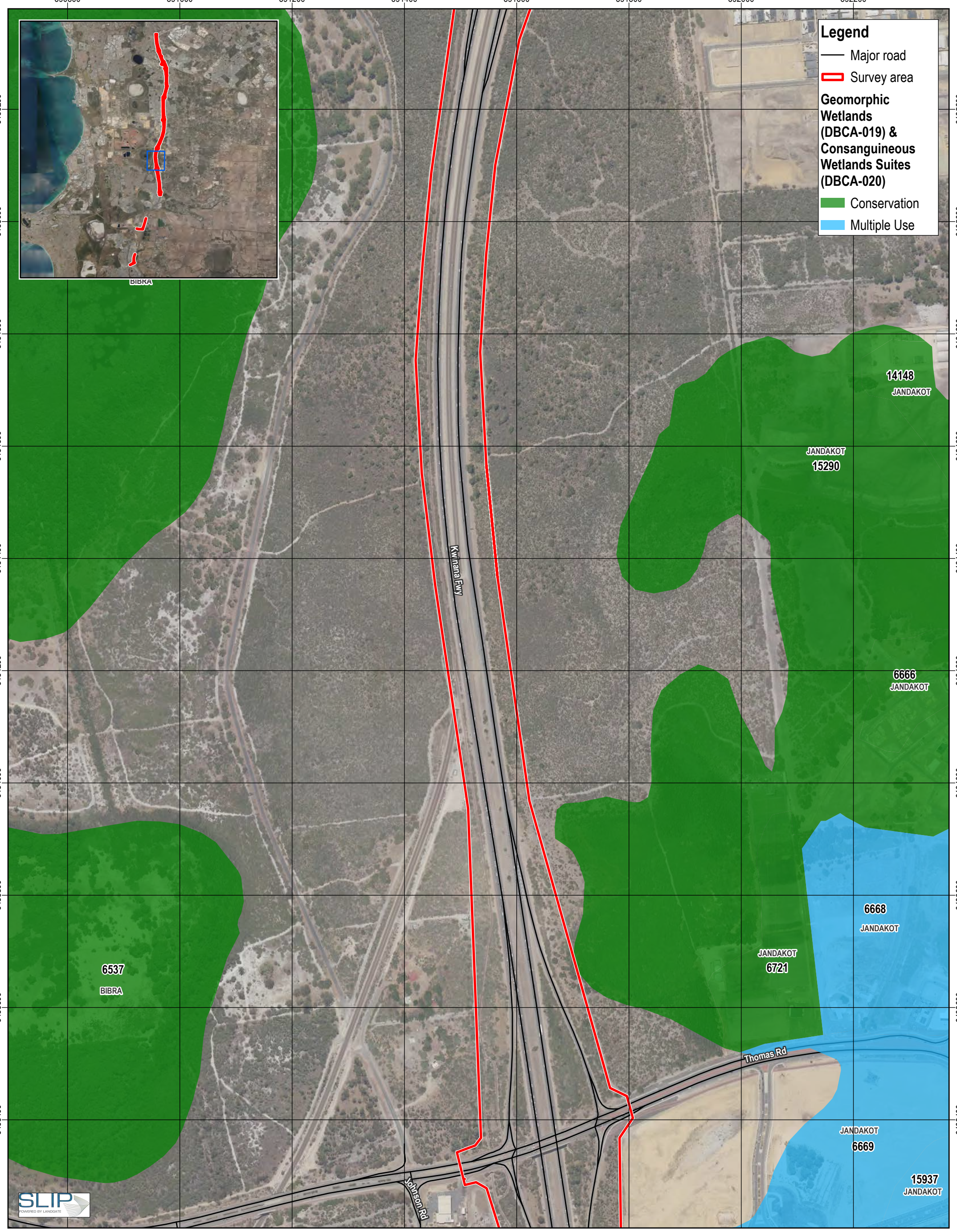

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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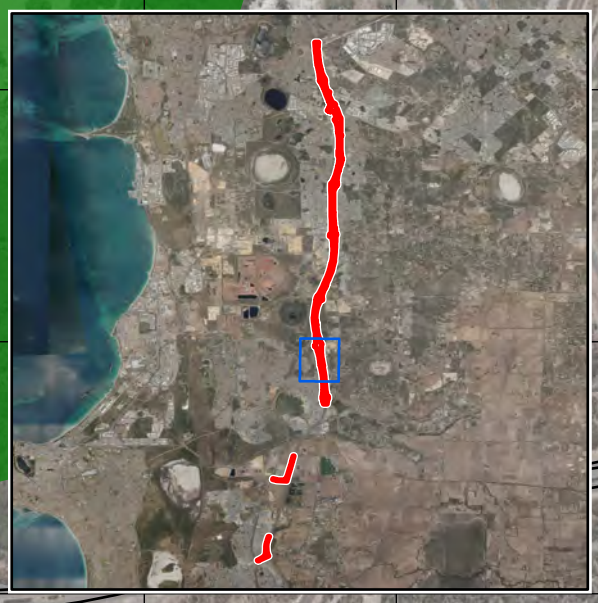

Legend

- Major road
- Survey area
- Evaluated wetlands

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Not Applicable
- Resource Enhancement

Thomas Rd

Kwinana Fwy

Johnson Rd

15290 JANDAKOT

6721 JANDAKOT

JANDAKOT 6669

JANDAKOT 6667

15967 JANDAKOT

15968 JANDAKOT

JANDAKOT 15969

JANDAKOT 14076

JANDAKOT 14079

15397 JANDAKOT

15971

JANDAKOT 15400

JANDAKOT 15970

JANDAKOT

BIBRA 6729

JANDAKOT 15399

JANDAKOT 15398

JANDAKOT 15972

JANDAKOT 15395

JANDAKOT 15973

JANDAKOT 15975

JANDAKOT 15974

6690 JANDAKOT

JANDAKOT 13966

JANDAKOT 13958

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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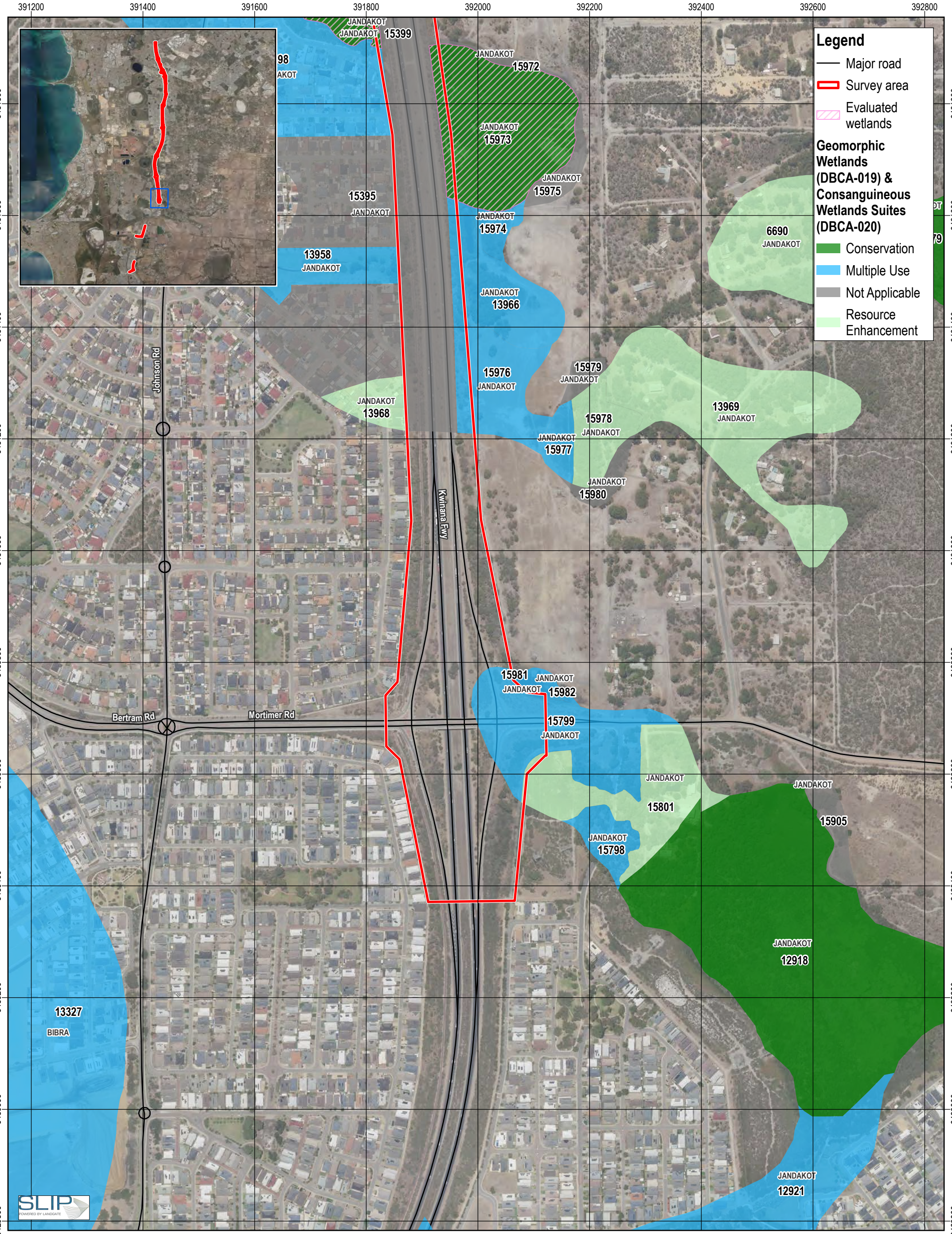

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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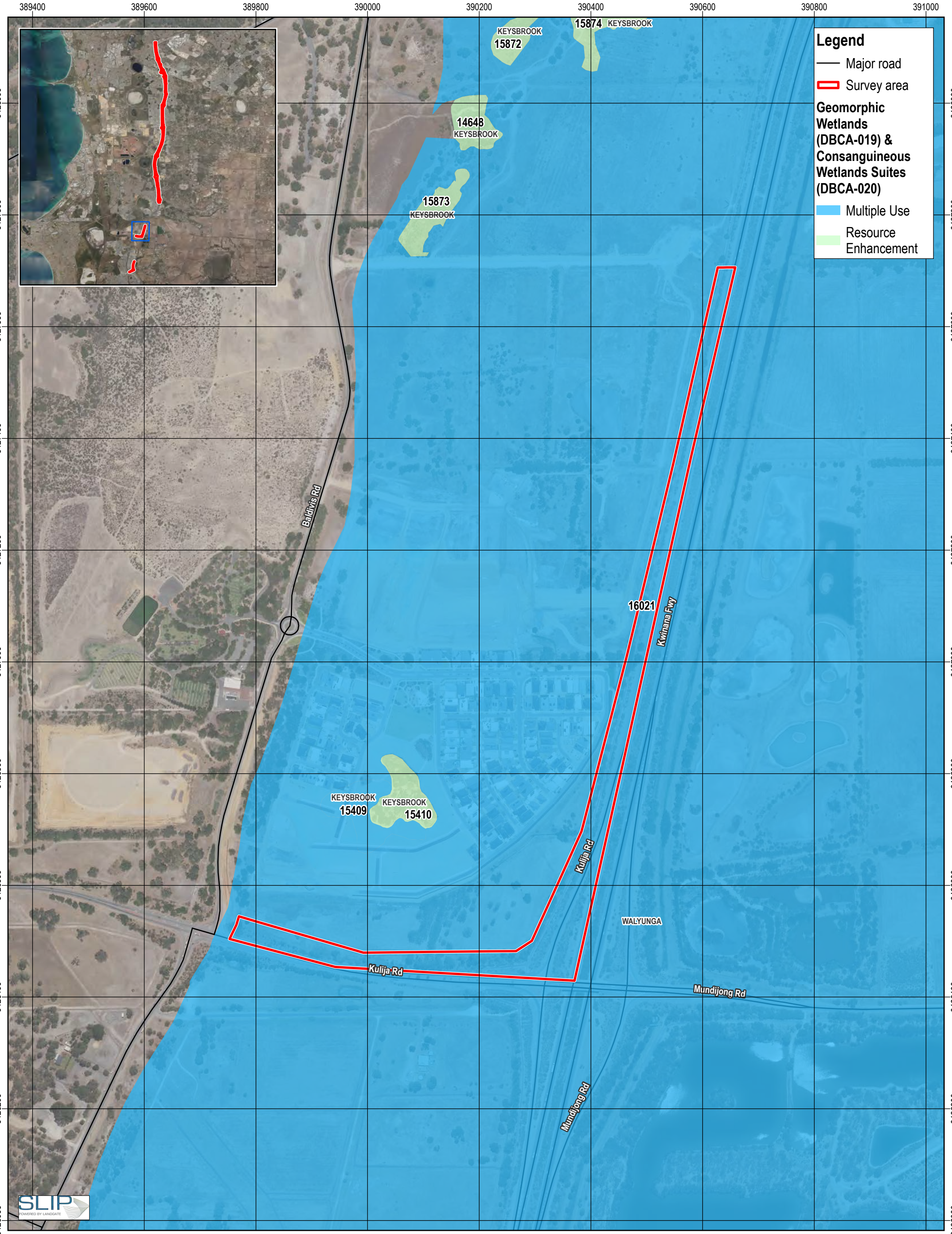

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
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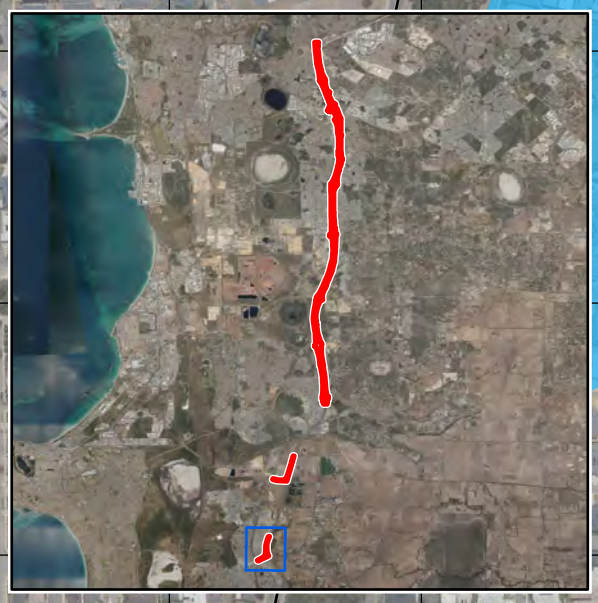

Legend

- Major road
- Survey area

Geomorphic Wetlands (DBCA-019) & Consanguineous Wetlands Suites (DBCA-020)

- Conservation
- Multiple Use
- Resource Enhancement

KEYSBROOK

KEYSBROOK
16015

KEYSBROOK
16009

16010

WALYUNGA

16021

14657
KEYSBROOK

Baldivis Rd

Kwinana Fwy

Safety Bay Rd

Safety Bay Rd

SLIP
POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Main Roads
Roe Hwy Widening Flora and Fauna Assessment

Wetland Assessment

Project No. **12634226**
Revision No. **0**
Date **24/07/2025**

FIGURE 11

\\ghdnet\ghd\AU\Perth\Projects\61\12634226\GIS\Maps\Working\12634226_figures_CB\12634226_figures_CB.aprx - 12634226_11_WetlandAssessment_rev0
Print date: 24 Jul 2025 - 19:04

Data source: WANow: Landgate / SLIP
Landgate_Subscription_Imagery\WANow: . Created by: dmontoya

Appendix B

Relevant legislation, conservation codes and background information

Relevant legislation

Federal *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

Nationally threatened flora and fauna species and ecological communities

Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

State *Environmental Protection Act 1986*

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

1. Native vegetation should not be cleared if it comprises a high level of biodiversity.
2. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
3. Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
4. Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
5. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
6. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
7. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
8. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

9. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
10. Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State *Biodiversity and Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

– Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
– If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
– The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
– The conservation of biodiversity and ecological integrity should be a fundamental consideration indecision-making
– Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976.* The main purposes of the BAM Act and its regulations are to:

– Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
– Manage the impact and spread of those pests already present in the state
– Safely manage the use of agricultural and veterinary chemicals
– Increased control over the sale of agricultural products that contain violative chemical residues.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the *Australian Heritage Commission Act 1975* of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in "Bush Forever" Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002.*
The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) applies.
Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

Reserves and conservation areas

Bush Forever

Bush Forever, which was released in December 2000 and proclaimed in 2010, is a Government initiate aimed to retain and protect regionally significant bushland on the Swan Coastal Plain within the Perth Metropolitan Region. Bush Forever aims to protect more than 51,000 hectares of regionally significant bushland within 287 sites across the metropolitan portion of the Swan Coastal Plain (Government of Western Australia (GoWA) 2000). Bush Forever sites constitute ESAs as declared by a notice under Section 51B of the EP Act.

Department of Biodiversity, Conservation and Attractions managed land and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional parks, nature reserves, State forest and timber reserves. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed land use changes and development proposals that abut DBCA managed lands will generally be referred to DBCA throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil.

Ramsar Wetlands (Wetlands of International Importance)

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity … because of their ecological, botanical, zoological, limnological or hydrological importance” (DAWE 2020b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DAWE 2020b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DAWE 2020a):

– It is a good example of a wetland type occurring within a biogeographic region in Australia
– It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
– It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
– The wetland supports one percent or more of the national populations of any native plant or animal taxa
– The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
– The wetland is of outstanding historical or cultural significance.

Geomorphic wetlands

Categorisation of wetlands has been conducted by Hill et al. (1996), delineating Swan Coastal Plain wetlands into levels of protection and management categories. Conservation Category Wetlands are wetlands that support high levels of attributes and functions. Resource Enhancement Wetlands are those that have been partly modified but still support substantial functions and attributes. Multiple Use Wetlands are classified as those wetlands with few attributes that still provide important wetland functions. Multiple Use wetlands have few important ecological attributes and functions remaining.

The Geomorphic Wetlands Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia’s Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2019), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated every 2-3 years.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (EPA 2016a). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Vegetation condition rating scale for the South West and Interzone Botanical Provinces

Condition	South West and Interzone Botanical Provinces description
Pristine	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, 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. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees or shrubs.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State BC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The BC Act provides for the Minister to list an ecological community as a TEC (section 27), or as a collapsed ecological community (section 31) statutory listing of State TECs by the Minister. The legislation also describes statutory processes for preparing recovery plans for TECs, the registration of their critical habitat, and penalties for unauthorised modification of TECs.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Codes and definitions for TECs listed under the EPBC Act and/or BC Act

Categories	Definitions
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Endangered *(EN)	An ecological community if, at that time: – is not critically endangered; and – is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Vulnerable (VU)	An ecological community if, at that time: – is not critically endangered or endangered; and – is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Western Australia Conservation Categories (BC Act)	
Threatened Ecological Communities	
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Categories	Definitions
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.
Collapsed ecological communities	
An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time – – there is no reasonable doubt that the last occurrence of the ecological community has collapsed); or – the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover – • its species composition or structure; or • its species composition and structure. Section 33 of the BC Act provides for a collapsed ecological community to be regarded as a threatened ecological community if it is discovered in a state that no longer makes it eligible for listing as a collapsed ecological community.	

Categories and definitions for PECs as listed by the DBCA

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2	Poorly known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority 3	Poorly known ecological communities. – Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: – communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; – communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Priority 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. – Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. – Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

Category	Description
	– Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016a, b) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- A role as a refuge
- Providing an important function required to maintain ecological integrity of a significant ecosystem
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in 'pristine' condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range.

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the BC Act can warrant referral to DAWE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for flora and fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of flora and fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act flora and fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national

extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened or Extinct species under the BC Act cannot also be listed as Specially Protected species.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

For the purposes of this assessment, all species listed under the EPBC Act, BC Act and DBCA Priority species are considered significant.

Categories and definitions for EPBC Act and BC Act listed flora and fauna species

Conservation category	Definition
Threatened species	
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.
Extinct species	
Extinct (EX)	Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).
Extinct in the Wild (EW)	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).
Specially protected species	
Migratory (MI)	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
Species of Special conservation interest (conservation dependent fauna) (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Codes for DBCA listed Priority flora and fauna

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

Priority category	Definition
Priority 2	Poorly-known taxa Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	Poorly-known taxa Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	Rare, Near Threatened and other taxa in need of monitoring – Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. – Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. – Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016a, b) states that significant flora may include taxa that have/are:

– A keystone role in a particular habitat for Threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
– Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
– New species or anomalous features that indicate a potential new species
– Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
– Unusual species, including restricted subspecies, varieties, or naturally occurring hybrids
– Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems).

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007.*

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

– Invasiveness
– Impacts
– Potential for spread
– Socio-economic and environmental values.

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

References

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EPA 2020, Technical Guide – Terrestrial Fauna Surveys, EPA, Perth, WA.

EPA 2016a, Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment, EPA, Perth, WA.

EPA 2016b, Environmental Factor Guideline - Flora and Vegetation, EPA, Perth, WA.

GoWA 2019, 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full report), Current as of March 2019, Perth Western Australia, Department of Environment and Conservation, from https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

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Appendix C

Database searches

PMST search results

NatureMap results for flora and fauna

EPBC Act Protected Matters Report

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

Report created: 29-Oct-2024

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

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	94
Listed Migratory Species:	72

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	459
Commonwealth Heritage Places:	3
Listed Marine Species:	99
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	46
Regional Forest Agreements:	1
Nationally Important Wetlands:	7
EPBC Act Referrals:	148
Key Ecological Features (Marine):	None
Biologically Important Areas:	10
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status	Buffer Status
Australian Convict Sites (Fremantle Prison)	WA	Declared property	In buffer area only

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Historic			
Fremantle Prison (former)	WA	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Forrestdale and thomsons lakes	Within Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

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

Community Name	Threatened Category	Presence Text	Buffer Status
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In feature area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In feature area
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area	In feature area
Empodisma peatlands of southwestern Australia	Endangered	Community may occur within area	In feature area
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community likely to occur within area	In buffer area only
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area	In buffer area only
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area	In buffer area only
Zanda baudinii listed as Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Roosting known to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
INSECT			
Leioproctus douglasiellus a short-tongued bee [66756]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Neopasiphae simplicior A native bee [66821]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
MAMMAL			
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Pseudocheirus occidentalis](#) Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Setonix brachyurus](#) Quokka [229]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
OTHER			
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In feature area
PLANT			
[Acacia anomala](#) Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Acacia aphylla](#) Leafless Rock Wattle [13553]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Andersonia gracilis](#) Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area	In feature area
[Anigozanthos viridis subsp. terraspectans](#) Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Anthocercis gracilis](#) Slender Tailflower [11103]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Austrostipa bronweniae listed as Austrostipa bronwenae](#) [92773]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Austrostipa jacobsiana [87809]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat known to occur within area	In feature area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area	In feature area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat known to occur within area	In feature area
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat may occur within area	In feature area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat known to occur within area	In feature area
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Diplolaena andrewsii [6601]	Endangered	Species or species habitat likely to occur within area	In feature area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area	In feature area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area	In feature area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area	In feature area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat known to occur within area	In feature area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area	In feature area
Goodenia arthrotricha [12448]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area	In feature area
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Grevillea thelemanniana Spider Net Grevillea [32835]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat known to occur within area	In feature area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Morelotia australiensis listed as Tetraria australiensis			
Southern Tetraria [92784]	Vulnerable	Species or species habitat known to occur within area	In feature area
Ptilotus pyramidatus			
Pyramid Mulla-mulla [18216]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Synaphea sp. Fairbridge Farm (D.Papenfus 696)			
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Synaphea sp. Pinjarra Plain (A.S.George 17182)			
[86878]	Endangered	Species or species habitat may occur within area	In feature area
Synaphea sp. Serpentine (G.R.Brand 103)			
[86879]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra dedmaniarum			
Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area	In feature area
Thelymitra stellata			
Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area	In feature area
Trithuria occidentalis			
Swan Hydatella [42224]	Endangered	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
SHARK			
Carcharias taurus (west coast population)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Carcharhinus longimanus](#) Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only
[Carcharias taurus](#) Grey Nurse Shark [64469]		Species or species habitat likely to occur within area	In buffer area only
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Eubalaena australis as Balaena glacialis australis](#) Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
[Lamna nasus](#) Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only
[Megaptera novaeangliae](#) Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In buffer area only
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Orcinus orca](#)			
Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
[Pristis pristis](#)			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
[Rhincodon typus](#)			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
[Motacilla cinerea](#)			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#)			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Arenaria interpres](#)			
Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only
[Calidris acuminata](#)			
Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
[Calidris alba](#)			
Sanderling [875]		Roosting known to occur within area	In buffer area only
[Calidris canutus](#)			
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#)			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area	In buffer area only
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area	In buffer area only
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area	In buffer area only
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area	In buffer area only
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In buffer area only
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Xenus cinereus			
Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - AIRTC CANNINGTON [50232]	WA	In buffer area only
Defence - AIRTC CANNINGTON [50233]	WA	In buffer area only
Defence - AIRTC CANNINGTON [50230]	WA	In buffer area only
Defence - AIRTC CANNINGTON [50231]	WA	In buffer area only
Defence - AIRTC CANNINGTON [50229]	WA	In buffer area only
Defence - ARTILLERY BARRACKS - FREMANTLE [50155]	WA	In buffer area only
Defence - BUSHMEAD RIFLE RANGE [50143]	WA	In buffer area only
Defence - BUSHMEAD TRAINING AREA [50259]	WA	In buffer area only
Defence - BUSHMEAD TRAINING AREA [50258]	WA	In buffer area only
Defence - BUSHMEAD TRAINING AREA [50260]	WA	In buffer area only
Defence - EAST FREMANTLE SMALL CRAFT BASE [50118]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50210]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50217]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50213]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50211]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50212]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50216]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Defence - HOLDFAST BARRACKS [50218]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50219]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50214]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50215]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50209]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50208]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50207]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50206]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50202]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50228]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50205]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50223]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50222]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50221]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50220]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50225]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50227]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50224]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50226]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50203]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50204]	WA	In buffer area only
Defence - HOLDFAST BARRACKS [50201]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50148]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50147]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50146]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50149]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50154]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50150]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50152]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50151]	WA	In buffer area only
Defence - LEEUWIN BARRACKS - EAST FREMANTLE [50153]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50180]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50179]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50176]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50177]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50178]	WA	In buffer area only
Defence - PRESTON POINT TRAINING DEPOT [50174]	WA	In buffer area only
Defence - PRESTON POINT TRAINING DEPOT [50172]	WA	In buffer area only
Defence - PRESTON POINT TRAINING DEPOT [50173]	WA	In buffer area only
Unknown		
Commonwealth Land - [51122]	WA	In buffer area only
Commonwealth Land - [51125]	WA	In buffer area only
Commonwealth Land - [51356]	WA	In feature area
Commonwealth Land - [51357]	WA	In feature area
Commonwealth Land - [51350]	WA	In feature area
Commonwealth Land - [51351]	WA	In buffer area only
Commonwealth Land - [51358]	WA	In buffer area only
Commonwealth Land - [51359]	WA	In buffer area only
Commonwealth Land - [51426]	WA	In buffer area only
Commonwealth Land - [51355]	WA	In buffer area only
Commonwealth Land - [51277]	WA	In buffer area only
Commonwealth Land - [51274]	WA	In buffer area only
Commonwealth Land - [51273]	WA	In buffer area only
Commonwealth Land - [51270]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51378]	WA	In buffer area only
Commonwealth Land - [51276]	WA	In buffer area only
Commonwealth Land - [51376]	WA	In buffer area only
Commonwealth Land - [51375]	WA	In buffer area only
Commonwealth Land - [50672]	WA	In buffer area only
Commonwealth Land - [51272]	WA	In buffer area only
Commonwealth Land - [51128]	WA	In buffer area only
Commonwealth Land - [51901]	WA	In feature area
Commonwealth Land - [51900]	WA	In feature area
Commonwealth Land - [51907]	WA	In buffer area only
Commonwealth Land - [51906]	WA	In buffer area only
Commonwealth Land - [51909]	WA	In buffer area only
Commonwealth Land - [51908]	WA	In buffer area only
Commonwealth Land - [51364]	WA	In buffer area only
Commonwealth Land - [50671]	WA	In buffer area only
Commonwealth Land - [51371]	WA	In buffer area only
Commonwealth Land - [51370]	WA	In buffer area only
Commonwealth Land - [51373]	WA	In buffer area only
Commonwealth Land - [51372]	WA	In buffer area only
Commonwealth Land - [51126]	WA	In buffer area only
Commonwealth Land - [51298]	WA	In buffer area only
Commonwealth Land - [51299]	WA	In buffer area only
Commonwealth Land - [51292]	WA	In buffer area only
Commonwealth Land - [51293]	WA	In buffer area only
Commonwealth Land - [51291]	WA	In buffer area only
Commonwealth Land - [51227]	WA	In buffer area only
Commonwealth Land - [51224]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51226]	WA	In buffer area only
Commonwealth Land - [51515]	WA	In buffer area only
Commonwealth Land - [51516]	WA	In buffer area only
Commonwealth Land - [51518]	WA	In buffer area only
Commonwealth Land - [51514]	WA	In buffer area only
Commonwealth Land - [50877]	WA	In buffer area only
Commonwealth Land - [50878]	WA	In buffer area only
Commonwealth Land - [51200]	WA	In buffer area only
Commonwealth Land - [50688]	WA	In buffer area only
Commonwealth Land - [50677]	WA	In buffer area only
Commonwealth Land - [50950]	WA	In buffer area only
Commonwealth Land - [51342]	WA	In buffer area only
Commonwealth Land - [51354]	WA	In feature area
Commonwealth Land - [50690]	WA	In buffer area only
Commonwealth Land - [51353]	WA	In buffer area only
Commonwealth Land - [51220]	WA	In buffer area only
Commonwealth Land - [51221]	WA	In buffer area only
Commonwealth Land - [51228]	WA	In buffer area only
Commonwealth Land - [51229]	WA	In buffer area only
Commonwealth Land - [51225]	WA	In buffer area only
Commonwealth Land - [51222]	WA	In buffer area only
Commonwealth Land - [51223]	WA	In buffer area only
Commonwealth Land - [51203]	WA	In buffer area only
Commonwealth Land - [51202]	WA	In buffer area only
Commonwealth Land - [51205]	WA	In buffer area only
Commonwealth Land - [51204]	WA	In buffer area only
Commonwealth Land - [51201]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51275]	WA	In buffer area only
Commonwealth Land - [51207]	WA	In buffer area only
Commonwealth Land - [51206]	WA	In buffer area only
Commonwealth Land - [51209]	WA	In buffer area only
Commonwealth Land - [51208]	WA	In buffer area only
Commonwealth Land - [51977]	WA	In buffer area only
Commonwealth Land - [50850]	WA	In buffer area only
Commonwealth Land - [50859]	WA	In buffer area only
Commonwealth Land - [51271]	WA	In buffer area only
Commonwealth Land - [50853]	WA	In buffer area only
Commonwealth Land - [50779]	WA	In buffer area only
Commonwealth Land - [51494]	WA	In buffer area only
Commonwealth Land - [50751]	WA	In buffer area only
Commonwealth Land - [50809]	WA	In buffer area only
Commonwealth Land - [50755]	WA	In buffer area only
Commonwealth Land - [50750]	WA	In buffer area only
Commonwealth Land - [51257]	WA	In buffer area only
Commonwealth Land - [50870]	WA	In buffer area only
Commonwealth Land - [50873]	WA	In buffer area only
Commonwealth Land - [50872]	WA	In buffer area only
Commonwealth Land - [50874]	WA	In buffer area only
Commonwealth Land - [50754]	WA	In buffer area only
Commonwealth Land - [50756]	WA	In buffer area only
Commonwealth Land - [51322]	WA	In buffer area only
Commonwealth Land - [51321]	WA	In buffer area only
Commonwealth Land - [51320]	WA	In buffer area only
Commonwealth Land - [51327]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51193]	WA	In buffer area only
Commonwealth Land - [51194]	WA	In buffer area only
Commonwealth Land - [51191]	WA	In buffer area only
Commonwealth Land - [51192]	WA	In buffer area only
Commonwealth Land - [51294]	WA	In buffer area only
Commonwealth Land - [51190]	WA	In buffer area only
Commonwealth Land - [51296]	WA	In buffer area only
Commonwealth Land - [51295]	WA	In buffer area only
Commonwealth Land - [51290]	WA	In buffer area only
Commonwealth Land - [51297]	WA	In buffer area only
Commonwealth Land - [51195]	WA	In buffer area only
Commonwealth Land - [51196]	WA	In buffer area only
Commonwealth Land - [51197]	WA	In buffer area only
Commonwealth Land - [51198]	WA	In buffer area only
Commonwealth Land - [51199]	WA	In buffer area only
Commonwealth Land - [50708]	WA	In buffer area only
Commonwealth Land - [50707]	WA	In buffer area only
Commonwealth Land - [50686]	WA	In buffer area only
Commonwealth Land - [50792]	WA	In buffer area only
Commonwealth Land - [51345]	WA	In buffer area only
Commonwealth Land - [50793]	WA	In buffer area only
Commonwealth Land - [51328]	WA	In buffer area only
Commonwealth Land - [51329]	WA	In buffer area only
Commonwealth Land - [51305]	WA	In buffer area only
Commonwealth Land - [51269]	WA	In buffer area only
Commonwealth Land - [51307]	WA	In buffer area only
Commonwealth Land - [51927]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51304]	WA	In buffer area only
Commonwealth Land - [51972]	WA	In buffer area only
Commonwealth Land - [51306]	WA	In buffer area only
Commonwealth Land - [51115]	WA	In buffer area only
Commonwealth Land - [51116]	WA	In buffer area only
Commonwealth Land - [51288]	WA	In buffer area only
Commonwealth Land - [51289]	WA	In buffer area only
Commonwealth Land - [51326]	WA	In buffer area only
Commonwealth Land - [51325]	WA	In buffer area only
Commonwealth Land - [51324]	WA	In buffer area only
Commonwealth Land - [51498]	WA	In buffer area only
Commonwealth Land - [51266]	WA	In buffer area only
Commonwealth Land - [51267]	WA	In buffer area only
Commonwealth Land - [51260]	WA	In buffer area only
Commonwealth Land - [51261]	WA	In buffer area only
Commonwealth Land - [51308]	WA	In buffer area only
Commonwealth Land - [51268]	WA	In buffer area only
Commonwealth Land - [51300]	WA	In buffer area only
Commonwealth Land - [51301]	WA	In buffer area only
Commonwealth Land - [51265]	WA	In buffer area only
Commonwealth Land - [51264]	WA	In buffer area only
Commonwealth Land - [50731]	WA	In buffer area only
Commonwealth Land - [50730]	WA	In buffer area only
Commonwealth Land - [51928]	WA	In buffer area only
Commonwealth Land - [50949]	WA	In buffer area only
Commonwealth Land - [51309]	WA	In buffer area only
Commonwealth Land - [50785]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50836]	WA	In buffer area only
Commonwealth Land - [50782]	WA	In buffer area only
Commonwealth Land - [50784]	WA	In buffer area only
Commonwealth Land - [50837]	WA	In buffer area only
Commonwealth Land - [50786]	WA	In buffer area only
Commonwealth Land - [50787]	WA	In buffer area only
Commonwealth Land - [50781]	WA	In buffer area only
Commonwealth Land - [50735]	WA	In buffer area only
Commonwealth Land - [50736]	WA	In buffer area only
Commonwealth Land - [50833]	WA	In buffer area only
Commonwealth Land - [50832]	WA	In buffer area only
Commonwealth Land - [50732]	WA	In buffer area only
Commonwealth Land - [50733]	WA	In buffer area only
Commonwealth Land - [50734]	WA	In buffer area only
Commonwealth Land - [50788]	WA	In buffer area only
Commonwealth Land - [50838]	WA	In buffer area only
Commonwealth Land - [50789]	WA	In buffer area only
Commonwealth Land - [50834]	WA	In buffer area only
Commonwealth Land - [50839]	WA	In buffer area only
Commonwealth Land - [50780]	WA	In buffer area only
Commonwealth Land - [50835]	WA	In buffer area only
Commonwealth Land - [51146]	WA	In feature area
Commonwealth Land - [51147]	WA	In buffer area only
Commonwealth Land - [51922]	WA	In buffer area only
Commonwealth Land - [51923]	WA	In buffer area only
Commonwealth Land - [51920]	WA	In buffer area only
Commonwealth Land - [51921]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51142]	WA	In buffer area only
Commonwealth Land - [51143]	WA	In buffer area only
Commonwealth Land - [51144]	WA	In buffer area only
Commonwealth Land - [51145]	WA	In buffer area only
Commonwealth Land - [51363]	WA	In buffer area only
Commonwealth Land - [51362]	WA	In buffer area only
Commonwealth Land - [51361]	WA	In buffer area only
Commonwealth Land - [51360]	WA	In buffer area only
Commonwealth Land - [51365]	WA	In buffer area only
Commonwealth Land - [50666]	WA	In buffer area only
Commonwealth Land - [51910]	WA	In buffer area only
Commonwealth Land - [51911]	WA	In buffer area only
Commonwealth Land - [51912]	WA	In buffer area only
Commonwealth Land - [51913]	WA	In buffer area only
Commonwealth Land - [51975]	WA	In buffer area only
Commonwealth Land - [51287]	WA	In buffer area only
Commonwealth Land - [51284]	WA	In buffer area only
Commonwealth Land - [51283]	WA	In buffer area only
Commonwealth Land - [51286]	WA	In buffer area only
Commonwealth Land - [51285]	WA	In buffer area only
Commonwealth Land - [51280]	WA	In buffer area only
Commonwealth Land - [51971]	WA	In buffer area only
Commonwealth Land - [51282]	WA	In buffer area only
Commonwealth Land - [51281]	WA	In buffer area only
Commonwealth Land - [51915]	WA	In buffer area only
Commonwealth Land - [51916]	WA	In buffer area only
Commonwealth Land - [51914]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51183]	WA	In buffer area only
Commonwealth Land - [51182]	WA	In buffer area only
Commonwealth Land - [51917]	WA	In buffer area only
Commonwealth Land - [51918]	WA	In buffer area only
Commonwealth Land - [51187]	WA	In buffer area only
Commonwealth Land - [51341]	WA	In buffer area only
Commonwealth Land - [51181]	WA	In buffer area only
Commonwealth Land - [51180]	WA	In buffer area only
Commonwealth Land - [51163]	WA	In buffer area only
Commonwealth Land - [51160]	WA	In feature area
Commonwealth Land - [51161]	WA	In buffer area only
Commonwealth Land - [51166]	WA	In buffer area only
Commonwealth Land - [51263]	WA	In buffer area only
Commonwealth Land - [51262]	WA	In buffer area only
Commonwealth Land - [51243]	WA	In buffer area only
Commonwealth Land - [51162]	WA	In buffer area only
Commonwealth Land - [51242]	WA	In buffer area only
Commonwealth Land - [51169]	WA	In buffer area only
Commonwealth Land - [50763]	WA	In buffer area only
Commonwealth Land - [50762]	WA	In buffer area only
Commonwealth Land - [50761]	WA	In buffer area only
Commonwealth Land - [50812]	WA	In buffer area only
Commonwealth Land - [51167]	WA	In buffer area only
Commonwealth Land - [51164]	WA	In buffer area only
Commonwealth Land - [51165]	WA	In buffer area only
Commonwealth Land - [50817]	WA	In buffer area only
Commonwealth Land - [51168]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50816]	WA	In buffer area only
Commonwealth Land - [51186]	WA	In buffer area only
Commonwealth Land - [51185]	WA	In buffer area only
Commonwealth Land - [51184]	WA	In buffer area only
Commonwealth Land - [51189]	WA	In buffer area only
Commonwealth Land - [51188]	WA	In buffer area only
Commonwealth Land - [51343]	WA	In buffer area only
Commonwealth Land - [51210]	WA	In buffer area only
Commonwealth Land - [51211]	WA	In buffer area only
Commonwealth Land - [51217]	WA	In buffer area only
Commonwealth Land - [50517]	WA	In buffer area only
Commonwealth Land - [50814]	WA	In buffer area only
Commonwealth Land - [50885]	WA	In buffer area only
Commonwealth Land - [50862]	WA	In buffer area only
Commonwealth Land - [51352]	WA	In buffer area only
Commonwealth Land - [50516]	WA	In buffer area only
Commonwealth Land - [51421]	WA	In buffer area only
Commonwealth Land - [51924]	WA	In buffer area only
Commonwealth Land - [51425]	WA	In buffer area only
Commonwealth Land - [51213]	WA	In buffer area only
Commonwealth Land - [51148]	WA	In buffer area only
Commonwealth Land - [51212]	WA	In buffer area only
Commonwealth Land - [51149]	WA	In buffer area only
Commonwealth Land - [51249]	WA	In buffer area only
Commonwealth Land - [51248]	WA	In buffer area only
Commonwealth Land - [50742]	WA	In buffer area only
Commonwealth Land - [51245]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50745]	WA	In buffer area only
Commonwealth Land - [51244]	WA	In buffer area only
Commonwealth Land - [50740]	WA	In buffer area only
Commonwealth Land - [51247]	WA	In buffer area only
Commonwealth Land - [50743]	WA	In buffer area only
Commonwealth Land - [51246]	WA	In buffer area only
Commonwealth Land - [50749]	WA	In buffer area only
Commonwealth Land - [50741]	WA	In buffer area only
Commonwealth Land - [51241]	WA	In buffer area only
Commonwealth Land - [50864]	WA	In buffer area only
Commonwealth Land - [51501]	WA	In buffer area only
Commonwealth Land - [50866]	WA	In buffer area only
Commonwealth Land - [50865]	WA	In buffer area only
Commonwealth Land - [50860]	WA	In buffer area only
Commonwealth Land - [50867]	WA	In buffer area only
Commonwealth Land - [50861]	WA	In buffer area only
Commonwealth Land - [51333]	WA	In buffer area only
Commonwealth Land - [51330]	WA	In buffer area only
Commonwealth Land - [51332]	WA	In buffer area only
Commonwealth Land - [51338]	WA	In buffer area only
Commonwealth Land - [51339]	WA	In buffer area only
Commonwealth Land - [50683]	WA	In buffer area only
Commonwealth Land - [51344]	WA	In buffer area only
Commonwealth Land - [51334]	WA	In buffer area only
Commonwealth Land - [51335]	WA	In buffer area only
Commonwealth Land - [51336]	WA	In buffer area only
Commonwealth Land - [51337]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51347]	WA	In feature area
Commonwealth Land - [51346]	WA	In buffer area only
Commonwealth Land - [50687]	WA	In buffer area only
Commonwealth Land - [50684]	WA	In buffer area only
Commonwealth Land - [51438]	WA	In buffer area only
Commonwealth Land - [51340]	WA	In buffer area only
Commonwealth Land - [50685]	WA	In buffer area only
Commonwealth Land - [51155]	WA	In buffer area only
Commonwealth Land - [51156]	WA	In buffer area only
Commonwealth Land - [51349]	WA	In feature area
Commonwealth Land - [51348]	WA	In feature area
Commonwealth Land - [51150]	WA	In feature area
Commonwealth Land - [51152]	WA	In buffer area only
Commonwealth Land - [51151]	WA	In buffer area only
Commonwealth Land - [51153]	WA	In buffer area only
Commonwealth Land - [51158]	WA	In buffer area only
Commonwealth Land - [51159]	WA	In buffer area only
Commonwealth Land - [51238]	WA	In buffer area only
Commonwealth Land - [51231]	WA	In buffer area only
Commonwealth Land - [51230]	WA	In buffer area only
Commonwealth Land - [51233]	WA	In buffer area only
Commonwealth Land - [51232]	WA	In buffer area only
Commonwealth Land - [50669]	WA	In buffer area only
Commonwealth Land - [51427]	WA	In buffer area only
Commonwealth Land - [51368]	WA	In buffer area only
Commonwealth Land - [51369]	WA	In buffer area only
Commonwealth Land - [51215]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51216]	WA	In buffer area only
Commonwealth Land - [51219]	WA	In buffer area only
Commonwealth Land - [51214]	WA	In buffer area only
Commonwealth Land - [51367]	WA	In buffer area only
Commonwealth Land - [51366]	WA	In buffer area only
Commonwealth Land - [50710]	WA	In buffer area only
Commonwealth Land - [51303]	WA	In buffer area only
Commonwealth Land - [51302]	WA	In buffer area only
Commonwealth Land - [50819]	WA	In buffer area only
Commonwealth Land - [50766]	WA	In buffer area only
Commonwealth Land - [51255]	WA	In buffer area only
Commonwealth Land - [51278]	WA	In buffer area only
Commonwealth Land - [51256]	WA	In buffer area only
Commonwealth Land - [51279]	WA	In buffer area only
Commonwealth Land - [51251]	WA	In buffer area only
Commonwealth Land - [51252]	WA	In buffer area only
Commonwealth Land - [51253]	WA	In buffer area only
Commonwealth Land - [51254]	WA	In buffer area only
Commonwealth Land - [50796]	WA	In buffer area only
Commonwealth Land - [51178]	WA	In buffer area only
Commonwealth Land - [51179]	WA	In buffer area only
Commonwealth Land - [51250]	WA	In buffer area only
Commonwealth Land - [51218]	WA	In buffer area only
Commonwealth Land - [51374]	WA	In buffer area only
Commonwealth Land - [51236]	WA	In buffer area only
Commonwealth Land - [51415]	WA	In buffer area only
Commonwealth Land - [50670]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51417]	WA	In buffer area only
Commonwealth Land - [51414]	WA	In buffer area only
Commonwealth Land - [51895]	WA	In buffer area only
Commonwealth Land - [51416]	WA	In buffer area only
Commonwealth Land - [51894]	WA	In buffer area only
Commonwealth Land - [51899]	WA	In buffer area only
Commonwealth Land - [51259]	WA	In buffer area only
Commonwealth Land - [51258]	WA	In buffer area only
Commonwealth Land - [50822]	WA	In buffer area only
Commonwealth Land - [51235]	WA	In buffer area only
Commonwealth Land - [51234]	WA	In buffer area only
Commonwealth Land - [51237]	WA	In buffer area only
Commonwealth Land - [51176]	WA	In buffer area only
Commonwealth Land - [51171]	WA	In buffer area only
Commonwealth Land - [50790]	WA	In buffer area only
Commonwealth Land - [51174]	WA	In buffer area only
Commonwealth Land - [51177]	WA	In buffer area only
Commonwealth Land - [51172]	WA	In buffer area only
Commonwealth Land - [50797]	WA	In buffer area only
Commonwealth Land - [50826]	WA	In buffer area only
Commonwealth Land - [51170]	WA	In buffer area only
Commonwealth Land - [50791]	WA	In buffer area only
Commonwealth Land - [51173]	WA	In buffer area only
Commonwealth Land - [50824]	WA	In buffer area only
Commonwealth Land - [50798]	WA	In buffer area only
Commonwealth Land - [50829]	WA	In buffer area only
Commonwealth Land - [50828]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50795]	WA	In buffer area only
Commonwealth Land - [51175]	WA	In buffer area only
Commonwealth Land - [51323]	WA	In buffer area only
Commonwealth Land - [50774]	WA	In buffer area only
Commonwealth Land - [50799]	WA	In buffer area only
Commonwealth Land - [50845]	WA	In buffer area only
Commonwealth Land - [50844]	WA	In buffer area only
Commonwealth Land - [50827]	WA	In buffer area only
Commonwealth Land - [51523]	WA	In buffer area only
Commonwealth Land - [51525]	WA	In buffer area only
Commonwealth Land - [50847]	WA	In buffer area only
Commonwealth Land - [50721]	WA	In buffer area only
Commonwealth Land - [50725]	WA	In buffer area only
Commonwealth Land - [50794]	WA	In buffer area only
Commonwealth Land - [50729]	WA	In buffer area only
Commonwealth Land - [51981]	WA	In buffer area only
Commonwealth Land - [50842]	WA	In buffer area only
Commonwealth Land - [51986]	WA	In buffer area only
Commonwealth Land - [50848]	WA	In buffer area only
Commonwealth Land - [50849]	WA	In buffer area only
Commonwealth Land - [50843]	WA	In buffer area only
Commonwealth Land - [50841]	WA	In buffer area only
Commonwealth Land - [51318]	WA	In buffer area only
Commonwealth Land - [51412]	WA	In buffer area only
Commonwealth Land - [51413]	WA	In buffer area only
Commonwealth Land - [50820]	WA	In buffer area only
Commonwealth Land - [50821]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50676]	WA	In buffer area only
Commonwealth Land - [51319]	WA	In buffer area only
Commonwealth Land - [50722]	WA	In buffer area only
Commonwealth Land - [51316]	WA	In buffer area only
Commonwealth Land - [51317]	WA	In buffer area only
Commonwealth Land - [51311]	WA	In buffer area only
Commonwealth Land - [51310]	WA	In buffer area only
Commonwealth Land - [51315]	WA	In buffer area only
Commonwealth Land - [51314]	WA	In buffer area only
Commonwealth Land - [51313]	WA	In buffer area only
Commonwealth Land - [51312]	WA	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Artillery Barracks	WA	Listed place	In buffer area only
South Perth Post Office	WA	Listed place	In buffer area only
Victoria Park Post Office	WA	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Anous tenuirostris melanops			
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris alba Sanderling [875]		Roosting known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In buffer area only
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area	In buffer area only
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area overfly marine area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In buffer area only
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area	In buffer area only
Fish			
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
[Hippocampus subelongatus](#) West Australian Seahorse [66722]		Species or species habitat may occur within area	In buffer area only
[Histiogamphelus cristatus](#) Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
[Lissocampus caudalis](#) Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only
[Lissocampus fatiloquus](#) Prophet's Pipefish [66250]		Species or species habitat may occur within area	In buffer area only
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In buffer area only
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Vanacampus phillipi](#)			
Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
[Vanacampus poecilolaemus](#)			
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Mammal			
[Arctocephalus forsteri](#)			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
[Neophoca cinerea](#)			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Reptile			
[Caretta caretta](#)			
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Chelonia mydas](#)			
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Dermochelys coriacea](#)			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Hydrophis kingii as Disteira kingii](#)			
Spectacled Sea Snake [93511]		Species or species habitat may occur within area	In buffer area only
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Alfred Cove	Nature Reserve	WA	In buffer area only
Balannup Lake	Nature Reserve	WA	In buffer area only
Beelu	National Park	WA	In buffer area only
Canning River	Management Area	WA	In feature area
Dundas Road	Nature Reserve	WA	In feature area
Forrestdale Lake	Nature Reserve	WA	In buffer area only
Gibbs Road	Nature Reserve	WA	In buffer area only
Gooseberry Hill	National Park	WA	In buffer area only
Greenmount	National Park	WA	In buffer area only
Harry Waring Marsupial Reserve	Nature Reserve	WA	In buffer area only
Helena River	Management Area	WA	In buffer area only
Kalamunda	National Park	WA	In buffer area only
Kenwick Wetlands	Nature Reserve	WA	In feature area
Korung	National Park	WA	In buffer area only
Lesmurdie Falls	National Park	WA	In buffer area only
Matilda Bay Reserve	5(1)(g) Reserve	WA	In buffer area only
Milyu	Nature Reserve	WA	In buffer area only
NTWA Bushland covenant (0074)	Conservation Covenant	WA	In buffer area only
Perth Zoo	Other	WA	In buffer area only
Piara	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Swan Estuary	Marine Park	WA	In buffer area only
Swan Estuary - Alfred Cove	Marine Park	WA	In buffer area only
Swan Estuary - Milyu	Marine Park	WA	In buffer area only
Swan Estuary - Pelican Point	Marine Park	WA	In buffer area only
Swan River	Management Area	WA	In buffer area only
Thomsons Lake	Nature Reserve	WA	In buffer area only
Unnamed WA23076	Nature Reserve	WA	In buffer area only
Unnamed WA24657	Conservation Park	WA	In buffer area only
Unnamed WA29815	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA36440	Management Area	WA	In buffer area only
Unnamed WA37997	Nature Reserve	WA	In feature area
Unnamed WA39584	Conservation Park	WA	In buffer area only
Unnamed WA39752	Conservation Park	WA	In buffer area only
Unnamed WA42469	Nature Reserve	WA	In buffer area only
Unnamed WA44414	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA45106	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA48291	Conservation Park	WA	In buffer area only
Unnamed WA49079	Nature Reserve	WA	In buffer area only
Unnamed WA49220	Conservation Park	WA	In buffer area only
Unnamed WA49299	Nature Reserve	WA	In buffer area only
Unnamed WA49362	Nature Reserve	WA	In buffer area only
Unnamed WA49363	Conservation Park	WA	In buffer area only
Unnamed WA49561	Conservation Park	WA	In buffer area only
Unnamed WA53313	Conservation Park	WA	In feature area
Unnamed WA53632	Conservation Park	WA	In buffer area only
Unnamed WA53649	Nature Reserve	WA	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Booragoon Swamp	WA	In buffer area only
Brixton Street Swamps	WA	In feature area
Forrestdale Lake	WA	In buffer area only
Gibbs Road Swamp System	WA	In buffer area only
Perth Airport Woodland Swamps	WA	In buffer area only
Swan-Canning Estuary	WA	In buffer area only
Thomsons Lake	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
119 Hammond Road Residential Development	2023/09541		Completed	In buffer area only
Beale Park Redevelopment	2022/09297		Assessment	In buffer area only
Cockburn Surf Park	2022/09267		Completed	In buffer area only
Fremantle District Police Complex Project	2022/09345		Completed	In buffer area only
Hammond Park Mixed Use Development	2024/09820		Assessment	In buffer area only
Industrial Development MKSEA Precinct 1	2023/09760		Completed	In buffer area only
Jandakot Airport Expansion, Commercial Development and Clearing of Vegetation	2009/4796		Approval	In feature area
JANDAKOT EASTERN LINK ROAD	2022/09401		Completed	In feature area
Jandakot Horse Agistment	2022/09280		Assessment	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Kwinana Alumina Refinery ? Future Residue Storage Area	2023/09454		Completed	In buffer area only
Land Clearing for Light Industrial Development	2022/09419		Completed	In buffer area only
Land clearing for limestone quarry	2023/09558		Completed	In buffer area only
Lot 16 Barfield Road: Residential Development	2023/09450		Approval	In buffer area only
Residential Development, Wattleup Road, Hammond Park, WA	2021/8933		Post-Approval	In buffer area only
Residential subdivision of Lot 126 Lawnbrook Road, Walliston	2021/9105		Completed	In buffer area only
Roe Highway and Great Eastern Highway Bypass Grade Separation Interchange, Hazelmere WA	2020/8784		Post-Approval	In buffer area only
Southern Link Road Stage 3 City of Canning	2020/8809		Assessment	In buffer area only
Talbot Road Asbestos Water Supply Pipe Decommissioning Project	2023/09661		Completed	In buffer area only
Tree removal for road widening - Eighth Road, Armadale, WA	2023/09563		Completed	In buffer area only
Vegetation clearing (Cwlth land), Jandakot Airport, Cockburn, WA	2013/7032		Post-Approval	In buffer area only
Controlled action				
Airport & Freight Access Gateway	2010/5384	Controlled Action	Post-Approval	In feature area
Alcoa Bauxite Residue Storage Area Extension	2011/5878	Controlled Action	Further Information Request	In buffer area only
Bushmead Residential Development, Hazelmere, WA	2015/7414	Controlled Action	Post-Approval	In buffer area only
Clearing for orchard expansion, Lot 400 Canning Road, Carmel, WA	2016/7647	Controlled Action	Completed	In buffer area only
Clearing of Lots 2 and 10 Rowley Road, Mandogalup WA	2018/8182	Controlled Action	Assessment Approach	In buffer area only
Construction of Fiona Stanley Hospital	2008/3970	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Construction of Residential Dwelling, Ozone Terrace, Kalamunda	2006/3147	Controlled Action	Post-Approval	In buffer area only
Development of an Integrated Aged Care Facility, Kalumunda, WA	2013/6990	Controlled Action	Completed	In buffer area only
Development of Kwinana Quay port facility	2008/4387	Controlled Action	Completed	In buffer area only
Extension of Beeliar Drive between the junction of Mayor and Fawcett Roads an...	2003/1029	Controlled Action	Completed	In buffer area only
Garden Street road extension, Huntingdale, city of Gosnells, WA	2016/7735	Controlled Action	Post-Approval	In buffer area only
Hammond Park Secondary School development, WA	2016/7741	Controlled Action	Post-Approval	In buffer area only
Honeywood Estate Development	2010/5476	Controlled Action	Post-Approval	In buffer area only
Keane Road Strategic Link, proposed construction central portion of Keane Road	2009/5035	Controlled Action	Completed	In buffer area only
Latitude 32-industrial development of various lots, Ashley and Sayer Roads, Hope Valley, WA	2016/7695	Controlled Action	Post-Approval	In buffer area only
Lots 13, 14 & 18 Barfield Rd & Lots 48-51 Rowley Rd, Hammond Park	2012/6524	Controlled Action	Post-Approval	In buffer area only
Mandogalup Urban Development, Mandogalup, WA	2014/7308	Controlled Action	Post-Approval	In buffer area only
National Lifestyle Village, Lot 97 Adelaide Street	2009/5141	Controlled Action	Post-Approval	In buffer area only
Native vegetation clearing of Lot 21 Webster Road for Industrial Development	2011/6186	Controlled Action	Post-Approval	In feature area
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval	In feature area
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Ranford Road Residential Development	2002/549	Controlled Action	Post-Approval	In feature area
Residential development and bushfire protection within part Lot	2016/7846	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
9006 Reilly Road, Harrisdale, WA				
Residential Development Lot 131 Jandakot Road, Treeby WA	2018/8205	Controlled Action	Further Information Request	In buffer area only
Residential developmnt, Lots 11 and 74 Beenyup Road, Banjup, WA	2017/7923	Controlled Action	Post-Approval	In buffer area only
Residential Estate at Lot 1580 Warton Road, Southern River	2004/1471	Controlled Action	Post-Approval	In buffer area only
Residential Estate Development, Lot 682 Rowley Road, Mandogalup, Western Australia	2014/7126	Controlled Action	Post-Approval	In buffer area only
Roe Highway and Kalamunda Road Interchange upgrade, WA	2018/8316	Controlled Action	Post-Approval	In buffer area only
Roe Highway extension, Kwinana Freeway to Stock Road, WA	2009/5031	Controlled Action	Post-Approval	In feature area
Roe Hwy Extension	2003/972	Controlled Action	Post-Approval	In feature area
Shenton Park Subdivision	2004/1479	Controlled Action	Completed	In buffer area only
Thornlie-Cockburn Link Project, WA	2018/8188	Controlled Action	Post-Approval	In feature area
To grade separate three intersections on Tonkin Highway, WA	2014/7385	Controlled Action	Post-Approval	In buffer area only
Tonkin Highway Grade Separated Interchanges	2019/8529	Controlled Action	Post-Approval	In feature area
Warders Hotel, Block 1 Warders Cottages, Fremantle, WA	2018/8144	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
'Looping 10' gas transmission pipeline from Kwinana to Hopelands	2005/2212	Not Controlled Action	Completed	In buffer area only
Armadale Road Duplication - Tapper to Anstey Road	2017/7972	Not Controlled Action	Completed	In buffer area only
Armadale Road to North Lake Road Bridge development, Jandakot, WA	2018/8284	Not Controlled Action	Completed	In buffer area only
Berkshire Road and Roe Highway Interchange, Forrestfield, East Perth, WA	2014/7243	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Bibra Lake Aboriginal Cultural Centre Development	2020/8642	Not Controlled Action	Completed	In buffer area only
Burslem Drive Bridge Duplication Over Canning River, Maddington, WA	2014/7115	Not Controlled Action	Completed	In buffer area only
Bushfire hazard reduction, Lot 37 Barfield Road, Hammond Park, WA	2018/8204	Not Controlled Action	Completed	In buffer area only
Calleya Residential Development, Banjup, WA	2016/7708	Not Controlled Action	Completed	In buffer area only
Canning Mills Road Improvement Project, Martin, WA	2015/7426	Not Controlled Action	Completed	In buffer area only
Clearing and development of 220 and 234 Wattleup Rd, Wattleup, WA	2016/7738	Not Controlled Action	Completed	In buffer area only
Clearing of Lot 400 Canning Road, Carmel, WA	2017/7979	Not Controlled Action	Completed	In buffer area only
Clearing of Native Vegetation, Hammond Park, WA	2011/6041	Not Controlled Action	Completed	In buffer area only
Commercial development of Lot 106 Wright Road, Forrestdale WA	2003/1255	Not Controlled Action	Completed	In feature area
Community Centre Project, Kalamunda, WA	2019/8473	Not Controlled Action	Completed	In buffer area only
Construction of Hammond Road Primary School, Hammond Park, WA	2012/6619	Not Controlled Action	Completed	In buffer area only
Construction of international rowing course and commercial/residential areas	2003/1034	Not Controlled Action	Completed	In feature area
Construction of Pawsey High Performance Computing Centre	2010/5560	Not Controlled Action	Completed	In buffer area only
Construction of the Perth Stadium and associated infrastructure	2013/6740	Not Controlled Action	Completed	In buffer area only
Curtin Main Street Project - Transformation of Bentley Campus to a major urban centre WA	2013/7044	Not Controlled Action	Completed	In buffer area only
Denny Avenue Level Crossing Removal, Kelmscott WA	2018/8377	Not Controlled Action	Completed	In buffer area only
Development of Crown Towers Five Star Quality Hotel	2012/6695	Not Controlled Action	Completed	In buffer area only
Development of Lots 100-101 Sayer Road, Hope Valley, WA	2019/8399	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Disposal of residential properties, Fremantle, WA	2019/8593	Not Controlled Action	Completed	In buffer area only
Eradication of the European House Borer, Perth metropolitan area, WA	2009/5027	Not Controlled Action	Completed	In feature area
extensions to minerals laboratory	2005/2285	Not Controlled Action	Completed	In buffer area only
Forrestfield Airport Link, WA	2015/7399	Not Controlled Action	Completed	In buffer area only
Frankland Parks Oval project, Hammond Park, WA	2018/8369	Not Controlled Action	Completed	In buffer area only
Fremantle Ports Inner Harbour Capital Dredging Proposal	2005/2477	Not Controlled Action	Completed	In buffer area only
Gas-fired Power Station	2005/2213	Not Controlled Action	Completed	In buffer area only
Grazing of stock and associated works on Lot 1790 Passmore Street, Southern River Western Australia	2018/8176	Not Controlled Action	Completed	In buffer area only
Hammond West Urban Development, Hammond Park, WA	2017/7917	Not Controlled Action	Completed	In buffer area only
Hartfield Park Sporting Field Extension	2013/7008	Not Controlled Action	Completed	In feature area
Hazard reduction and site access, Lot 682 Rowley Road, Mandogalup, WA	2018/8186	Not Controlled Action	Completed	In buffer area only
High Street Upgrade, Fremantle, WA	2018/8315	Not Controlled Action	Completed	In buffer area only
Hope Valley-Wattleup Redevelopment Project	2020/8644	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Industrial Development (multiple lots) Edward Street, Kenwick, WA	2018/8231	Not Controlled Action	Completed	In feature area
Industrial development 105 Sayer Road, Hope Valley, WA	2014/7261	Not Controlled Action	Completed	In buffer area only
Industrial Development Lot 64 Ashley Road, Hope Valley, WA	2014/7238	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Jandakot Road Widening, Solomon Road to Berrigan Drive, Jandakot, WA	2020/8728	Not Controlled Action	Completed	In buffer area only
Kwinana Fwy southbound widening Roe Hwy to Armadale Rd and construction of farrington Rd off-ramp	2013/7062	Not Controlled Action	Completed	In feature area
Kwinana Gas-Fired Power Station	2005/2101	Not Controlled Action	Completed	In buffer area only
Latitude 32 industrial development 6A, Cockburn, WA	2018/8193	Not Controlled Action	Completed	In buffer area only
Lot 28 157 Barfield Road, Hammond Park - Proposed Residential Development	2021/9063	Not Controlled Action	Completed	In buffer area only
Lot 29 Barfield Road, Hammond Park	2017/7948	Not Controlled Action	Completed	In buffer area only
Lot 2 Nicholson Road, Forrestdale	2012/6561	Not Controlled Action	Completed	In buffer area only
Lots 12, 13 and 18 Hammond Road, Lot 80 Beeliar Drive and Lot 500 Hird Road	2012/6576	Not Controlled Action	Completed	In buffer area only
Murdoch University Sports Precinct, Melville, WA	2016/7823	Not Controlled Action	Completed	In buffer area only
Office & Electronic Assembly Building, Lot 106 Watts Place, Bentley, WA	2012/6440	Not Controlled Action	Completed	In buffer area only
Perth Seawater Desalination Project: Thomsons Lake to Kogolup Pipeline	2005/1971	Not Controlled Action	Completed	In buffer area only
Pipeline Extension, Hazelmere and Helena Valley, WA	2018/8239	Not Controlled Action	Completed	In buffer area only
Redevelopment of Purvis Street school site, Hamilton Hill, WA	2018/8255	Not Controlled Action	Completed	In buffer area only
Residential Development, Lot 12 Lyon Road, Aubin Grove, WA	2013/6852	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 13 Lyon Road, Aubin Grove, WA	2014/7151	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 33 Barfield Road, Hammond Park, WA	2015/7548	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 74 Wattleup Road, Hammond Park, WA	2018/8273	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Residential development, Lots 124 and 125, Wattleup Road, Hammond Park, WA	2015/7519	Not Controlled Action	Completed	In buffer area only
Residential Development Lot 4225 North Lake Road, Kardinya, WA	2015/7505	Not Controlled Action	Completed	In buffer area only
Residential Development - Lot 608 Dixon Road, Kalamundah, WA	2014/7389	Not Controlled Action	Completed	In buffer area only
Residential development of Lots 302, 308, 320 and part of Lot 9502, Hawtin Rd, Forrestfield, WA	2016/7770	Not Controlled Action	Completed	In buffer area only
Residential Development of Lots 76 and 107 Wattleup Road, Hamond Park	2020/8865	Not Controlled Action	Completed	In buffer area only
Residential development on part of Lot 2 Fanstone Avenue, Beeliar, WA	2016/7726	Not Controlled Action	Completed	In buffer area only
Ridge Hill Road intersection modification and offsite water main installation, Gooseberry Hill, WA	2020/8842	Not Controlled Action	Completed	In buffer area only
Road widening - Eighth Road Armadale between Gribble Avenue and Armadale Road	2021/8964	Not Controlled Action	Completed	In buffer area only
Roe Highway - Karel Avenue to Hope Road Bridge Project	2005/2061	Not Controlled Action	Completed	In feature area
Roe Highway Noise Wall, High Wycombe, WA	2014/7149	Not Controlled Action	Completed	In buffer area only
Southern River Mixed Business Precinct F, City of Gosnells, WA	2013/6813	Not Controlled Action	Completed	In buffer area only
Southern River Precinct 3E	2017/7900	Not Controlled Action	Completed	In buffer area only
South Metropolitan Crop Research Hub, Murdoch WA	2018/8201	Not Controlled Action	Completed	In buffer area only
Stages 2-5 of primary school and assoc facilities development, Hammond Park, WA	2015/7407	Not Controlled Action	Completed	In buffer area only
To develop a residential development at Glyde Road, Lesmurdie, WA	2013/7096	Not Controlled Action	Completed	In buffer area only
Tonkin Highway Extension	2001/470	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Tonkin Highway Upgrade, Guildford Road to Great Eastern Highway, WA	2019/8545	Not Controlled Action	Completed	In buffer area only
Translocation of orchids (Caladenia huegelii) from Roe Hway Reserve	2002/781	Not Controlled Action	Completed	In feature area
Urban development, Lot 109 Wattleup Road, Hammond Park, WA	2015/7425	Not Controlled Action	Completed	In buffer area only
Urban development of Lot 107 Wattleup Road, Hammond Park, WA	2017/7890	Not Controlled Action	Completed	In buffer area only
Urban developmnet & associated infrastructure, Lot 4 Armadale Road, Banjup WA	2013/7049	Not Controlled Action	Completed	In buffer area only
Warders' Cottages Block 2 'W2'	2022/9148	Not Controlled Action	Completed	In buffer area only
Warders' Cottages W2 minor works, Fremantle, WA	2018/8185	Not Controlled Action	Completed	In buffer area only
Wentworth West residential development, Bartram Road, Success, WA	2014/7245	Not Controlled Action	Completed	In buffer area only
Wungong Transfer Mains Project	2007/3532	Not Controlled Action	Completed	In buffer area only
Yule Brook Main Drain Flood Mitigation Works	2019/8572	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
City of Cockburn Sporting Facilties	2005/2139	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Commercial Estate and Aeronautical Infrastructure Development, Precincts 2A & 2B	2006/3021	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Extension of Spearwood Ave, from Barrington Rd to Miguel Rd	2009/5140	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Sale of ABC Sound Broadcasting and Television Studios	2008/3951	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
State Football Centre	2020/8824	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
AIC Forrestdale Campus, Educational Establishment	2021/9134	Referral Decision	Referral Publication	In buffer area only
Commercial development of Lot 414 Grove Road, Kenwick	2021/9022	Referral Decision	Referral Publication	In feature area
Rezoning of Crown Reserve 39181 to facilitate future residential development	2005/2096	Referral Decision	Completed	In feature area

Biologically Important Areas			[Resource Information]
Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur	In buffer area only
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In buffer area only
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In buffer area only
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In buffer area only
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur	In buffer area only
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In buffer area only
Seals			
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur	In buffer area only
Whales			
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur	In buffer area only

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact us page.

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NatureMap data – 10 km buffer

Animalia	**165433**
ALGA	**7**
Chaetomorpha sp.	1
Dictyota sp.	1
Gracilaria sp.	2
Halimeda sp.	1
Microcoleus sp.	1
Ulva sp.	1
AMPHI	**2133**
Crinia georgiana	113
Crinia glauerti	407
Crinia insignifera	374
Crinia pseudinsignifera	104
Crinia sp.	1
Geocrinia leai	7
Heleioporus barycragus	30
Heleioporus eyrei	591
Heleioporus inornatus	8
Heleioporus sp.	41
Limnodynastes dorsalis	149
Litoria adelaidensis	109
Litoria adelaidensis (Slender Tree Frog)	1
Litoria moorei	112
Litoria moorei (Motorbike Frog)	1
Litoria sp.	1
Myobatrachus gouldii	57
Neobatrachus pelobatoides	4
Pseudophryne guentheri	23
BIRD	**151705**
Acanthagenys rufogularis	2
Acanthiza apicalis	1139
Acanthiza chrysorrhoa	1748
Acanthiza inornata	437
Acanthiza uropygialis	1
Acanthorhynchus superciliosus	795
Accipiter cirrhocephalus	1
Accipiter cirrocephalus	255
Accipiter cirrocephalus subsp. cirrocephalus	1
Accipiter fasciatus	549
Accipiter fasciatus subsp. didimus	1

Accipiter fasciatus subsp. fasciatus	7
Acridotheres fuscus	1
Acridotheres tristis subsp. tristis	1
Acrocephalus australis	1128
Acrocephalus australis subsp. gouldi	2
Acrocephalus scripaceus	1
Actitis hypoleucos	74
Aegotheles cristatus	8
Anas castanea	46
Anas gracilis	2306
Anas platyrhynchos	125
Anas platyrhynchos subsp. domesticus	24
Anas rhynchotis	982
Anas superciliosa	3669
Anhinga melanogaster	45
Anhinga melanogaster subsp. novaehollandiae	4
Anhinga novaehollandiae	754
Anous tenuirostris subsp. melanops	5
Anser anser	20
Anthochaera carunculata	3860
Anthochaera lunulata	793
Anthus australis	1
Apus pacificus	5
Aquila audax	351
Aquila morphnoides	2
Aquila morphnoides subsp. morphnoides	3
Ardea alba	2
Ardea alba subsp. modesta	68
Ardea garzetta	3
Ardea garzetta subsp. nigripes	6
Ardea ibis	15
Ardea intermedia	6
Ardea modesta	1274
Ardea novaehollandiae	165
Ardea pacifica	372
Ardea sacra	1
Ardenna pacifica	1
Arenaria interpres	68
Artamus cinereus	436
Artamus cinereus subsp. melanops	3
Artamus cyanopterus	151

Artamus personatus	9
Aythya australis	853
Barnardius zonarius	2291
Biziura lobata	1185
Botaurus poiciloptilus	5
Burhinus grallarius	2
Cacatua galerita	5
Cacatua pastinator	21
Cacatua roseicapilla	49
Cacatua sanguinea	404
Cacatua tenuirostris	149
Cacomantis flabelliformis	446
Cacomantis flabelliformis subsp. flabelliformis	1
Cacomantis pallidus	153
Calidris acuminata	196
Calidris alba	5
Calidris canutus	56
Calidris canutus subsp. rogersi	2
Calidris ferruginea	109
Calidris melanotos	29
Calidris minuta	1
Calidris ruficollis	342
Calidris sp.	1
Calidris subminuta	56
Calidris tenuirostris	187
Calyptorhynchus banksii	972
Calyptorhynchus banksii naso	3
Calyptorhynchus banksii subsp. naso	185
Calyptorhynchus sp.	223
Calyptorhynchus sp. 'white-tailed black cockatoo'	41
Carduelis carduelis	3
Carduelis chloris	1
Catharacta skua	1
Charadrius dubius	4
Charadrius leschenaultii	8
Charadrius melanops	57
Charadrius ruficapillus	580
Chenonetta jubata	1207
Cheramoeca leucosterna	7
Cheramoeca leucosternus	1
Chlidonias leucopterus	3

Chroicocephalus novaehollandiae	869
Chrysococcyx basalis	6
Chrysococcyx lucidus	7
Chrysococcyx lucidus subsp. plagosus	8
Cincloramphus cruralis	6
Cincloramphus mathewsi	13
Circus approximans	885
Circus assimilis	3
Cladorhynchus leucocephalus	183
Climacteris rufa	7
Colluricincla harmonica	746
Colluricincla harmonica subsp. rufiventris	1
Columba livia	584
Coracina maxima	2
Coracina novaehollandiae	2251
Coracina novaehollandiae subsp. novaehollandiae	1
Corvus bennetti	4
Corvus coronoides	4399
Corvus coronoides subsp. perplexus	11
Corvus splendens	3
Corvus splendens subsp. protegatus	4
Coturnix pectoralis	8
Coturnix ypsilophora	44
Coturnix ypsilophora subsp. australis	1
Cracticus nigrogularis	24
Cracticus tibicen	3947
Cracticus tibicen subsp. dorsalis	28
Cracticus tibicen subsp. tibicen	1
Cracticus torquatus	2232
Cracticus torquatus subsp. torquatus	1
Cygnus atratus	2188
Cygnus olor	30
Dacelo novaeguinea	1
Dacelo novaeguineae	1903
Dacelo novaeguineae subsp. novaeguineae	2
Daphoenositta chrysoptera	181
Daphoenositta chrysoptera subsp. pileata	3
Daption capense	1
Dendrocygna arcuata	1
Dicaeum hirundinaceum	446
Diomedea chlororhynchos	1

Diomedea chlororhynchos subsp. carteri	1
Diomedea chrysostoma	5
Diomedea exulans subsp. exulans	2
Dromaius novaehollandiae	6
Egretta garzetta	74
Egretta novaehollandiae	1387
Egretta sacra	11
Elanus axillaris	466
Elanus caeruleus	6
Elanus caeruleus subsp. axillaris	4
Elseyornis melanops	599
Eolophus roseicapillus	1661
Eopsaltria australis subsp. griseogularis	1
Eopsaltria georgiana	84
Eopsaltria griseogularis	9
Epthianura albifrons	91
Erythrogonys cinctus	94
Eudyptula minor	1
Eudyptula minor subsp. novaehollandiae	19
Eurostopodus argus	3
Eurystomus orientalis	4
Falco berigora	30
Falco berigora subsp. berigora	1
Falco cenchroides	630
Falco cenchroides subsp. cenchroides	3
Falco longipennis	512
Falco longipennis subsp. longipennis	3
Falco peregrinus	92
Falco peregrinus subsp. macropus	2
Fulica atra	1831
Fulica atra subsp. australis	131
Gallinago hardwickii	1
Gallinago stenura	1
Gallinula tenebrosa	1281
Gallinula tenebrosa subsp. tenebrosa	52
Gallinula ventralis	17
Gallirallus philippensis	316
Gallirallus philippensis subsp. mellori	2
Gallus gallus	2
Gavicalis virescens	18
Gelochelidon nilotica	6

Geopelia cuneata	2
Gerygone fusca	2600
Gerygone fusca subsp. fusca	1
Glossopsitta porphyrocephala	17
Glyciphila melanops	219
Grallina cyanoleuca	3209
Haematopus fuliginosus	2
Haematopus longirostris	413
Haliaeetus leucogaster	70
Haliastur indus	3
Haliastur sphenurus	815
Halobaena caerulea	9
Hamirostra isura	2
Hieraaetus morphnoides	374
Himantopus himantopus	1681
Himantopus himantopus subsp. leucocephalus	5
Hirundo neoxena	2414
Hirundo nigricans	23
Hirundo nigricans subsp. nigricans	1
Hydroprogne caspia	406
Ixobrychus dubius	16
Ixobrychus minutus	1
Ixobrychus minutus subsp. dubius	1
Lalage tricolor	2
Larus novaehollandiae	6
Larus novaehollandiae subsp. novaehollandiae	39
Larus pacificus	2
Lichenostomus leucotis	3
Lichenostomus ornatus	23
Lichenostomus virescens	3658
Lichmera indistincta	3913
Lichmera indistincta subsp. indistincta	4
Limosa lapponica	173
Limosa limosa	44
Limosa limosa subsp. melanuroides	1
Lonchura castaneothorax	14
Lophoictinia isura	23
Macronectes giganteus	10
Malacorhynchus membranaceus	431
Malurus elegans	143
Malurus lamberti	7

Malurus sp.	2
Malurus splendens	2400
Malurus splendens subsp. splendens	3
Manorina flavigula	377
Megalurus gramineus	517
Melanodryas cucullata	7
Melithreptus brevirostris	24
Melithreptus chloropsis	4
Melithreptus lunatus	125
Melopsittacus undulatus	2
Merops ornatus	1072
Microcarbo melanoleucos	1160
Microeca fascinans	9
Milvus migrans	5
Morus serrator	13
Myiagra inquieta	5
Neochmia temporalis	37
Neochmia temporalis subsp. temporalis	2
Neophema elegans	149
Neophema petrophila	3
Neophema pulchella	1
Ninox connivens	7
Ninox novaeseelandiae	188
Ninox novaeseelandiae subsp. boobook	12
Numenius madagascariensis	6
Numenius phaeopus	9
Nycticorax caledonicus	342
Nycticorax caledonicus subsp. hilli	2
Nymphicus hollandicus	9
Oceanites marinus subsp. dulciae	4
Ocyphaps lophotes	696
Oxyura australis	567
Pachycephala pectoralis	359
Pachycephala pectoralis subsp. fuliginosa	3
Pachycephala rufiventris	2222
Pachycephala rufiventris subsp. rufiventris	3
Pachyptila belcheri	9
Pachyptila desolata	5
Pachyptila salvini	4
Pachyptila turtur	1
Pandion cristatus	329

Pandion haliaetus	3
Pandion haliaetus subsp. cristatus	3
Pardalotus punctatus	524
Pardalotus punctatus subsp. punctatus	5
Pardalotus punctatus subsp. xanthopyge	3
Pardalotus striatus	2818
Pardalotus striatus subsp. westraliensis	6
Passer montanus	5
Pelecanus conspicillatus	1708
Petrochelidon ariel	18
Petrochelidon nigricans	2172
Petroica boodang	527
Petroica goodenovii	83
Petroica multicolor	1
Petroica multicolor subsp. campbelli	6
Phaethon rubricauda	5
Phalacrocorax carbo	672
Phalacrocorax fuscescens	1
Phalacrocorax melanoleucos	112
Phalacrocorax melanoleucos subsp. melanoleucos	1
Phalacrocorax sulcirostris	1324
Phalacrocorax varius	388
Phalacrocorax varius subsp. hypoleucos	3
Phaps chalcoptera	1231
Phaps elegans	16
Philomachus pugnax	4
Phylidonyris melanops	1
Phylidonyris niger	795
Phylidonyris nigra	14
Phylidonyris nigra subsp. gouldii	1
Phylidonyris novaehollandiae	3036
Phylidonyris novaehollandidae	1
Platalea flavipes	1105
Platalea regia	3
Platycercus icterotis	139
Platycercus icterotis (Western Rosella)	2
Platycercus icterotis subsp. icterotis	1
Platycercus spurius	28
Platycercus spurius (Red-capped Parrot)	2
Platycercus zonarius	44
Platycercus zonarius subsp. semitorquatus	12

Platycercus zonarius subsp. zonarius	1
Plegadis falcinellus	293
Pluvialis fulva	38
Pluvialis squatarola	436
Podargus strigoides	105
Podargus strigoides subsp. brachypterus	6
Podiceps cristatus	300
Poliocephalus poliocephalus	775
Polytelis anthopeplus	281
Polytelis anthopeplus subsp. westralis	1
Pomatostomus superciliosus	1
Porphyrio porphyrio	2054
Porphyrio porphyrio subsp. bellus	64
Porzana fluminea	131
Porzana pusilla	76
Porzana pusilla subsp. palustris	1
Porzana tabuensis	263
Psittacula krameri	6
Pterodroma brevirostris	11
Pterodroma lessonii	1
Pterodroma macroptera	1
Pterodroma mollis	1
Ptilotula ornatus	2
Puffinus assimilis subsp. assimilis	3
Purnella albifrons	1
Purpureicephalus spurius	1419
Recurvirostra novaehollandiae	349
Rhipidura albiscapa	2605
Rhipidura fuliginosa	28
Rhipidura fuliginosa subsp. alisteri	1
Rhipidura fuliginosa subsp. preissi	1
Rhipidura leucophrys	3547
Rhipidura leucophrys subsp. leucophrys	5
Rostratula australis	6
Sericornis frontalis	1076
Smicrornis brevirostris	1604
Stagonopleura oculata	156
Stercorarius antarcticus	1
Stercorarius longicaudus	1
Stercorarius parasiticus	14
Stercorarius pomarinus	1

Sterna anaethetus subsp. anaethetus	2
Sterna bergii	3
Sterna caspia	3
Sterna dougallii	2
Sterna fuscata subsp. nubilosa	1
Sterna hirundo subsp. hirundo	1
Sterna hybrida	2
Sterna hybrida subsp. javanica	1
Sternula albifrons	1
Sternula nereis	234
Sternula nereis subsp. nereis	1
Stictonetta naevosa	26
Stipiturus malachurus	6
Strepera versicolor	99
Streptopelia chinensis	2269
Streptopelia chinensis subsp. tigrina	3
Streptopelia senegalensis	2483
Streptopelia senegalensis subsp. senegalensis	6
Sugomel niger	3
Sula serrator	2
Tachybaptus novaehollandiae	1355
Tachybaptus novaehollandiae subsp. novaehollandiae	99
Tadorna radjah	7
Tadorna tadornoides	2244
Thalasseus bergii	427
Thinornis rubricollis	18
Threskiornis molucca	3003
Threskiornis moluccus	4
Threskiornis spinicollis	1126
Todiramphus sanctus	545
Todiramphus sanctus subsp. sanctus	7
Tribonyx ventralis	30
Trichoglossus haematodus	2973
Trichoglossus haematodus subsp. moluccanus	1
Trichoglossus haematodus subsp. rubritorquis	1
Trichoglossus moluccanus	11
Tringa brevipes	15
Tringa glareola	105
Tringa guttifer	2
Tringa hypoleucos	5
Tringa nebularia	711

Tringa stagnatalis	1
Tringa stagnatilis	49
Turnix varia	3
Turnix varia subsp. varia	6
Turnix varius	30
Turnix velox	6
Tyto alba	2
Tyto alba subsp. delicatula	4
Tyto novaehollandiae	2
Tyto novaehollandiae subsp. novaehollandiae	4
Vanellus miles	2
Vanellus tricolor	86
Xenus cinereus	5
Zanda baudinii	114
Zanda latirostris	3884
Zosterops lateralis	3634
Zosterops lateralis subsp. gouldi	8
FISH	**407**
? ?	2
Acentrogobius bifrenatus	8
Afurcagobius suppositus	1
Aldrichetta forsteri	2
Ammotretis elongatus	3
Anguilla australis	1
Anoplocapros lenticularis	4
Anoplocapros robustus	2
Aploactisoma milesii	1
Apogon rueppellii	59
Apogon victoriae	1
Aptychotrema vincentiana	2
Aracana aurita	2
Aracana ornata	1
Arenigobius bifrenatus	2
Argyrosomus japonicus	1
Arothron hispidus	1
Arripis georgiana	1
Atherinomorus lacunosus	1
Atherinomorus vaigiensis	3
Atherinosoma wallacei	1
Aulohalaelurus labiosus	1
Callogobius mucosus	2

Cantherhines sp.	1
Carassius auratus	1
Carcharhinus leucas	2
Carcharhinus obscurus	1
Carcharhinus sp.	1
Carcharodon carcharias	1
Chaetodermis penicilligera	1
Cheilodactylus gibbosus	8
Chelidonichthys kumu	5
Cirrhimuraena calamus	2
Cleidopus gloriamaris	2
Cnidoglanis macrocephalus	7
Contusus brevicaudus	2
Coryphaena hippurus	1
Craterocephalus mugiloides	1
Cristiceps australis	1
Cristiceps sp.	1
Cypselurus sp.	1
Dactylopus dactylopus	5
Diodon nicthemerus	2
Dipulus caecus	1
Echeneis naucrates	3
Elops hawaiensis	2
Engraulis australis	1
Enoplosus armatus	1
Epinephelus sp.	1
Favonigobius lateralis	1
Filicampus tigris	5
Galaxias maculatus	1
Galaxias occidentalis	31
Girella zebra	3
Gonorynchus greyi	9
Gymnapistes marmoratus	9
Gymnothorax woodwardi	7
Heterodontus portusjacksoni	1
Hippocampus elongatus	2
Hippocampus sp.	1
Histrio histrio	3
Hyperlophus vittatus	1
Hyporhamphus regularis	1
Idiotropiscis australe?	1

Kyphosus sydneyanus	1
Lagocephalus sceleratus	1
Lepidoblennius marmoratus	1
Maxillicosta scabriceps	1
Megalaspis cordyla	1
Metavelifer multiradiatus	1
Meuschenia hippocrepis	4
Microcanthus strigatus	1
Monacanthus chinensis	1
Mugil cephalus	2
Myliobatis australis	9
Nannoperca vittata	12
Nematalosa erebi	2
Nematalosa vlaminghi	2
Neoodax balteatus	1
Odax cyanomelas	1
Ophisurus serpens	11
Papillogobius punctatus	1
Parablennius postoculomaculatus	3
Parablennius tasmanianus	1
Parequula melbournensis	1
Parma mccullochi	1
Pegasus volitans	21
Pelates sexlineatus	3
Phalloceros caudimaculatus	1
Phalloceros harpagos	1
Phycodurus eques	1
Phyllophryne scortea	2
Priolepis nuchifasciata	1
Pseudogobius olorum	3
Pseudorhombus jenynsii	2
Pterois antennata	1
Pterygotrigla polyommata	6
Rachycentron canadum	2
Rhycherus gloveri	1
Sardinella lemuru?	3
Saurida undosquamis	1
Scomberoides lysan	1
Scorpis georgianus	2
Seriola hippos	1
Sillago bassensis	3

Sillago burrus	4
Siphonognathus argyrophanes	1
Siphonognathus radiatus	1
Solegnathus lettiensis	1
Sphyrna zygaena	1
Spratelloides robustus	18
Stigmatopora argus	14
Strongylura leiura	1
Tandanus bostocki	1
Terapon sp.	1
Torquigener pleurogramma	13
Trygonorrhina fasciata	1
Upeneus tragula	1
Urocampus carinirostris	1
INVERT	**2320**
Acercella falcipes	9
Acroaspis olorina	4
Afraflacilla huntorum	1
Aganippe rhaphiduca	2
Akamptogonus novarae	10
Allothereua maculata	5
Allotrochosina karri	1
Ambicodamus kochi	2
Amblyomma triguttatum	2
Aname mainae	103
Aname tepperi	24
Ancylidae sp.	1
Antichiropus sp. indet.	2
Antichiropus 'ubs2'	1
Antichiropus variabilis	55
Arachnura higginsi	7
Araneus cyphoxis	16
Araneus eburneiventris	1
Araneus eburnus	1
Araneus senicaudatus	18
Argiope protensa	7
Argiope trifasciata	7
Arkys walckenaeri	3
Artema atlanta	1
Artoria flavimana	13
Artoria linnaei	58

Artoria taeniifera	5
Artoriopsis eccentrica	2
Artoriopsis expolita	12
Artoriopsis joergi	15
Asadipus kunderang	3
Aurecocrypta lugubris	1
Austracantha minax	13
Australomimetus ovidi	1
Australotomurus morbidus	1
Austromerope poultoni	1
Backobourkia brounii	6
Backobourkia heroine	12
Badumna insignis	3
Baiami volucripes	1
Ballarra longipalpus	9
beetle sp.	1
Bianor maculatus	3
Caenidae sp.	7
Callevophthalmus lividus	1
Ceinidae sp.	1
Ceratopogonidae sp.	5
Cercophonius granulosus	1
Cercophonius sulcatus	27
Ceryerda cursitans	12
Cheiracanthium nervosum	1
Cherax cainii	8
Cherax destructor	19
Cherax preissii	5
Cherax quinquecarinatus	17
Cherax sp.	4
Chironominae sp.	7
Clynotis albobarbatus	3
Clynotis severus	1
Coenagrionidae sp.	1
Corixidae sp.	2
Cormocephalus aurantiipes	20
Cormocephalus novaehollandiae	6
Cormocephalus rubriceps	4
Cormocephalus strigosus	5
Cormocephalus turneri	2
Crustulina bicruciata	4

Cryptoerithus quobba	10
Culicidae sp.	1
Cyclosa trilobata	6
Cyrtophora parnasia	5
Daphnia carinata	4
Delena cancerides	2
Dingosa murata	2
Dingosa serrata	51
Dinocambala ingens	16
Dytiscidae sp.	6
earthworm sp.	2
Ecnomidae sp.	3
Enoplognatha bidens	1
Eodelena convexa	1
Eodelena lapidicola	2
Eriophora biapicata	25
Eriophora pustulosa	1
Ero aphana	1
Erythracarus decoris	9
Ethmostigmus rubripes	2
Eucyrtops latior	3
Eupograpta kottae	1
fly sp.	8
Gea theridioides	1
Geogarypus taylori	8
Glossurocolletes bilobatus	1
Gomphidae sp.	2
Gripopterygidae sp.	5
Gyrinidae sp.	5
Hasarius adansoni	1
Hebridae sp.	1
Hemicloea insidiosa	1
Hemicloea sp.	1
Hemicorduliidae sp.	2
Henicops dentatus	1
Heurodes turritus	1
Hoggicosa storri	3
Hogna crispipes	7
Holasteron perth	3
Holasteron wamuseum	1
Holconia westralia	11

Holoplatys dejongi	2
Hydrophilidae sp.	3
Hydropsychidae sp.	4
Hydroptilidae sp.	2
Hyriidae sp.	1
Idiommata blackwalli	40
Idiosoma hirsutum	1
Idiosoma sigillatum	48
Isometroides vescus	2
Isopeda leishmanni	60
Isopeda magna	2
Isopedella cana	11
Ixodes australiensis	1
Kangarosa ludwigi	1
Kangarosa properipes	9
Karaops ellenae	6
Kawaniphila pachomai	1
Lampona brevipes	6
Lampona cylindrata	23
Latrodectus hasseltii	41
Leioproctus contrarius	3
Leioproctus douglasiellus	3
Leptoceridae sp.	7
Leptophlebiidae sp.	5
Leucauge dromedaria	1
Libellulidae sp.	3
Longepi woodman	11
Lychas sp.	1
Lycosa ariadnae	7
Lycosa australicola	1
Lycosa gilberta	1
Lycosa godeffroyi	2
Lycosa lacertosa	1
Maratus mungaich	5
Maratus pavonis	29
Masasteron maini	1
Missulena granulosa	83
Missulena hoggi	3
Missulena occatoria	16
Mituliodon tarantulinus	10
Mitzoruga insularis	3

Molycria vokes	1
Myandra bicincta	5
Myandra cambridgei	1
Nanometa gentilis	1
Neopasiphae simplicior	4
Nephila edulis	11
Nicodamus mainae	9
Notiasemus glauerti	2
Notonectidae sp.	2
Novakiella trituberculosa	1
Nunciella aspera	18
Occiperipatoides gilesii	7
Ocrisiona leucocomis	2
Ocrisiona parmeliae	1
Oecobius navus	4
Oligochaeta sp.	5
Ommatoiulus moreleti	20
Ommatoiulus moreletii	75
Oniscidae sp.	1
Orphnaeus brevilabiatus	1
Orthocladiinae sp.	7
Ostearius melanopygius	2
Oxyopes gracilipes	3
Oxyopes punctatus	1
Palaemonidae sp.	5
Paralampona marangaroo	1
Paralamyctes cammooensis	1
Parastacidae sp.	3
Pediana occidentalis	4
Perthiidae sp.	5
Phenasteron longiconductor	2
Pholcus phalangioides	3
Phreatoicidae sp.	1
Phryganoporus candidus	10
Phryganoporus gausapatus subsp. occidentalis	1
Physidae sp.	3
Pinkfloydia harveii	5
Piona cumberlandensis	10
Planorbidae sp.	1
Podykipus collinus	10
Poltys laciniosus	2

Polygonarea repanda	1
Prionosternum nitidiceps	1
Prionosternum scutatum	2
Pseudolampona woodman	14
Raveniella arenacea	9
Raveniella cirrata	14
Raveniella peckorum	22
Raveniella subcirrata	2
Richardsonianidae sp.	1
Sandalodes joannae	1
Sandalodes superbus	2
Scirtidae sp.	1
Scolopendra laeta	11
Servaea melaina	6
Servaea spinibarbis	5
Simaetha tenuior	9
Simuliidae sp.	5
Smeringopus natalensis	6
Solaenodolichopus pruvoti	2
Sphaerotrichopus ramosus	3
Steatoda capensis	1
Steatoda grossa	4
Storena formosa	2
Storena sinuosa	1
Supunna funerea	24
Supunna picta	33
Synemon gratiosa	14
Synothele durokoppin	2
Synothele michaelseni	4
Synothele rastelloides	1
Synsphyronus magnus	1
Tabanidae sp.	1
Tamopsis darlingtoniana	2
Tamopsis distinguenda	1
Tamopsis perthensis	8
Tanypodinae sp.	2
Tasmanicosa leuckartii	22
Tetragnatha demissa	72
Tetragnatha nitens	10
Tetragnatha valida	1
Thereuopoda lesueurii	1

Throscodectes xiphos	4
Tinytrema yarra	1
Tipulidae sp.	2
Trachycosmus sculptilis	1
Trachyspina mundaring	1
Trichocyclus nullarbor	1
Urodacus novaehollandiae	133
Urodacus planimanus	59
Urodacus woodwardii	1
Venator immansueta	113
Venatrix arenaris	1
Venatrix pullastra	91
Westralunio carteri	49
Westrarchaea sinuosa	2
Zachria flavicoma	1
Zebraplatys fractivittata	2
MAMMAL	**4050**
Antechinus flavipes subsp. leucogaster	18
Arctocephalus forsteri	1
Austronomus australis	14
Bettongia penicillata subsp. ogilbyi	1
Canis lupus	1
Canis lupus subsp. familiaris	3
Cercartetus concinnus	4
Chalinolobus gouldii	52
Chalinolobus morio	2
Dasyurus geoffroii	56
Falsistrellus mackenziei	1
Felis cattus	1
Felis catus	34
Funambulus pennanti	11
Hydromys chrysogaster	42
Isoodon fusciventer	982
Isoodon obesulus	640
Isoodon obesulus fusciventer	201
Isoodon obesulus subsp. fusciventer	957
Kogia breviceps	1
Macropus fuliginosus	35
Macropus irma	41
Mormopterus planiceps	1
Mormopterus sp. 4	2

Mus musculus	370
Mustela putorius	3
Myrmecobius fasciatus	10
Neophoca cinerea	1
Notamacropus eugenii subsp. derbianus	2
Notamacropus irma	17
Nyctophilus geoffroyi	23
Nyctophilus gouldi	1
Nyctophilus major	1
Nyctophilus major major	1
Nyctophilus timoriensis	1
Nyctophilus timoriensis subsp. timoriensis	2
Oryctolagus cuniculus	40
Ozimops kitcheneri	2
Perameles bougainville	1
Phascogale tapoatafa	2
Phascogale tapoatafa subsp. tapoatafa	19
Phascogale tapoatafa subsp. wambenger	25
Pteropus scapulatus	1
Rattus fuscipes	3
Rattus norvegicus	4
Rattus rattus	216
Rattus sp.	3
Scotorepens balstoni	1
Setonix brachyurus	3
Sminthopsis gilberti	1
Sus scrofa	2
Tachyglossus aculeatus	10
Tadarida australis	7
Tarsipes rostratus	17
Trichosurus vulpecula	72
Trichosurus vulpecula hypoleucus	6
Trichosurus vulpecula subsp. vulpecula	29
Tursiops truncatus	4
Vespadelus regulus	29
Vulpes vulpes	20
REPTILE	**4811**
Acanthophis antarcticus	11
Acritoscincus trilineata	6
Acritoscincus trilineatum	23
Acritoscincus trilineatus	82

Acritoscincus trilineatus (Western Three-lined Skink)	1
Anilios australis	4
Antaresia stimsoni subsp. stimsoni	11
Aprasia pulchella	5
Aprasia repens	72
Brachyurophis fasciolatus subsp. fasciolatus	1
Brachyurophis semifasciatus	33
Caretta caretta	8
Chelodina colliei	15
Chelodina oblonga	44
Chelonia mydas	1
Christinus marmoratus	57
Crenadactylus ocellatus subsp. ocellatus	9
Cryptoblepharus buchananii	274
Cryptoblepharus plagiocephalus	8
Cryptoblepharus sp.	1
Ctenophorus adelaidensis	31
Ctenophorus ornatus	38
Ctenotus australis	296
Ctenotus delli	11
Ctenotus fallens	187
Ctenotus gemmula	10
Ctenotus impar	20
Ctenotus labillardieri	18
Delma fraseri	70
Delma grayii	26
Delma sp.	1
Demansia psammophis	1
Demansia psammophis subsp. reticulata	13
Dermochelys coriacea	3
Diplodactylus granariensis subsp. granariensis	5
Diplodactylus lateroides	1
Diplodactylus polyophthalmus	25
Diplodactylus pulcher	2
Diplodactylus sp.	2
Egernia kingii	10
Egernia napoleonis	69
Elapognathus coronatus	15
Eremiascincus richardsonii	1
Gehyra variegata	41
Hemiergis initialis subsp. initialis	27

Hemiergis quadrilineata	431
Heteronotia binoei	5
Hydrophis elegans	2
Hydrophis ornatus	1
Hydrophis platurus	17
Lerista christinae	1
Lerista distinguenda	11
Lerista elegans	410
Lerista lineata	338
Lialis burtonis	159
Menetia greyii	279
Menetia maini	1
Menetia sp.	1
Menetia surda subsp. cresswelli	1
Menetia surda subsp. surda	1
Morelia spilota subsp. imbricata	7
Morethia adelaidensis	1
Morethia boulengeri	1
Morethia butleri	1
Morethia lineoocellata	65
Morethia obscura	111
Morethia ruficauda subsp. exquisita	2
Morethia ruficauda subsp. ruficauda	2
Morethia storri	2
Neelaps bimaculatus	11
Neelaps calonotos	24
Notechis scutatus	47
Notoscincus butleri	2
Notoscincus ornatus subsp. ornatus	2
Notoscincus ornatus subsp. wotjulum	2
Parasuta gouldii	46
Parasuta nigriceps	4
Pletholax gracilis	13
Pletholax gracilis subsp. edelensis	1
Pletholax gracilis subsp. gracilis	49
Pogona minima	1
Pogona minor	28
Pogona minor subsp. minima	1
Pogona minor subsp. minor	92
Pogona minor subsp. mitchelli	1
Pogona nullarbor	1

Proablepharus reginae	2
Proablepharus tenuis	2
Pseudechis australis	6
Pseudemoia baudini	2
Pseudemydura umbrina	1
Pseudonaja affinis	67
Pseudonaja affinis affinis	1
Pseudonaja affinis subsp. affinis	228
Pseudonaja affinis subsp. exilis	10
Pseudonaja afinnis afiinis	1
Pseudonaja mengdeni	6
Pseudonaja nuchalis	1
Pygopus lepidopodus	31
Pygopus nigriceps	1
Ramphotyphlops australis	78
Ramphotyphlops bituberculatus	1
Ramphotyphlops braminus	1
Ramphotyphlops pinguis	7
Ramphotyphlops waitii	4
Rankinia adelaidensis	3
Rankinia adelaidensis subsp. adelaidensis	6
Rankinia adelaidensis subsp. chapmani	1
Simoselaps bertholdi	32
Simoselaps littoralis	1
Strophurus spinigerus	3
Strophurus spinigerus subsp. inornatus	18
Strophurus spinigerus subsp. spinigerus	15
Strophurus strophurus	2
Tiliqua multifasciata	2
Tiliqua occipitalis	22
Tiliqua rugosa	125
Tiliqua rugosa rugosa	45
Tiliqua rugosa subsp. aspera	18
Tiliqua rugosa subsp. konowi	2
Tiliqua rugosa subsp. palarra	2
Tiliqua rugosa subsp. rugosa	219
Underwoodisaurus milii	34
Varanus gouldii	31
Varanus rosenbergi	3
Varanus rosenbergii	2
Varanus sp.	1

Varanus tristis	7
Varanus tristis subsp. tristis	3

Appendix D

Flora data

Quadrat and relevé data

Tuart Patch Assessment

Banksia Patch Assessment

Flora species list by family

Flora species list by vegetation type

Significant flora and significant weed locations

GHD Dendrogram

Gibson Dendrogram

Keighery Dendrogram

Flora likelihood of occurrence assessment guidelines

Flora likelihood of occurrence assessment

Threatened and Priority flora report form

QUADRAT AND RELEVE DATA

Site ID:	Kwin01	VT EgBspp.
Type:	Quadrat	5m x 20m
Date:	02/08/2024 and 19/09/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391642	6435529
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	11-30%	
Litter cover:	2-10%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia stenoptera		1	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Allocasuarina fraseriana		3	5	Tree (U)	Vegetative
Banksia attenuata		20	5	Tree (U)	Vegetative
Banksia menziesii		15	5	Tree (U)	Vegetative
Banksia ilicifolia		1	5	Tree (U)	Flowering
Briza maxima	*	1	0.25	Tussock grass (G)	Dehisced fruit
Burchardia congesta		1	0.25	Forb (G)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Caladenia sp. (sterile)		1	0.1	Forb (G)	Vegetative
Chaetospora curvifolia		1	0.1	Sedge (G)	Fruit
Chamaescilla corymbosa var. corymbosa		1	0.1	Forb (G)	Flower bud
Conostylis aculeata subsp. aculeata		1	0.25	Forb (G)	Vegetative
Daviesia divaricata subsp. divaricata		1	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Daviesia triflora		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Desmocladus flexuosus		1	0.25	Sedge (G)	Vegetative
Drosera erythrorhiza		1	0.1	Forb (G)	Vegetative
Ehrharta calycina	*	10	0.5	Tussock grass (G)	Vegetative
Ehrharta longiflora	*	30	0.25	Tussock grass (G)	Vegetative
Gladiolus caryophyllaceus	*	1	0.25	Forb (G)	Vegetative
Gompholobium tomentosum		1	0.5	Shrub, cycad, grass-tree (M)	Flower bud
Haemodorum sp. (sterile)		1	0.5	Forb (G)	Dehisced fruit
Hibbertia hypericoides		30	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Jacksonia furcellata		1	2	Shrub, cycad, grass-tree (M)	Vegetative
Kunzea glabrescens		15	4	Tree (U)	Vegetative
Laxmannia squarrosa		1	0.1	Shrub, cycad, grass-tree (M)	Dehisced fruit
Lomandra caespitosa		1	0.25	Forb (G)	Flower bud
Lomandra hermaphrodita		1	0.25	Forb (G)	Vegetative
Mesomelaena pseudostygia		1	0.25	Sedge (G)	Fruit
Pterostylis sanguinea		1	0.1	Forb (G)	Flower
Pterostylis sp. (sterile)		1	0.1	Forb (G)	Vegetative
Romulea rosea	*	1	0.1	Forb (G)	Vegetative
Scaevola canescens		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Sowerbaea laxiflora		1	0.1	Forb (G)	Vegetative
Styphelia conostephioides		1	0.5	Shrub, cycad, grass-tree (M)	Flower bud
Thysanotus ?sparteus		1	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Thysanotus sp. (sterile)		1	0.25	Vine (G)	Vegetative
Trachymene pilosa		1	0.1	Forb (G)	Vegetative
Ursinia anthemoides	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin01R	VT - Isolated Banksia spp.
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391619	6435444
Landform:	Steep slope	
Drainage:	Good	
Bare ground:	31-70%	
Litter cover:	2-10%	
Soil type:	Yellow and grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		1	1	Shrub, cycad, grass-tree (M)	Vegetative
Adenanthos cygnorum		1	1.75	Shrub, cycad, grass-tree (M)	Vegetative
Banksia attenuata		1	4	Tree (U)	Vegetative
Banksia ilicifolia		1	4	Tree (U)	Flower
Calothamnus quadrifidus	N	5	2.5	Shrub, cycad, grass-tree (M)	Fruit
Chamelaucium uncinatum		5	2.5	Shrub, cycad, grass-tree (M)	Flower
Gaudium laevigatum	*	35	2.5	Shrub, cycad, grass-tree (M)	Vegetative
Gompholobium tomentosum		1	0.5	Shrub, cycad, grass-tree (M)	Flower bud

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Hibbertia hypericoides		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypocalymma angustifolium		1	1	Shrub, cycad, grass-tree (M)	Flower bud
Hypochaeris glabra	*	1	0.1	Forb (G)	Vegetative
Jacksonia furcellata		1	2	Shrub, cycad, grass-tree (M)	Vegetative
Mesomelaena pseudostygia		1	0.25	Sedge (G)	Fruit
Styphelia conostephioides		1	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Ursinia anthemoides	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin02	VT – EgBspp.
Type:	Quadrat	10 x 10 m
Date:	02/08/2024 and 19/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391423	6434756
Landform:	Hillslope	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		5	1.5	Shrub, cycad, grass-tree (M)	Flower
Acacia saligna		3	3	Shrub, cycad, grass-tree (M)	Vegetative
Adenanthos cygnorum		5	1.75	Shrub, cycad, grass-tree (M)	Vegetative
Allocasuarina humilis		3	1.5	Shrub, cycad, grass-tree (M)	Fruit
Banksia menziesii		4	2	Tree (U)	Flower
Bossiaea eriocarpa		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	2	0.25	Tussock grass (G)	Fruit
Caladenia latifolia		1	0.025	Forb (G)	Flower

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Calothamnus quadrifidus	N	3	1.5	Shrub, cycad, grass-tree (M)	Flower
Ehrharta calycina	*	15	0.5	Tussock grass (G)	Vegetative
Eucalyptus gomphocephala		30	10	Tree (U)	Flower bud
Euphorbia peplus	*	1	0.25	Forb (G)	Vegetative
Euphorbia terracina	*	5	0.25	Forb (G)	Vegetative
Fumaria capreolata	*	10	0.25	Forb (G)	Flower
Geranium molle	*	1	0.1	Forb (G)	Vegetative
Hardenbergia comptoniana		1	0.1	Vine (G)	Flower
Jacksonia furcellata		1	1.5	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		3	2	Shrub, cycad, grass-tree (M)	Fruit
Lysiandra calycina		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Lysimachia arvensis	*	1	0.1	Forb (G)	Flower
Macrozamia riedlei		5	1.5	Shrub, cycad, grass-tree (M)	Vegetative
Melaleuca nesophila	*	1	2	Tree (U)	Flower
Pelargonium capitatum	*	2	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Sonchus oleraceus	*	1	0.1	Forb (G)	Flower
Trifolium arvense	*	1	0.1	Forb (G)	Flower

Site ID:	Kwin02R	VT – EgBspp.
Type:	Relevé	NA
Date:	01/08/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391461	6448710
Landform:	sandplain	
Drainage:	Good	
Bare ground:	2-10%	
Litter cover:	11-30%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		10	0.75	Shrub, cycad, grass-tree (M)	Flower
Allocasuarina humilis		3	1.5	Shrub, cycad, grass-tree (M)	Fruit
Banksia attenuata		5	4	Tree (U)	Flower bud
Banksia menziesii		5	4	Tree (U)	Flower
Brachyloma preissii		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	2	0.25	Tussock grass (G)	Fruit
Conostephium pendulum		3	0.5	Shrub, cycad, grass-tree (M)	Flower
Ehrharta calycina	*	5	0.5	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Eucalyptus marginata		3	6	Tree (U)	Fruit
Hibbertia hypericoides		10	0.75	Shrub, cycad, grass-tree (M)	Flower
Mesomelaena pseudostygia		5	0.5	Sedge (G)	Flower
Stirlingia latifolia		3	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Xanthorrhoea preissii		5	1.5	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin03	VT – EgBspp.
Type:	Quadrat	10 x 10 m
Date:	02/08/2024 and 19/09/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391529	6434852
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Brown/grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		1	1	Shrub, cycad, grass-tree (M)	Vegetative
Banksia attenuata		10	5	Tree (U)	Vegetative
Banksia menziesii		2	5	Tree (U)	Vegetative
Caladenia sp. (sterile)		1	0.1	Forb (G)	Vegetative
Ehrharta calycina	*	40	0.5	Tussock grass (G)	Vegetative
Ehrharta longiflora	*	40	0.25	Tussock grass (G)	Vegetative
Eucalyptus gomphocephala		20	15	Tree (U)	Vegetative
Gladiolus caryophyllaceus	*	1	0.25	Forb (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Hardenbergia comptoniana		1	0.5	Vine (G)	Flower bud
Hibbertia hypericoides		25	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypochaeris glabra	*	1	0.1	Forb (G)	Vegetative
Lomandra hermaphrodita		1	0.25	Forb (G)	Vegetative
Lupinus cosentinii	*	1	0.25	Forb (G)	Vegetative
Lysimachia arvensis	*	1	0.1	Forb (G)	Vegetative
Lysiandra calycina		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Macrozamia riedlei		2	1.25	Shrub, cycad, grass-tree (M)	Vegetative
Mesomelaena pseudostygia		10	0.25	Sedge (G)	Flower
Romulea rosea	*	1	0.1	Forb (G)	Vegetative
Sowerbaea laxiflora		1	0.25	Forb (G)	Vegetative
Trifolium sp. (sterile)	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin03R	VT – EgBspp.
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391542	6434519
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Brown/grey sand	
Fire age:	Moderate (3 to 5 yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Banksia menziesii		10	4	Tree (U)	Vegetative
Banksia attenuata		3	4	Tree (U)	Vegetative
Ehrharta longiflora	*	90	0.25	Tussock grass (G)	Vegetative
Gladiolus caryophyllaceus	*	1	0.25	Forb (G)	Vegetative
Hibbertia hypericoides		3	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypochaeris glabra	*	1	0.1	Forb (G)	Vegetative
Jacksonia furcellata		30	4	Tree (U)	Vegetative
Lomandra hermaphrodita		1	0.25	Forb (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Lysiandra calycina		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Macrozamia riedlei		1	1.25	Shrub, cycad, grass-tree (M)	Vegetative
Mesomelaena pseudostygia		1	0.25	Sedge (G)	Fruit
Sonchus oleraceus	*	1	0.1	Forb (G)	Vegetative
Trifolium sp. (sterile)	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin04	VT EmBspp.
Type:	Quadrat	10 x 10 m
Date:	02/08/2024 and 19/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391528	6433744
Landform:	sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		2	0.5	Shrub, cycad, grass-tree (M)	Flower
Banksia attenuata		40	5	Tree (U)	Flower bud
Banksia menziesii		5	5	Tree (U)	Flower
Bossiaea eriocarpa		2	0.5	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	1	0.25	Tussock grass (G)	Fruit
Burchardia congesta		1	0.25	Forb (G)	Dehisced fruit
Caesia micrantha		10	0.25	Shrub, cycad, grass-tree (M)	Flower
Caladenia flava		1	0.1	Forb (G)	Flower

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Chamaescilla corymbosa var. corymbosa		5	0.1	Forb (G)	Vegetative
Conostephium pendulum		1	1	Shrub, cycad, grass-tree (M)	Flower
Conostylis aculeata subsp. aculeata		1	0.25	Forb (G)	Flower
Crassula colorata var. colorata		1	0.1	Forb (G)	Flower
Daviesia triflora		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Desmocladus flexuosus		1	0.25	Sedge (G)	Vegetative
Drosera erythrorhiza		1	0.1	Forb (G)	Vegetative
Drosera porrecta		1	0.1	Forb (G)	Dehisced fruit
Fumaria capreolata	*	2	0.1	Forb (G)	Flower
Ehrharta calycina	*	5	1	Tussock grass (G)	Vegetative
Eucalyptus marginata		2	5	Tree (U)	Fruit
Gladiolus caryophyllaceus	*	1	0.5	Forb (G)	Vegetative
Hardenbergia comptoniana		1	0.1	Vine (G)	Flower
Hibbertia hypericoides		10	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypocalymma robustum		3	1	Shrub, cycad, grass-tree (M)	Flower
Hypochaeris glabra	*	1	0.1	Forb (G)	Flower
Jacksonia furcellata		1	1	Shrub, cycad, grass-tree (M)	Flower
Macrozamia riedlei		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Phlebocarya ciliata		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Pterostylis sanguinea		1	0.1	Forb (G)	Flower
Sowerbaea laxiflora		1	0.5	Forb (G)	Flower
Trachymene pilosa		1	0.1	Forb (G)	Fruit
Ursinia anthemoides	*	1	0.1	Forb (G)	Dehisced fruit
Xanthorrhoea gracilis		2	0.5	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin04R	VT - Isolated Euca spp.
Type:	Relevé	NA
Date:	01/08/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392541	6442768
Landform:	Undulating	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Sand	
Fire age:	Old (6+ yr)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia floribunda	*	2	2	Shrub, cycad, grass-tree (M)	Flower
Acacia rostellifera		5	2	Shrub, cycad, grass-tree (M)	Flower
Acacia saligna		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Carpobrotus edulis	*	1	0.25	Forb (G)	Fruit
Chamaecytisus palmensis	*	1	2	Tree (U)	Vegetative
Corymbia calophylla		1	8	Tree (U)	Fruit
Ehrharta calycina	*	2	1.5	Tussock grass (G)	Vegetative
Eragrostis curvula	*	3	1.5	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Eucalyptus camaldulensis	N	1	15	Tree (U)	Fruit
Eucalyptus rudis		1	12	Tree (U)	Fruit
Euphorbia terracina	*	1	0.25	Forb (G)	Vegetative
Fumaria capreolata	*	1	0.5	Forb (G)	Flower
Hardenbergia comptoniana		1	0.1	Vine (G)	Flower
Gaudium laevigatum	*	2	2	Shrub, cycad, grass-tree (M)	Vegetative
Pelargonium capitatum	*	1	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Schinus terebinthifolia	*	1	2	Tree (U)	Vegetative
Zantedeschia aethiopica	*DP	1	1	Forb (G)	Flower

Site ID:	Kwin05	VT - BmBa
Type:	Quadrat	10 x 10 m
Date:	08/08/2024 and 18/92024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392163	6439242
Landform:	Hillslope	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		3	1.5	Shrub, cycad, grass-tree (M)	Flower
Amphipogon turbinatus		4	0.25	Tussock grass (G)	Dehisced fruit
Anigozanthos humilis subsp. humilis		1	0.25	Forb (G)	Flower
Banksia menziesii		10	5	Tree (U)	Flower
Banksia attenuata		10	5	Tree (U)	Flower bud
Bossiaea eriocarpa		2	0.25	Shrub, cycad, grass-tree (M)	Flower
Burchardia congesta		1	0.25	Forb (G)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Caladenia flava		2	0.25	Forb (G)	Flower
Chaetospora curvifolia		1	0.25	Sedge (G)	Fruit
Chamaescilla corymbosa var. corymbosa		1	0.1	Forb (G)	Vegetative
Conostylis setigera subsp. setigera		3	0.25	Forb (G)	Flower
Dasypogon bromeliifolius		5	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Daviesia triflora		2	0.5	Shrub, cycad, grass-tree (M)	Flower
Desmocladus flexuosus		2	0.25	Sedge (G)	Vegetative
Dianella revoluta var. divaricata		1	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Drosera drummondii		2	0.25	Forb (G)	Dehisced fruit
Drosera erythrorhiza		1	0.1	Forb (G)	Vegetative
Eucalyptus marginata		3	5	Tree (U)	Fruit
Gastrolobium capitatum		2	0.5	Shrub, cycad, grass-tree (M)	Flower
Gompholobium tomentosum		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Gladiolus caryophyllaceus	*	1	0.25	Forb (G)	Vegetative
Hibbertia hypericoides		5	0.5	Shrub, cycad, grass-tree (M)	Flower
Hibbertia racemosa		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Hovea trisperma		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Hypocalymma robustum		2	1	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		5	2	Shrub, cycad, grass-tree (M)	Fruit
Lomandra caespitosa		1	0.25	Forb (G)	Flower
Lomandra nigricans		1	0.25	Forb (G)	Flower
Lomandra preissii		1	0.25	Forb (G)	Flower
Lyginia barbata		3	0.5	Sedge (G)	Flower
Opercularia vaginata		1	0.25	Forb (G)	Flower
Patersonia occidentalis		10	0.5	Forb (G)	Dehisced fruit
Persoonia saccata		1	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Phlebocarya ciliata		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Phyllangium ?divergens		1	0.1	Forb (G)	Flower bud
Senecio condylus	*	1	0.25	Forb (G)	Flower
Stirlingia latifolia		5	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Stylidium brunonianum		1	0.25	Forb (G)	Flower
Thysanotus manglesianus		1	0.1	Vine (G)	Flower
Trachymene pilosa		1	0.1	Forb (G)	Fruit
Ursinia anthemoides	*	1	0.1	Forb (G)	Dehisced fruit
Xanthorrhoea preissii		15	2	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin05R	VT - EgBspp.
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391577	6434218
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Brown/grey sand	
Fire age:	Moderate (3 to 5 yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		1	0.75	Shrub, cycad, grass-tree (M)	Vegetative
Adenanthos cygnorum		1	2	Shrub, cycad, grass-tree (M)	Vegetative
Banksia attenuata		2	4	Tree (U)	Vegetative
Banksia ilicifolia		1	4	Tree (U)	Vegetative
Banksia menziesii		2	4	Tree (U)	Vegetative
Conostylis aculeata subsp. aculeata		1	0.25	Forb (G)	Vegetative
Desmocladus flexuosus		1	0.25	Sedge (G)	Vegetative
Ehrharta calycina	*	15	0.5	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Ehrharta longiflora	*	70	0.25	Tussock grass (G)	Vegetative
Gaudium laevigatum	*	1	1.75	Shrub, cycad, grass-tree (M)	Vegetative
Hardenbergia comptoniana		1	0.5	Vine (G)	Flower
Hibbertia hypericoides		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypocalymma robustum		1	1	Shrub, cycad, grass-tree (M)	Flower bud
Jacksonia sternbergiana		1	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Lomandra caespitosa		1	0.25	Forb (G)	Flower
Macrozamia riedlei		1	1	Shrub, cycad, grass-tree (M)	Vegetative
Mesomelaena pseudostygia		1	0.25	Sedge (G)	Fruit
Persoonia saccata		1	0.75	Shrub, cycad, grass-tree (M)	Vegetative
Petrophile linearis		1	0.25	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin06	VT - ErMr
Type:	Quadrat	10 x 10 m
Date:	20/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391993.06	6436544.62
Landform:	Wetland	
Drainage:	Seasonally inundated	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Brown sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good to Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Cenchrus clandestinus	*	2	0.5	Other grass (G)	Vegetative
Eucalyptus rudis		20	20	Tree (U)	Fruit
Euphorbia terracina	*	2	0.25	Forb (G)	Vegetative
Ehrharta longiflora	*	10	0.5	Tussock grass (G)	Vegetative
Fumaria capreolata	*	2	0.25	Forb (G)	Flower
Fumaria densiflora	*	2	0.25	Forb (G)	Flower
Melaleuca rhaphiophylla		5	10	Tree (U)	Dehisced fruit
Oxalis pes-caprae	*	2	0.25	Forb (G)	Flower

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Pteridium esculentum		85	1.75	Fern (G)	Vegetative
Rumex crispus	*	2	0.5	Forb (G)	Flower
Zantedeschia aethiopica	*DP	2	1	Forb (G)	Flower

Site ID:	Kwin06R	VT - Modified wetland drainage area
Type:	Relevé	NA
Date:	01/08/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392062	6445410
Landform:	Wetland/ drainage	
Drainage:	Seasonal wet	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia floribunda	*	5	2	Shrub, cycad, grass-tree (M)	Flower
Acacia saligna		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Asparagus asparagoides	*DP & WoNS	10	0.25	Forb (G)	Vegetative
Erigeron bonariensis	*	2	0.25	Forb (G)	Flower
Eucalyptus sp.	*	2	5	Tree (U)	Fruit
Grevillea preissii		2	0.5	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		5	2	Shrub, cycad, grass-tree (M)	Fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Lepidosperma longitudinale		10	1	Sedge (G)	Flower
Medicago polymorpha	*	5	0.1	Forb (G)	Flower
Melaleuca preissiana		10	5	Tree (U)	Dehisced fruit
Phytolacca octandra	*	5	0.5	Shrub, cycad, grass-tree (M)	Fruit
Schinus terebinthifolia	*	5	2	Tree (U)	Vegetative
Vicia sativa	*	1	0.1	Forb (G)	Flower
Xanthorrhoea preissii		1	1.5	Shrub, cycad, grass-tree (M)	Vegetative
Zantedeschia aethiopica	*DP	1	1	Forb (G)	Flower

Site ID:	Kwin07	VT - ErMr
Type:	Quadrat	10 x 10 m
Date:	20/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391874	6432203
Landform:	Wetland	
Drainage:	Seasonal wet	
Bare ground:	<2%	
Litter cover:	31-70%	
Soil type:	Black clay	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Very good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Cyathochaeta avenacea		20	1.5	Sedge (G)	Flower
Eucalyptus rudis		5	15	Tree (U)	Fruit
Leptocarpus decipiens		10	1.5	Sedge (G)	Flower
Lepidosperma longitudinale		30	1.5	Sedge (G)	Flower
Leptocarpus scariosus		10	1.5	Sedge (G)	Flower
Melaleuca preissiana		40	10	Tree (U)	Dehisced fruit
Taxandria linearifolia		20	4	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin07R	VT - ErMr
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391687	6433716
Landform:	Wetland	
Drainage:	Poor	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Ehrharta longiflora	*	80	0.25	Tussock grass (G)	Vegetative
Eucalyptus rudis		5	4.5	Tree (U)	Fruit
Euphorbia peplus	*	1	0.25	Forb (G)	Vegetative
Melaleuca rhaphiophylla		45	4.5	Tree (U)	Dehisced fruit
Melaleuca teretifolia		1	1.5	Shrub, cycad, grass-tree (M)	
Trifolium sp. (sterile)	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin08	VT - ErMr
Type:	Quadrat	10 x 10 m
Date:	20/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391892	6432059
Landform:	Dampland	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Brown loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Very good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Banksia menziesii		5	4	Tree (U)	Flower
Briza maxima	*	5	0.25	Tussock grass (G)	Fruit
Boronia crenulata subsp. viminea		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Bossiaea eriocarpa		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Burchardia congesta		2	0.5	Forb (G)	Dehisced fruit
Conostylis aurea		5	0.25	Forb (G)	Flower
Conostylis juncea		1	0.25	Forb (G)	Flower
Corymbia calophylla		30	20	Tree (U)	Fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Dasypogon bromeliifolius		5	0.5	Shrub, cycad, grass-tree (M)	Dehisced fruit
Desmocladus flexuosus		10	0.25	Sedge (G)	Vegetative
Dianella revoluta var. divaricata		1	0.5	Shrub, cycad, grass-tree (M)	Dehisced fruit
Ehrharta longiflora	*	10	0.5	Tussock grass (G)	Vegetative
Hardenbergia comptoniana		2	0.1	Vine (G)	Flower
Kunzea glabrescens		5	0.25	Shrub, cycad, grass-tree (M)	Fruit
Lepidosperma pubisquameum		3	0.25	Sedge (G)	Flower
Leptocarpus ?roycei		5	0.5	Sedge (G)	Flower
Patersonia occidentalis		1	0.5	Forb (G)	Dehisced fruit
Phlebocarya ciliata		10	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Pterostylis sanguinea		1	0.1	Forb (G)	Flower
Thysanotus manglesianus		1	0.1	Vine (G)	Flower
Xanthorrhoea preissii		5	1.5	Shrub, cycad, grass-tree (M)	Vegetative
Xanthorrhoea gracilis		5	1	Shrub, cycad, grass-tree (M)	Vegetative
Zantedeschia aethiopica	*DP	1	0.25	Forb (G)	Flower

Site ID:	Kwin08R	VT - Isolated Banksia spp.
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391437.09	6434944.99
Landform:	Hillslope	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Brown sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Banksia menziesii		5	5	Tree (U)	Flower
Banksia attenuata		5	5	Tree (U)	Flower bud
Calothamnus quadrifidus	N	5	1.5	Shrub, cycad, grass-tree (M)	Flower
Euphorbia terracina	*	5	0.1	Forb (G)	Vegetative
Fumaria capreolata	*	10	0.1	Forb (G)	Flower
Gladiolus caryophyllaceus	*	15	0.5	Forb (G)	Dehisced fruit
Hardenbergia comptoniana		1	0.1	Vine (G)	Flower
Poaceae sp. (sterile)		30	0.25	Other grass (G)	Vegetative

Site ID:	Kwin09	VT - ErMr
Type:	Quadrat	10 x 10 m
Date:	26/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391770	6432194
Landform:	Dampland	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Brown sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Very good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Aira caryophyllea	*	1	0.1	Other grass (G)	Dehisced fruit
Avena barbata	*	1	0.5	Other grass (G)	Dehisced fruit
Bossiaea eriocarpa		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	6	0.25	Tussock grass (G)	Fruit
Burchardia congesta		1	0.5	Forb (G)	Dehisced fruit
Cassytha glabella		1	0.1	Vine (G)	Fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Chamaescilla corymbosa var. corymbosa		1	0.1	Forb (G)	Vegetative
Conostylis aurea		1	0.25	Forb (G)	Flower
Conostylis juncea		1	0.25	Forb (G)	Flower
Corymbia calophylla		10	20	Tree (U)	Fruit
Dampiera linearis		1	0.25	Forb (G)	Flower
Dasypogon bromeliifolius		5	0.5	Shrub, cycad, grass-tree (M)	Dehisced fruit
Desmocladus flexuosus		20	0.25	Sedge (G)	Vegetative
Ehrharta calycina	*	1	1	Tussock grass (G)	Vegetative
Ehrharta longiflora	*	1	0.5	Tussock grass (G)	Vegetative
Gladiolus caryophyllaceus	*	1	0.5	Forb (G)	Vegetative
Gompholobium tomentosum		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Hardenbergia comptoniana		1	0.1	Vine (G)	Flower
Hypocalymma angustifolium		10	1.5	Shrub, cycad, grass-tree (M)	Flower bud
Jacksonia furcellata		1	0.25	Shrub, cycad, grass-tree (M)	Flower
Jacksonia gracillima	P3	1	0.5	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		2	0.5	Shrub, cycad, grass-tree (M)	Fruit
Laxmannia ramosa		1	0.1	Forb (G)	Flower
Lepidosperma calcicola		5	0.25	Sedge (G)	Flower
Lepidosperma longitudinale		1		Sedge (G)	Flower
Lepidosperma pubisquameum		1	0.25	Sedge (G)	Flower
Lepidosperma sp. (sterile)		2	0.25	Sedge (G)	Vegetative
Lobelia tenuior		1	0.25	Forb (G)	Flower
Patersonia occidentalis		2	0.5	Forb (G)	Dehisced fruit
Phlebocarya ciliata		1	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Pimelea rosea subsp. rosea		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Stylidium repens		1	0.1	Forb (G)	Flower
Thysanotus arbuscula		1	0.5	Forb (G)	Flower
Thysanotus multiflorus		1	0.25	Forb (G)	Flower
Trachymene pilosa		1	0.1	Forb (G)	Fruit
Tricoryne elatior		1	0.1	Forb (G)	Flower
Xanthorrhoea preissii		20	1.5	Shrub, cycad, grass-tree (M)	Vegetative
Xanthorrhoea gracilis		5	1	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin09R	VT – EmBspp.
Type:	Relevé	NA
Date:	02/08/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	391775	6433149
Landform:	Sand dune	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia pulchella var pulchella		1	0.75	Shrub, cycad, grass-tree (M)	Vegetative
Banksia attenuata		20	5	Tree (U)	Vegetative
Banksia menziesii		20	5	Tree (U)	Vegetative
Briza maxima	*	1	0.25	Tussock grass (G)	Dehisced fruit
Burchardia congesta		1	0.25	Forb (G)	Dehisced fruit
Carpobrotus edulis	*	1	0.25	Forb (G)	Vegetative
Conostylis aculeata subsp. aculeata		1	0.25	Forb (G)	Vegetative
Dasypogon bromeliifolius		1	0.5	Shrub, cycad, grass-tree (M)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Dianella revoluta var. divaricata		1	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Ehrharta calycina	*	85	0.5	Tussock grass (G)	Vegetative
Gladiolus caryophyllaceus	*	1	0.25	Forb (G)	Vegetative
Gompholobium tomentosum		1	0.5	Shrub, cycad, grass-tree (M)	Flower bud
Hemiandra pungens		1	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Hypochaeris glabra	*	1	0.1	Forb (G)	Vegetative
Jacksonia furcellata		5	3	Tree (U)	Vegetative
Lomandra caespitosa		1	0.25	Forb (G)	Flower
Thysanotus ?sparteus		1	0.25	Forb (G)	Vegetative
Ursinia anthemoides	*	1	0.1	Forb (G)	Vegetative

Site ID:	Kwin10	VT – EgBspp.
Type:	Quadrat	10 x 10 m
Date:	29/07/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391347	6448715
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Brown sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Very good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Aira caryophyllea	*	1	0.1	Other grass (G)	Dehisced fruit
Allocasuarina humilis		2	1.5	Shrub, cycad, grass-tree (M)	Fruit
Anigozanthos humilis subsp. humilis		1	0.25	Forb (G)	Flower
Banksia attenuata		5	6	Tree (U)	Flower bud
Banksia dallanneyi subsp. dallanneyi var. dallanneyi		1	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Banksia menziesii		15	6	Tree (U)	Flower
Bossiaea eriocarpa		1	0.25	Shrub, cycad, grass-tree (M)	Flower

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Brachyloma preissii		5	1	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	1	0.25	Tussock grass (G)	Fruit
Burchardia congesta		1	0.5	Forb (G)	Dehisced fruit
Caladenia flava		1	0.25	Forb (G)	Flower
Centrolepis drummondiana		2	0.1	Forb (G)	Fruit
Chamaescilla corymbosa var. corymbosa		1	0.1	Forb (G)	Vegetative
Conostephium pendulum		2	0.25	Shrub, cycad, grass-tree (M)	Flower
Conostylis setigera subsp. setigera		1	0.25	Forb (G)	Flower
Corynotheca micrantha		1	0.25	Forb (G)	Vegetative
Dasypogon bromeliifolius		2	0.5	Shrub, cycad, grass-tree (M)	Dehisced fruit
Daviesia triflora		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Diuris corymbosa		1	0.25	Forb (G)	Flower
Drosera macrantha		1	0.1	Forb (G)	Dehisced fruit
Ehrharta calycina	*	2	0.5	Tussock grass (G)	Vegetative
Eucalyptus marginata		1	5	Tree (U)	Fruit
Freesia leichtlinii subsp. alba × leichtlinii subsp. leichtlinii	*	1	0.25	Forb (G)	Flower
Gastrolobium capitatum		1	0.1	Shrub, cycad, grass-tree (M)	Flower
Gladiolus caryophyllaceus	*	2	0.25	Forb (G)	Vegetative
Hibbertia hypericoides		5	0.5	Shrub, cycad, grass-tree (M)	Flower
Hypochaeris glabra	*	1	0.1	Forb (G)	Flower
Lomandra caespitosa		1	0.25	Forb (G)	Flower
Lomandra preissii		1	0.25	Forb (G)	Flower
Mesomelaena pseudostygia		20	0.5	Sedge (G)	Flower
Millotia tenuifolia var. tenuifolia		1	0.1	Forb (G)	Flower
Phyllangium ?divergens		1	0.1	Forb (G)	Flower bud
Podotheca angustifolia		1	0.25	Forb (G)	Flower
Potamogeton ?drummondii		1	0.25	Aquatic (G)	Vegetative
Prasophyllum parvifolium		1	0.25	Forb (G)	Flower
Rhodanthe citrina		1	0.1	Forb (G)	Flower
Romulea rosea	*	1	0.1	Forb (G)	Flower
Scaevola canescens		1	0.1	Shrub, cycad, grass-tree (M)	Flower
Schoenus clandestinus		1	0.1	Sedge (G)	Flower
Siloxerus ?filifolius		1	0.1	Forb (G)	Vegetative
Sowerbaea laxiflora		1	0.25	Forb (G)	Flower
Styphelia conostephioides		2	0.5	Shrub, cycad, grass-tree (M)	Flower bud
Thysanotus manglesianus		1	0.1	Vine (G)	Flower
Trachymene pilosa		1	0.1	Forb (G)	Fruit
Ursinia anthemoides	*	2	0.25	Forb (G)	Dehisced fruit
Xanthorrhoea preissii		15	1.5	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin10R	VT – EmBspp.
Type:	Relevé	NA
Date:	08/08/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391553	6433595
Landform:	Hillslope	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Adenanthos cygnorum		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Banksia attenuata		5	5	Tree (U)	Flower bud
Banksia ilicifolia		1	6	Tree (U)	Flower
Banksia menziesii		10	8	Tree (U)	Flower
Ehrharta calycina	*	20	1.5	Tussock grass (G)	Vegetative
Eragrostis curvula	*	20	1.5	Tussock grass (G)	Vegetative
Fumaria capreolata	*	10	0.25	Forb (G)	Flower
Kunzea glabrescens		5	2	Shrub, cycad, grass-tree (M)	Fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Oxalis pes-caprae	*	5	0.1	Forb (G)	Flower

Site ID:	Kwin11R	VT - ErMr
Type:	Relevé	NA
Date:	26/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392047	6430501
Landform:	Drainage area/floodplain	
Drainage:	Seasonal wet	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Grey sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia cochlearis		2	1.5	Shrub, cycad, grass-tree (M)	Flower
Acacia saligna		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Briza maxima	*	2	0.25	Tussock grass (G)	Fruit
Callistemon phoeniceus	*N	2	1.5	Shrub, cycad, grass-tree (M)	Flower
Chaetospora curvifolia		2	1.5	Sedge (G)	Fruit
Eucalyptus rudis		10	15	Tree (U)	Fruit
Euphorbia terracina	*	3	0.25	Forb (G)	Vegetative
Kunzea glabrescens		5	4	Shrub, cycad, grass-tree (M)	Fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Lepidosperma longitudinale		60	1.5	Sedge (G)	Flower
Melaleuca rhaphiophylla		15	10	Tree (U)	Dehisced fruit
Typha ?orientalis		20	1.5	Sedge (G)	Fruit

Site ID:	Kwin12R	VT – Mixed Shrubland
Type:	Relevé	NA
Date:	19/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392210	6440959
Landform:	Sandplain	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	2-10%%	
Soil type:	Sand	
Fire age:	Old (6+ yr)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia saligna		15	5	Shrub, cycad, grass-tree (M)	Vegetative
Arctotheca calendula	*	2	0.25	Forb (G)	Vegetative
Avena barbata	*	20	5	Other grass (G)	Dehisced fruit
Briza maxima	*	1	0.25	Tussock grass (G)	Fruit
Bromus diandrus	*	5	0.5	Tussock grass (G)	Dehisced fruit
Calothamnus quadrifidus	N	5	2	Shrub, cycad, grass-tree (M)	Flower
Chamelaucium uncinatum		10	5	Shrub, cycad, grass-tree (M)	Flower
Ehrharta calycina	*	20	10	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Eragrostis curvula	*	20	15	Tussock grass (G)	Flower
Lolium rigidum	*	5	0.5	Other grass (G)	Flower
Lysimachia arvensis	*	5	0.1	Forb (G)	Flower
Pelargonium capitatum	*	5	0.25	Shrub, cycad, grass-tree (M)	Vegetative
Trifolium arvense	*	1	0.1	Forb (G)	Flower

Site ID:	Kwin13R	VT - Modified wetland drainage area
Type:	Relevé	NA
Date:	26/11/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	389509	6422798
Landform:	Drainage area/floodplain	
Drainage:	Poor	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Grey sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia saligna		1	2	Shrub, cycad, grass-tree (M)	Vegetative
Bromus diandrus	*	5	0.5	Tussock grass (G)	Dehisced fruit
Cirsium vulgare	*	1	0.5	Shrub, cycad, grass-tree (M)	Flower
Cynodon dactylon	*	30	0.25	Other grass (G)	Vegetative
Ehrharta calycina	*	40	1	Tussock grass (G)	Dehisced fruit
Ehrharta longiflora	*	15	0.25	Tussock grass (G)	Dehisced fruit
Euphorbia peplus	*	1	0.25	Forb (G)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Jacksonia furcellata		1	2	Shrub, cycad, grass-tree (M)	Dehisced fruit
Lactuca serriola	*	1	0.25	Forb (G)	Dehisced fruit
Lupinus cosentinii	*	1	0.5	Forb (G)	Dehisced fruit
Machaerina articulata		2	1.5	Sedge (G)	Fruit
Melaleuca rhaphiophylla		5	4	Shrub, cycad, grass-tree (M)	Dehisced fruit
Melaleuca teretifolia		1	1.5	Shrub, cycad, grass-tree (M)	Dehisced fruit
Paspalum urvillei	*	1	0.5	Tussock grass (G)	Fruit
Pelargonium capitatum	*	3	0.25	Shrub, cycad, grass-tree (M)	Dehisced fruit
Schinus terebinthifolia	*	1	3	Tree (U)	Vegetative
Typha ?orientalis		30	2	Sedge (G)	Fruit
Viminaria juncea		1	2	Shrub, cycad, grass-tree (M)	Vegetative

Site ID:	Kwin14R	VT - ErMr
Type:	Relevé	NA
Date:	19/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392227	6437252
Landform:	Drainage	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia iteaphylla	*	10	3	Shrub, cycad, grass-tree (M)	Flower
Briza maxima	*	20	0.25	Tussock grass (G)	Fruit
Ehrharta calycina	*	20	0.5	Tussock grass (G)	Vegetative
Ehrharta longiflora	*	20	0.5	Tussock grass (G)	Vegetative
Eucalyptus rudis		5	10	Tree (U)	Fruit
Kunzea glabrescens		2	2	Shrub, cycad, grass-tree (M)	Fruit
Lagurus ovatus	*	10	0.25	Other grass (G)	Flower
Melaleuca preissiana		5	8	Tree (U)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Pultenaea reticulata		1	2	Shrub, cycad, grass-tree (M)	Flower
Zantedeschia aethiopica	*DP	10	1.5	Forb (G)	Flower

Site ID:	Kwin15R	VT - Isolated Euca spp.
Type:	Relevé	NA
Date:	26/11/2024	Described by: A. Sleep
Co-ordinates (Easting/Northing):	390328	6426561
Landform:	Drainage area/floodplain	
Drainage:	Seasonally inundated	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Grey sand	
Fire age:	Old (6+ yr)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia cochlearis		1	1	Shrub, cycad, grass-tree (M)	Flower
Bromus diandrus	*	10	0.25	Tussock grass (G)	Fruit
Ehrharta calycina	*	20	0.5	Tussock grass (G)	Dehisced fruit
Ehrharta longiflora	*	10	0.25	Tussock grass (G)	Dehisced fruit
Eleocharis acuta		1	1	Sedge (G)	Flower
Eucalyptus gomphocephala		1	5	Tree (U)	Flower bud
Gomphocarpus fruticosus	*DP	1	1.5	Forb (G)	Fruit
Hyparrhenia hirta	*	2	1.5	Tussock grass (G)	Flower

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Isolepis cernua var. setiformis		1	0.1	Forb (G)	Flower
Lythrum hyssopifolia	*	1	0.1	Forb (G)	Flower
Machaerina articulata		1	1.5	Sedge (G)	Flower
Melaleuca huegelii subsp. huegelii		2	3	Shrub, cycad, grass-tree (M)	Flower
Melaleuca megacephala	N	1	1.5	Shrub, cycad, grass-tree (M)	Flower
Paspalum urvillei	*	3	1.25	Tussock grass (G)	Flower
Phleum pratense	*	3	1.5	Tussock grass (G)	Flower
Rumex crispus	*	1	1	Forb (G)	Flower
Typha ?orientalis		40	1.5	Sedge (G)	Fruit
Vicia sativa	*	1	0.25	Forb (G)	Flower

Site ID:	Kwin16R	VT - ErMr
Type:	Relevé	NA
Date:	20/09/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391930	6431762
Landform:	Wetland	
Drainage:	Permanent wet	
Bare ground:	11-30%	
Litter cover:	2-10%	
Soil type:	Sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Completely Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia saligna		5	2	Shrub, cycad, grass-tree (M)	Vegetative
Ehrharta calycina	*	5	1	Tussock grass (G)	Vegetative
Eucalyptus rudis		2	10	Tree (U)	Fruit
Hypocalymma angustifolium		1	1	Shrub, cycad, grass-tree (M)	Flower bud
Jacksonia furcellata		5	1.5	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		5	2	Shrub, cycad, grass-tree (M)	Fruit
Lysimachia arvensis	*	1	0.1	Forb (G)	Flower
Melaleuca rhaphiophylla		2	5	Tree (U)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Monoculus monstrosus	*	2	0.25	Forb (G)	Fruit
Senecio condylus	*	2	0.25	Forb (G)	Flower

Site ID:	Kwin17R	VT - Isolated Banksia spp.
Type:	Relevé	NA
Date:	28/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392247	6440025
Landform:	Slope	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	11-30%	
Soil type:	Brown sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Adenanthos cygnorum		10	2	Shrub, cycad, grass-tree (M)	Vegetative
Austrostipa elegantissima		1	0.5	Other grass (G)	Dehisced fruit
Banksia menziesii		10	6	Tree (U)	Flower
Banksia attenuata		10	5	Tree (U)	Flowerbud
Briza maxima	*	2	0.25	Tussock grass (G)	Fruit
Calothamnus quadrifidus	N	5	2	Shrub, cycad, grass-tree (M)	Flower
Chamelaucium uncinatum		5	2	Shrub, cycad, grass-tree (M)	Flower
Ehrharta calycina	*	30	1	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Eucalyptus gomphocephala		2	4	Tree (U)	Flowerbud
Gladiolus caryophyllaceus	*	2	1	Forb (G)	Vegetative
Grevillea curviloba	T, N	5	0.5	Shrub, cycad, grass-tree (M)	Flower
Jacksonia furcellata		2	1.25	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		5	2	Shrub, cycad, grass-tree (M)	Fruit
Pelargonium capitatum	*	10	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Ursinia anthemoides	*	2	0.25	Forb (G)	Dehisced fruit

Site ID:	Kwin18R	VT - ErMr
Type:	Relevé	NA
Date:	26/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391817	6432006
Landform:	Dampland	
Drainage:	Seasonal wet	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Sandy loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Good	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Briza maxima	*	1	0.5	Tussock grass (G)	Fruit
Bromus diandrus	*	1	0.5	Tussock grass (G)	Dehisced fruit
Corymbia calophylla		5	20	Tree (U)	Fruit
Ehrharta longiflora	*	1	0.5	Tussock grass (G)	Vegetative
Eucalyptus rudis		1	10	Tree (U)	Fruit
Kunzea glabrescens		2	2	Shrub, cycad, grass-tree (M)	Fruit
Lolium sp.	*	1	0.5	Other grass (G)	Vegetative
Melaleuca rhaphiophylla		2	5	Tree (U)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Pteridium esculentum		90	1.75	Fern (G)	Vegetative

Site ID:	Kwin19R	VT - ErMr
Type:	Relevé	NA
Date:	28/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	392321	6438001
Landform:	Drainage	
Drainage:	Seasonal wet	
Bare ground:	<2%	
Litter cover:	2-10%	
Soil type:	Sand	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Avena barbata	*	10	1	Other grass (G)	Dehisced fruit
Ehrharta calycina	*	20	1	Tussock grass (G)	Vegetative
Eucalyptus rudis		2	8	Tree (U)	Fruit
Euphorbia terracina	*	2	0.25	Forb (G)	Vegetative
Fumaria capreolata	*	5	0.5	Forb (G)	Flower
Gomphocarpus fruticosus	*DP	2	1.5	Shrub, cycad, grass-tree (M)	Vegetative
Lepidosperma longitudinale		20	1	Sedge (G)	Flower
Melaleuca rhaphiophylla		10	8	Tree (U)	Dehisced fruit

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Melaleuca teretifolia		2	2	Shrub, cycad, grass-tree (M)	
Rumex crispus	*	2	0.5	Forb (G)	Flower

Site ID:	Kwin20R	VT - Isolated Euca spp.
Type:	Relevé	NA
Date:	26/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	389994	6426465
Landform:	Drainage	
Drainage:	Good	
Bare ground:	<2%	
Litter cover:	<2%	
Soil type:	Sandy Loam	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Acacia cochlearis		2	2	Shrub, cycad, grass-tree (M)	Flower
Cynodon dactylon	*	20	0.25	Other grass (G)	Vegetative
Eucalyptus rudis		1	8	Tree (U)	Fruit
Lolium rigidum	*	20	0.5	Other grass (G)	Flower
Melaleuca huegellii subsp. huegellii		5	2	Shrub, cycad, grass-tree (M)	Flower
Rumex crispus	*	5	1	Forb (G)	Flower
Typha ?orientalis		10	1.5	Sedge (G)	Fruit
Vicia sativa	*	1	0.1	Forb (G)	Flower

Site ID:	Kwin21R	VT - EmBspp.
Type:	Relevé	NA
Date:	28/11/2024	Described by: A. Benkovic
Co-ordinates (Easting/Northing):	391622	6433116
Landform:	Slope	
Drainage:	Good	
Bare ground:	Grey sand	
Litter cover:	2-10%	
Soil type:	2-10%	
Fire age:	Old (6+ yrs)	
Vegetation condition:	Degraded	

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Allocasuarina fraseriana		2	8	Tree (U)	Fruit
Avena barbata	*	10	0.25	Other grass (G)	Dehisced fruit
Banksia attenuata		5	6	Tree (U)	Flower bud
Banksia menziesii		5	6	Tree (U)	Flower
Bossiaea eriocarpa		1	0.5	Shrub, cycad, grass-tree (M)	Flower
Dianella revoluta var. divaricata		1	1	Shrub, cycad, grass-tree (M)	Dehisced fruit
Ehrharta calycina	*	30	1	Tussock grass (G)	Vegetative

Species	Status	% cover	Height (m)	Form/stratum	Reprod. status
Eucalyptus marginata		2	6	Tree (U)	Fruit
Gladiolus caryophyllaceus	*	5	1	Forb (G)	Vegetative
Hibbertia hypericoides		2	1	Shrub, cycad, grass-tree (M)	Flower
Kunzea glabrescens		10	2	Shrub, cycad, grass-tree (M)	Fruit
Melaleuca systena		10	2	Shrub, cycad, grass-tree (M)	
Stirlingia latifolia		2	0.5	Shrub, cycad, grass-tree (M)	Vegetative
Ursinia anthemoides	*	5	0.25	Forb (G)	Dehisced fruit

Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain TEC – Patch Assessment

Site Name	Kwin03	391529 m E 6434852 m N
Patch Number	Patch 01	
Date	02/08/2024 and 19/09/2024	
Location	Sandplain	
Dune system	Spearwood	
Soils	Brown/grey sand	
Vegetation Type Description	*+/- Eucalyptus gomphocephala tall open woodland over Banksia attenuata and B. menziesii woodland over Acacia pulchella var pulchella Xanthorrhoea preissii Hibbertia hypericoides Mesomelaena pseudostygia*	
Condition	Degraded	
Disturbances	Kwinana freeway, weeds	
Structure	Open Woodland	
Tuart tree count in patch	14	
Structural form and size (DBH of Tuarts	tree, ≥150mm	
Native understorey present (%) and diversity	Native understorey present 51% cover, 10 species	
Native understorey species	*Acacia pulchella var pulchella, Caladenia sp. (sterile), Hardenbergia comptoniana, Hibbertia hypericoides, Lomandra hermaphrodita, Lysiandra calycina, Macrozamia riedlei, Mesomelaena pseudostygia, Burchardia congesta* and *Sowerbaea laxiflora*	
Weed cover (%) and dominant weed species	8 weed species present, 86% cover. *Ehrharta calycina* (40%) and *Ehrharta longiflora* (40%) considered dominant.	
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	1.48 ha, patch extends outside survey area up to 11.08 ha	
Summary of patch and whether it meets DAWE criteria to be TEC	Patches < 2 ha in degraded condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (< 5 ha) represented by Conservation Park R 53313, ESA 3287 and Bush Forever site 270, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending eastward from the survey area	
Photograph		

Site Name	Kwin02 -	391423m E 6434756m N
Patch Number	Patch 02	
Date	02/08/2024 and 19/9/2024	
Landform	Hillslope	
Dune system	Spearwood	
Soils	Grey sand	
Vegetation Type Description	*+/- Eucalyptus gomphocephala tall open woodland over Banksia attenuata and B. menziesii woodland over Acacia pulchella var pulchella Xanthorrhoea preissii Hibbertia hypericoides Mesomelaena pseudostygia*	
Condition	Degraded	
Disturbances	Kwinana freeway, weeds	
Structure	Open Woodland	
Tuart tree count in patch	31	
Structural form and size (DBH of Tuarts	tree, ≥150mm	
Native understorey present (%) and diversity	Native understorey present 26% cover, 11 species	
Native understorey species	*Acacia pulchella var pulchella, Adenanthos cygnorum, Allocasuarina humilis, Bossiaea eriocarpa ,Caladenia latifolia ,Hardenbergia comptoniana ,Jacksonia furcellata ,Kunzea glabrescens ,Lysiandra calycina* and *Macrozamia riedlei*	
Weed cover (%) and dominant weed species	12 weed species present, 48% cover. Dominant weeds were **Ehrharta calycina, *Euphorbia terracina* and **Fumaria capreolata,*	
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	0.68 ha, patch extends outside survey area up to 8.12 ha.	
Summary of patch and whether it meets DCCEEW criteria to be TEC	Patches that are 0.5 <1 ha in Poor condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (< 5 ha) represented by Conservation Park R 53313, ESA 3290 and Bush Forever site 269, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending westward from the survey area	
Photograph		

Site Name	Kwin01	391662m E 6435529m N
Patch Number	Patch 03	
Date	02/08/2024 and 19/9/2024	
Landform	Sandplain	
Dune system	Spearwood	
Soils	Grey sand	
Vegetation Type Description	*+/- Eucalyptus gomphocephala tall open woodland over Banksia attenuata and B. menziesii woodland over Acacia pulchella var pulchella Xanthorrhoea preissii Hibbertia hypericoides Mesomelaena pseudostygia*	
Condition	Good	
Disturbances	Kwinana freeway, weeds	
Structure	Open Woodland	
Tuart tree count in patch	6	
Structural form and size (DBH of Tuarts	tree, ≥150mm	
Native understorey present (%) and diversity	Native understorey present 61% cover, 32 species	
Native understorey species	*Acacia stenoptera, Burchardia congesta, Chaetophora curvifolia, Chamaescilla corymbosa var. corymbosa, Conostylis aculeata subsp. aculeata, Daviesia divaricata subsp. divaricata, Daviesia triflora, Desmocladus flexuosus, Drosera erythrorhiza, Gompholobium tomentosum, Haemodorum sp. (sterile), Hibbertia hypericoides ,Jacksonia furcellata, Laxmannia squarrosa, Lomandra caespitosa, Lomandra hermaphrodita, Mesomelaena pseudostygia, Pterostylis sanguinea, Scaevola canescens, Sowerbaea laxiflora, Styphelia conostephioides, Thysanotus ?sparteus, Trachymene pilosa, Phyllangium ?divergens, Wahlenbergia preissii, Calandrinia corrigioloides, Crassula colorata var. colorata, Caladenia flava, Centrolepis drummondiana, Neurachne alopecuroidea, Dichopogon capillipes* and *Thysanotus manglesianus*	
Weed cover (%) and dominant weed species	7 weed species present, 45% cover. Dominant weeds were **Ehrharta calycina* (10%) *and *E. longiflora* (30%)	
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	0.40 ha, patch extends outside survey area up to 3.61 ha.	
Summary of patch and whether it meets DCCEEW criteria to be TEC	Patches that are <0.5ha in Moderate condition are not part of the nationally protected ecological community; however, this patch is part of a larger patch (> 3.5 ha) represented by Conservation Park R 53313, ESA 3287 and Bush Forever site 270, aerial imagery shows a canopy of *Eucalyptus gomphocephala* extending eastward from the survey area	
Photograph		

Site Name	No site (field notes)	
Patch Number	Patch 04	
Date	29/07/2024	
Location	Sandplain	
Dune system	Bassendean	
Soils	Brown/grey sand	
Vegetation Type Description	Isolated stands of *Corymbia calophylla* over weeds	
Condition	Completely Degraded	
Disturbances	Kwinana freeway, weeds	
Structure	Isolated trees	
Tuart tree count in patch	2	
Structural form and size (DBH of Tuarts	tree, 800mm mallee 200mm	
Native understorey present (%) and diversity	3%, three species	
Native understorey species	*Mesomelaena pseudostygia, Jacksonia furcellata* and *Grevillea preissii*	
Weed cover (%) and dominant weed species	80% dominant weeds included: *Avena barbata* (60%) and *Ehrharta calycina* (20%),	
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	0.11 ha, canopy extends outside survey area up to 0.22 ha	
Summary of patch and whether it meets DAWE criteria to be TEC	This patch does not meet the criteria. Patches < 0.5 ha and in poor condition are not part of the nationally protected ecological community.	
Photograph		

Banksia Woodlands of the Swan Coastal Plain TEC – Patch Assessment

Site Name	Kwin10
Patch Number	Patch 01
Date	29/07/2024 and 18/09/2024
Location	391347mE 6448715mN
Vegetation Type Description	EgBspp -+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella* var *pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia and *Ehrharta calycina* sedgeland/ grassland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia attenuata* 6 m *Banksia menziesii* 6 m
Emergent tree layer (>10 m height) and species	Not present
Canopy percent cover and species dominance	Canopy dominated by *Banksia menziesii* 15% cover and *B. attenuata* 5% cover
Native understorey present (%) and diversity	Native understorey present 78% cover, 34 species
Weed cover (%) and dominant weed species	8 weed species present, 11% cover. None of the weed species recorded were considered dominant.
Soil type and colour	Brown sandy loam
Landform	Sand plain
Minimum patch size	0.70 ha (VG (0.24ha) G-D (0.46ha))
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	0.70 ha, patch extends westward outside survey area.
Size of patch outside survey area (in hectares)	~6.78 ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

Site Name	Kwin02R
Patch Number	Patch 02
Date	01/08/2024
Location	391461mE 6448710mN
Vegetation Type Description	EgBspp -+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella* var *pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia and *Ehrharta calycina* sedgeland/ grassland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia attenuata* 4 m *Banksia menziesii* 4 m
Emergent tree layer (>10 m height) and species	Not present
Canopy percent cover and species dominance	Canopy dominated by *Banksia menziesii* 5% cover and *B. attenuata* 5% cover
Native understorey present (%) and diversity	Native understorey present 40% cover, 8 species
Weed cover (%) and dominant weed species	2 weed species present, 7% cover. *Ehrharta calycina (5%) and Briza maxima (2%)
Soil type and colour	Brown sandy loam
Landform	Sand plain
Minimum patch size	0.72 ha (G (0.43ha), D (0.30ha))
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	0.72 ha, patch extends northward outside the Kwinana survey area. The patch is captured within the Roe Highway survey area (report in preparation)
Size of patch outside survey area (in hectares)	~11.62 ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is that is known to be in Good or better condition as it has been surveyed and mapped as part of the Roe Highway Widening (report in preparation), therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

Site Name	Kwin05
Patch Number	Patch 03
Date	08/08/2024 and 19/09/2024
Location	392163m E 6439247m N
Vegetation Type Description	BaBm: Banksia attenuata *and Banksia menziesii* woodland over *Hibbertia hypericoides Scholtzia involucrata Styphelia conostephioides* low shrubland over *Patersonia occidentalis, Desmocladus flexuosus* and *Lyginia barbata* open herb/sedgeland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia attenuata*, 5 m *B. menziesii,* 5 m
Emergent tree layer (>10 m height) and species	Not present
Canopy percent cover and species dominance	Canopy dominated by *Banksia attenuata* 10% cover and *Banksia menziesii* 10% cover
Native understorey present (%) and diversity	Native understorey present 88% cover, 36 species
Weed cover (%) and dominant weed species	3 weed species present, <5% cover. None of the weed species recorded were considered dominant.
Soil type and colour	Grey sand
Landform	Hillslope
Minimum patch size	3.86 ha, condition ranged from Very Good to Completely Degraded
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	3.86 ha, patch extends westward outside survey area.
Size of patch outside survey area (in hectares)	~15.08ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016). Additionally, the section rated as Completely Degraded at the time of the survey was burnt in 2024, its unknown what condition this area will regenerate to post fire.
Photograph	

Patch 4 contains Kwin01 and Kwin03,

Site Name	Kwin01
Patch Number	Patch 04
Date	02/08/2024 and 19/09/2024
Location	391662m E 6435529m N
Vegetation Type Description	EgBspp -+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella* var *pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia and *Ehrharta calycina* sedgeland/ grassland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Allocasuarina fraseriana*, 5 m *Banksia attenuata*, 5 m *Banksia ilicifolia*, 5 m *Banksia menziesii*, 5 m *Kunzea glabrescens*, 4 m
Emergent tree layer (>10 m height) and species	*Outside of quadrat- Eucalyptus gomphocephala,* 15m
Canopy percent cover and species dominance	Canopy dominated by *Banksia attenuata*, 20% cover Followed by *Banksia menziesii*, 15% cover, and *Kunzea glabrescens*, 15% cover
Native understorey present (%) and diversity	Native understorey present 61% cover, 32 species
Weed cover (%) and dominant weed species	7 weed species present, 45% cover. Dominant weeds were **Ehrharta calycina* (10%) and **E. longiflora* (30%)
Soil type and colour	Grey sand
Landform	Sand plain
Minimum patch size	4.18ha (Condition ranges from Very Good to Degraded)
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	4.18 ha, patch extends outside survey area. Mapped up to 58.41 ha
Size of patch outside survey area (in hectares)	~58.41 ha
Summary of patch and whether it meets DEECCW criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

Site Name	Kwin03
Patch Number	Patch 04
Date	02/08/2024 and 19/09/2024
Location	391529 m E 6434852 m N
Vegetation Type Description	EgBspp -+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella* var *pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia and* **Ehrharta calycina* sedgeland/ grassland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia attenuata*, 5 m *B. menziesii,* 5 m
Emergent tree layer (>10 m height) and species	*Eucalyptus gomphocephala,* 15 m
Canopy percent cover and species dominance	Canopy dominated by *Eucalyptus gomphocephala* 15%, *Banksia attenuata* 10% and *B. menziesii* 2% (densities for Banksia spp. were both 15% outside of quadrat.
Native understorey present (%) and diversity	Native understorey present 44% cover, 10 species
Weed cover (%) and dominant weed species	8 weed species present, 86% cover. **Ehrharta calycina* (40%) and **E. longiflora* (40%) considered dominant.
Soil type and colour	Brown/grey sand
Landform	Sand plain
Minimum patch size	4.18ha (Condition ranges from Very Good to Degraded)
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	4.18 ha, patch extends outside survey area. Mapped up to 58.41 ha
Size of patch outside survey area (in hectares)	~58.41 ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

Site Name	Kwin04
Patch Number	Patch 05
Date	02/08/2024 and 19/09/2024
Location	391527.4366 m E 6433742.978 m N
Vegetation Type Description	EmBspp*: +/- Eucalyptus marginata* tall open woodland over *Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* woodland over *Acacia pulchella* var *pulchella Hibbertia hypericoides, Bossiaea eriocarpa* low open shrubland over weedy grasses
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia menziesii* 5 m *B.attenuata 5m* *Eucalyptus marginata* 5 m
Emergent tree layer(>10 m height) and species	NA
Canopy percent cover and species dominance	Canopy dominated by *Banksia attenuata,* 40% cover, *B.menziesii* 5% and *Eucalyptus marginata* 2%
Native understorey present (%) and diversity	Native understorey present 54% cover, 23 species
Weed cover (%) and dominant weed species	6 weed species present, 11% cover. Dominant species was **Ehrharta calycina* 5%
Soil type and colour	Grey sand
Landform	Sand plain
Minimum patch size	1.71 ha, condition ranged from Good to Degraded
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	1.71 ha, patch extends westward outside survey area.
Size of patch outside survey area (in hectares)	~5.44ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

Note: Patch 06 occurs north of patch 07, a sample site wasn't completed in the field as initially it was felt this would be one patch. Both patches align to the same larger remnant west of the survey area and were in similar condition

Site Name	Kwin02
Patch Number	Patches 06 & 07
Date	02/08/2024 and 19/09/2024
Location	391423m E 6434756m N
Vegetation Type Description	EgBspp -+/- *Eucalyptus gomphocephala* tall open woodland over *Banksia attenuata* and *B. menziesii* woodland over *Acacia pulchella* var *pulchella, Xanthorrhoea preissii* and *Hibbertia hypericoides* low open shrubland over *Mesomelaena pseudostygia and *Ehrharta calycina* sedgeland/ grassland
IBRA Subregion	Perth
Structure	Woodland
Upper layer of trees and approximate heights	*Banksia menziesii*, 4 m
Emergent tree layer (>10 m height) and species	*Eucalyptus gomphocephala*, 10 m
Canopy percent cover and species dominance	Canopy dominated by *Eucalyptus gomphocephala*, 30% cover and *Banksia menziesii* 5% cover (within quadrat, outside the quadrat % cover was 15%)
Native understorey present (%) and diversity	Native understorey present 29% cover, 11 species
Weed cover (%) and dominant weed species	12 weed species present, 43% cover. Dominant weeds were**Ehrharta calycina* (15%) and , **Fumaria capreolata* (10%)
Soil type and colour	Grey sand
Landform	Hillslope
Minimum patch size	1.11 ha and 0.87 ha, both Degraded
Size of patch within survey area (in hectares) and indication of whether the patch extends outside survey area	Patch 6:1.11 ha, patch extends westward outside survey area. Patch 7: 1.05 ha, patch extends westward outside survey area.
Size of patch outside survey area (in hectares)	~49.96 ha
Summary of patch and whether it meets DAWE criteria to be TEC	The size and condition of the patch within the survey are does not meet the criteria to be a TEC. However, it forms part of a larger patch outside the survey area that is likely to be in Good or better condition, therefore potentially meets the key criteria as outlined in the Approved Conservation Advice (Threatened Species Scientific Committee 2016).
Photograph	

FLORA SPECIES LIST

Family	*Species*	Status
Aizoaceae	*Carpobrotus edulis*	*
Anacardiaceae	*Schinus terebinthifolia*	*
Anarthriaceae	*Lyginia barbata*	
Apiaceae	*Eryngium pinnatifidum* subsp. *pinnatifidum*	
Apocynaceae	*Gomphocarpus fruticosus*	*DP
Araceae	*Zantedeschia aethiopica*	*DP
Araliaceae	*Trachymene pilosa*	
Asparagaceae	*Acanthocarpus preissii*	
Asparagaceae	*Asparagus asparagoides*	*DP & WoNS
Asparagaceae	*Laxmannia ramosa*	
Asparagaceae	*Laxmannia squarrosa*	
Asparagaceae	*Lomandra caespitosa*	
Asparagaceae	*Lomandra hermaphrodita*	
Asparagaceae	*Lomandra nigricans*	
Asparagaceae	*Lomandra preissii*	
Asparagaceae	*Sowerbaea laxiflora*	
Asparagaceae	*Thysanotus ?sparteus*	
Asparagaceae	*Thysanotus arbuscula*	
Asparagaceae	*Thysanotus manglesianus*	
Asparagaceae	*Thysanotus multiflorus*	
Asparagaceae	*Thysanotus* sp. (sterile)	
Asteraceae	*Arctotheca calendula*	*
Asteraceae	*Cirsium vulgare*	*
Asteraceae	*Erigeron bonariensis*	*
Asteraceae	*Hypochaeris glabra*	*
Asteraceae	*Hypochaeris radicata*	*
Asteraceae	*Lactuca serriola*	*
Asteraceae	*Millotia tenuifolia* var. *tenuifolia*	
Asteraceae	*Monoculus monstrosus*	*
Asteraceae	*Olearia axillaris*	
Asteraceae	*Osteospermum ecklonis*	*
Asteraceae	*Podolepis gracilis*	
Asteraceae	*Podotheca angustifolia*	
Asteraceae	*Rhodanthe citrina*	
Asteraceae	*Senecio condylus*	*
Asteraceae	*Siloxerus ?filifolius*	
Asteraceae	*Sonchus oleraceus*	*
Asteraceae	*Taraxacum khatoonae*	*

Family	*Species*	Status
Asteraceae	*Ursinia anthemoides*	*
Cactaceae	*Opuntia stricta*	*DP
Campanulaceae	*Lobelia tenuior*	
Casuarinaceae	*Allocasuarina fraseriana*	
Casuarinaceae	*Allocasuarina humilis*	
Centrolepidaceae	*Centrolepis drummondiana*	
Colchicaceae	*Burchardia congesta*	
Crassulaceae	*Crassula colorata* var. *colorata*	
Crassulaceae	*Crassula decumbens* var. *decumbens*	
Cyperaceae	*Bolboschoenus caldwellii*	
Cyperaceae	*Chaetospora curvifolia*	
Cyperaceae	*Cyathochaeta avenacea*	
Cyperaceae	*Eleocharis acuta*	
Cyperaceae	*Gaudium laevigatum*	*
Cyperaceae	*Isolepis cernua* var. *setiformis*	
Cyperaceae	*Lepidosperma calcicola*	
Cyperaceae	*Lepidosperma longitudinale*	
Cyperaceae	*Lepidosperma pubisquameum*	
Cyperaceae	*Lepidosperma* sp. (sterile)	
Cyperaceae	*Machaerina articulata*	
Cyperaceae	*Schoenus clandestinus*	
Dasypogonaceae	*Dasypogon bromeliifolius*	
Dennstaedtiaceae	*Pteridium esculentum*	
Dilleniaceae	*Hibbertia hypericoides*	
Dilleniaceae	*Hibbertia racemosa*	
Droseraceae	*Drosera drummondii*	
Droseraceae	*Drosera erythrorhiza*	
Droseraceae	*Drosera macrantha*	
Droseraceae	*Drosera porrecta*	
Ericaceae	*Brachyloma preissii*	
Ericaceae	*Conostephium pendulum*	
Ericaceae	*Styphelia conostephioides*	
Euphorbiaceae	*Euphorbia peplus*	*
Euphorbiaceae	*Euphorbia terracina*	*
Fabaceae	*Acacia cochlearis*	
Fabaceae	*Acacia floribunda*	*
Fabaceae	*Acacia iteaphylla*	*
Fabaceae	*Acacia pulchella* var *pulchella*	
Fabaceae	*Acacia rostellifera*	
Fabaceae	*Acacia saligna*	
Fabaceae	*Acacia stenoptera*	

Family	*Species*	Status
Fabaceae	*Bossiaea eriocarpa*	
Fabaceae	*Chamaecytisus palmensis*	*
Fabaceae	*Daviesia divaricata* subsp. *divaricata*	
Fabaceae	*Daviesia incrassata* subsp. *incrassata*	
Fabaceae	*Daviesia triflora*	
Fabaceae	*Gastrolobium capitatum*	
Fabaceae	*Gompholobium tomentosum*	
Fabaceae	*Hardenbergia comptoniana*	
Fabaceae	*Hovea trisperma*	
Fabaceae	*Jacksonia furcellata*	
Fabaceae	*Jacksonia gracillima*	P3
Fabaceae	*Jacksonia sternbergiana*	
Fabaceae	*Lupinus cosentinii*	*
Fabaceae	*Medicago polymorpha*	*
Fabaceae	*Pultenaea reticulata*	
Fabaceae	*Trifolium arvense*	*
Fabaceae	*Trifolium dubium*	*
Fabaceae	*Trifolium* sp. (sterile)	*
Fabaceae	*Vicia sativa*	*
Fabaceae	*Viminaria juncea*	
Geraniaceae	*Geranium molle*	*
Geraniaceae	*Pelargonium capitatum*	*
Goodeniaceae	*Dampiera linearis*	
Goodeniaceae	*Scaevola canescens*	
Goodeniaceae	*Scaevola nitida*	
Goodeniaceae	*Scaevola repens*	
Haemodoraceae	*Anigozanthos humilis* subsp. *humilis*	
Haemodoraceae	*Conostylis aculeata* subsp. *aculeata*	
Haemodoraceae	*Conostylis aurea*	
Haemodoraceae	*Conostylis juncea*	
Haemodoraceae	*Conostylis setigera* subsp. *setigera*	
Haemodoraceae	*Haemodorum* sp. (sterile)	
Haemodoraceae	*Phlebocarya ciliata*	
Hemerocallidaceae	*Caesia micrantha*	
Hemerocallidaceae	*Chamaescilla corymbosa* var. *corymbosa*	
Hemerocallidaceae	*Corynotheca micrantha*	
Hemerocallidaceae	*Dianella revoluta* var. *divaricata*	
Hemerocallidaceae	*Tricoryne elatior*	
Iridaceae	*Freesia leichtlinii* subsp. *alba* × *leichtlinii* subsp. *leichtlinii*	*
Iridaceae	*Fumaria capreolata*	*
Iridaceae	*Gladiolus caryophyllaceus*	*

Family	*Species*	Status
Iridaceae	*Moraea flaccida*	*DP
Iridaceae	*Patersonia occidentalis*	
Iridaceae	*Romulea rosea*	*
Lamiaceae	*Hemiandra pungens*	
Lauraceae	*Cassytha glabella*	
Lauraceae	*Cassytha racemosa* forma *pilosa*	
Loganiaceae	*Phyllangium ?divergens*	
Lythraceae	*Lythrum hyssopifolia*	*
Myrtaceae	*Astartea scoparia*	
Myrtaceae	*Callistemon phoeniceus*	N
Myrtaceae	*Calothamnus quadrifidus*	N
Myrtaceae	*Chamelaucium uncinatum*	
Myrtaceae	*Corymbia calophylla*	
Myrtaceae	*Eremaea asterocarpa* subsp. *asterocarpa*	
Myrtaceae	*Eucalyptus camaldulensis*	N
Myrtaceae	*Eucalyptus gomphocephala*	
Myrtaceae	*Eucalyptus marginata*	
Myrtaceae	*Eucalyptus rudis*	
Myrtaceae	*Eucalyptus* sp.	*
Myrtaceae	*Gaudium laevigatum*	*
Myrtaceae	*Hypocalymma angustifolium*	
Myrtaceae	*Hypocalymma robustum*	
Myrtaceae	*Kunzea baxteri*	N
Myrtaceae	*Kunzea glabrescens*	
Myrtaceae	*Melaleuca huegelii* subsp. *huegelii*	
Myrtaceae	*Melaleuca megacephala*	N
Myrtaceae	*Melaleuca nesophila*	*
Myrtaceae	*Melaleuca preissiana*	
Myrtaceae	*Melaleuca rhaphiophylla*	
Myrtaceae	*Melaleuca systena*	
Myrtaceae	*Melaleuca teretifolia*	
Myrtaceae	*Taxandria linearifolia*	
Orchidaceae	*Caladenia discoidea*	
Orchidaceae	*Caladenia flava*	
Orchidaceae	*Caladenia latifolia*	
Orchidaceae	*Caladenia* sp. (sterile)	
Orchidaceae	*Cyanicula gemmata*	
Orchidaceae	*Diuris corymbosa*	
Orchidaceae	*Prasophyllum parvifolium*	
Orchidaceae	*Pterostylis sanguinea*	
Orchidaceae	*Pterostylis* sp. (sterile)	

Family	*Species*	Status
Oxalidaceae	*Oxalis pes-caprae*	*
Papaveraceae	*Fumaria densiflora*	*
Phyllanthaceae	*Lysiandra calycina*	
Phytolaccaceae	*Phytolacca octandra*	*
Poaceae	*Aira caryophyllea*	*
Poaceae	*Amphipogon turbinatus*	
Poaceae	*Austrostipa elegantissima*	
Poaceae	*Avena barbata*	*
Poaceae	*Briza maxima*	*
Poaceae	*Bromus diandrus*	*
Poaceae	*Cenchrus clandestinus*	*
Poaceae	*Cynodon dactylon*	*
Poaceae	*Ehrharta calycina*	*
Poaceae	*Ehrharta longiflora*	*
Poaceae	*Eragrostis curvula*	*
Poaceae	*Erodium botrys*	*
Poaceae	*Hyparrhenia hirta*	*
Poaceae	*Lagurus ovatus*	*
Poaceae	*Lolium rigidum*	*
Poaceae	*Lolium* sp.	*
Poaceae	*Neurachne alopecuroidea*	
Poaceae	*Paspalum urvillei*	*
Poaceae	*Phleum pratense*	*
Poaceae	Poaceae sp. (sterile)	
Polygonaceae	*Rumex crispus*	*
Potamogetonaceae	*Potamogeton ?drummondii*	
Primulaceae	*Lysimachia arvensis*	*
Proteaceae	*Adenanthos cygnorum*	
Proteaceae	*Banksia attenuata*	
Proteaceae	*Banksia dallanneyi* subsp. *dallanneyi* var. *dallanneyi*	
Proteaceae	*Banksia grandis*	
Proteaceae	*Banksia ilicifolia*	
Proteaceae	*Banksia menziesii*	
Proteaceae	*Grevillea curviloba*	T, N
Proteaceae	*Grevillea preissii*	
Proteaceae	*Grevillea vestita*	
Proteaceae	*Persoonia saccata*	
Proteaceae	*Petrophile linearis*	
Proteaceae	*Stirlingia latifolia*	
Proteaceae	*Grevillea olivacea*	P4, N
Restionaceae	*Desmocladus flexuosus*	

Family	*Species*	Status
Restionaceae	*Dielsia stenostachya*	
Restionaceae	*Leptocarpus ?roycei*	
Restionaceae	*Leptocarpus decipiens*	
Restionaceae	*Leptocarpus scariosus*	
Restionaceae	*Mesomelaena pseudostygia*	
Rubiaceae	*Opercularia vaginata*	
Rutaceae	*Boronia crenulata* subsp. *viminea*	
Sapindaceae	*Dodonaea* sp.	
Solanaceae	*Solanum linnaeanum*	*DP
Solanaceae	*Solanum nigrum*	*
Stylidiaceae	*Stylidium brunonianum*	
Stylidiaceae	*Stylidium repens*	
Thymelaeaceae	*Pimelea rosea* subsp. *rosea*	
Tropaeolaceae	*Tropaeolum majus*	*
Typhaceae	*Typha ?orientalis*	
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	
Zamiaceae	*Macrozamia riedlei*	

* - Weed species
DP -Declared Plant
WoNS – Weed of National Significance
P - Priority Flora
T – Threatened Flora
N - Naturalised Flora

FLORA SPECIES LIST BY VEGETATION TYPE

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Acacia cochlearis					X			X	X			
Acacia floribunda	*							X			X	
Acacia iteaphylla	*				X							
Acacia pulchella var *pulchella*		X	X	X			X					
Acacia rostellifera								X				
Acacia saligna			X		X			X		X	X	
Acacia stenoptera			X									
Acanthocarpus preissii												X
Adenanthos cygnorum			X	X		X	X					
Aira caryophyllea	*		X		X							
Allocasuarina fraseriana			X	X								
Allocasuarina humilis			X									
Amphipogon turbinatus		X										
Anigozanthos humilis subsp. *humilis*		X	X									
Arctotheca calendula	*									X		
Asparagus asparagoides	*DP & WoNS										X	
Astartea scoparia												X
Austrostipa elegantissima						X						
Avena barbata	*			X	X					X		
Banksia attenuata		X	X	X		X	X					

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*			X									
Banksia grandis												X
Banksia ilicifolia			X	X			X					
Banksia menziesii		X	X	X	X	X						
Bolboschoenus caldwellii												X
Boronia crenulata subsp. *viminea*					X							
Bossiaea eriocarpa		X	X	X	X							
Brachyloma preissii			X									
Briza maxima	*		X	X	X	X				X		
Bromus diandrus	*				X			X		X	X	
Burchardia congesta		X	X	X	X							
Caesia micrantha				X								
Caladenia discoidea												X
Caladenia flava		X	X	X								
Caladenia latifolia			X									
Caladenia sp. (sterile)			X									
Callistemon phoeniceus	N				X							
Calothamnus quadrifidus	N		X			X	X			X		
Carpobrotus edulis	*			X				X				
Cassytha glabella					X							
Cassytha racemosa forma *pilosa*												X
Cenchrus clandestinus	*				X							
Centrolepis drummondiana			X									
Chaetospora curvifolia		X	X		X							
Chamaecytisus palmensis	*							X				

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Chamaescilla corymbosa var. *corymbosa*		X	X	X	X							
Chamelaucium uncinatum						X	X			X		
Cirsium vulgare	*										X	
Conostephium pendulum			X	X								
Conostylis aculeata subsp. *aculeata*			X	X								
Conostylis aurea					X							
Conostylis juncea					X							
Conostylis setigera subsp. *setigera*		X	X									
Corymbia calophylla					X			X				
Corynotheca micrantha			X									
Crassula colorata var. *colorata*				X								
Crassula decumbens var. *decumbens*												X
Cyanicula gemmata												X
Cyathochaeta avenacea					X							
Cynodon dactylon	*								X		X	
Dampiera linearis					X							
Dasypogon bromeliifolius		X	X	X	X							
Daviesia divaricata subsp. *divaricata*			X									
Daviesia incrassata subsp. *incrassata*												X
Daviesia triflora		X	X	X								
Desmocladus flexuosus		X	X	X	X							
Dianella revoluta var. *divaricata*		X		X	X							
Dielsia stenostachya												X
Diuris corymbosa			X									
Dodonaea sp.												X

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Drosera drummondii		X										
Drosera erythrorhiza		X	X	X								
Drosera macrantha			X									
Drosera porrecta				X								
Ehrharta calycina	*		X	X	X	X		X		X	X	
Ehrharta longiflora	*		X		X			X			X	
Eleocharis acuta								X				
Eragrostis curvula	*			X				X		X		
Eremaea asterocarpa subsp. *asterocarpa*												X
Erigeron bonariensis	*										X	
Erodium botrys	*											X
Eryngium pinnatifidum subsp. *pinnatifidum*												X
Eucalyptus camaldulensis	N							X				
Eucalyptus gomphocephala			X			X		X				
Eucalyptus marginata		X	X	X								
Eucalyptus rudis					X			X	X			
Eucalyptus sp.	*										X	
Euphorbia peplus	*		X		X						X	
Euphorbia terracina	*		X		X	X		X				
Freesia leichtlinii subsp. *alba* × *leichtlinii* subsp. *leichtlinii*	*		X									
Fumaria capreolata	*		X	X	X	X		X				
Fumaria densiflora	*				X							
Gastrolobium capitatum		X	X									
Gaudium laevigatum	*		X				X	X				

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Geranium molle	*		X									
Gladiolus caryophyllaceus	*	X	X	X	X	X						
Gomphocarpus fruticosus	*DP				X			X				
Gompholobium tomentosum		X	X	X	X		X					
Grevillea curviloba	T, N					X						
Grevillea olivacea	P4, N											
Grevillea preissii											X	
Grevillea vestita												X
Haemodorum sp. (sterile)			X									
Hardenbergia comptoniana			X	X	X	X		X				
Hemiandra pungens				X								
Hibbertia hypericoides		X	X	X			X					
Hibbertia racemosa		X										
Hovea trisperma		X										
Hyparrhenia hirta	*							X				
Hypocalymma angustifolium					X		X					
Hypocalymma robustum		X	X	X								
Hypochaeris glabra	*		X	X			X					
Hypochaeris radicata	*											X
Isolepis cernua var. *setiformis*								X				
Jacksonia furcellata			X	X	X	X	X				X	
Jacksonia gracillima	P3				X							
Jacksonia sternbergiana			X									
Kunzea baxteri	N											X
Kunzea glabrescens		X	X	X	X	X					X	

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Banksia spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Lactuca serriola	*										X	
Lagurus ovatus	*				X							
Laxmannia ramosa					X							
Laxmannia squarrosa			X									
Lepidosperma calcicola					X							
Lepidosperma longitudinale					X						X	
Lepidosperma pubisquameum					X							
Lepidosperma sp. (sterile)					X							
Leptocarpus ?roycei					X							
Leptocarpus decipiens					X							
Leptocarpus scariosus					X							
Lobelia tenuior					X							
Lolium rigidum	*								X	X		
Lolium sp.	*				X							
Lomandra caespitosa		X	X	X								
Lomandra hermaphrodita			X									
Lomandra nigricans		X										
Lomandra preissii		X	X									
Lupinus cosentinii	*		X								X	
Lyginia barbata		X										
Lysiandra calycina			X									
Lysimachia arvensis	*		X		X					X		
Lythrum hyssopifolia	*							X				
Machaerina articulata								X			X	
Macrozamia riedlei			X	X								

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Medicago polymorpha	*										X	
Melaleuca huegelii subsp. *huegelii*								X	X			
Melaleuca megacephala	N							X				
Melaleuca nesophila	*		X									
Melaleuca preissiana					X						X	
Melaleuca rhaphiophylla					X						X	
Melaleuca systena				X								
Melaleuca teretifolia					X						X	
Mesomelaena pseudostygia			X				X					
Millotia tenuifolia var. *tenuifolia*			X									
Monoculus monstrosus	*				X							
Moraea flaccida	*DP											X
Neurachne alopecuroidea												X
Olearia axillaris												X
Opercularia vaginata		X										
Opuntia stricta	*DP											X
Osteospermum ecklonis	*											X
Oxalis pes-caprae	*			X	X							
Paspalum urvillei	*							X			X	
Patersonia occidentalis		X			X							
Pelargonium capitatum	*		X			X		X		X	X	
Persoonia saccata		X	X									
Petrophile linearis			X									
Phlebocarya ciliata		X		X	X							
Phleum pratense	*							X				

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Phyllangium ?divergens		X	X									
Phytolacca octandra	*										X	
Pimelea rosea subsp. *rosea*					X							
Poaceae sp. (sterile)						X						
Podolepis gracilis												X
Podotheca angustifolia			X									
Potamogeton ?drummondii			X									
Prasophyllum parvifolium			X									
Pteridium esculentum					X							
Pterostylis sanguinea			X	X	X							
Pterostylis sp. (sterile)			X									
Pultenaea reticulata					X							
Rhodanthe citrina			X									
Romulea rosea	*		X									
Rumex crispus	*				X			X	X			
Scaevola canescens			X									
Scaevola nitida												X
Scaevola repens												X
Schinus terebinthifolia	*							X			X	
Schoenus clandestinus			X									
Senecio condylus	*	X			X							
Siloxerus ?filifolius			X									
Solanum linnaeanum	*DP											X
Solanum nigrum	*											X
Sonchus oleraceus	*		X									

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
Sowerbaea laxiflora			X	X								
Stirlingia latifolia		X	X	X								
Stylidium brunonianum		X										
Stylidium repens					X							
Styphelia conostephioides			X				X					
Taraxacum khatoonae	*											X
Taxandria linearifolia					X							
Thysanotus ?sparteus			X	X								
Thysanotus arbuscula					X							
Thysanotus manglesianus		X	X		X							
Thysanotus multiflorus					X							
Thysanotus sp. (sterile)			X									
Trachymene pilosa		X	X	X	X							
Tricoryne elatior					X							
Trifolium arvense	*		X							X		
Trifolium dubium	*											X
Trifolium sp. (sterile)	*		X		X							
Tropaeolum majus	*											X
Typha ?orientalis					X			X	X		X	
Ursinia anthemoides	*	X	X	X		X	X					
Vicia sativa	*							X	X		X	
Viminaria juncea											X	
Xanthorrhoea gracilis				X	X							
Xanthorrhoea preissii		X	X		X						X	
Zantedeschia aethiopica	*DP				X			X			X	

Species	Status	BmBa	EgBspp.	EmBspp.	ErMr	Isolated Bankisa spp.	Isolated Banksia spp.	Isolated Euca spp.	Isolated Euca spp.	Mixed shrubs	Modified wetland drainage area	Opp
	Total	**42**	**92**	**48**	**76**	**19**	**15**	**34**	**8**	**13**	**31**	**30**

SIGNIFICANT FLORA

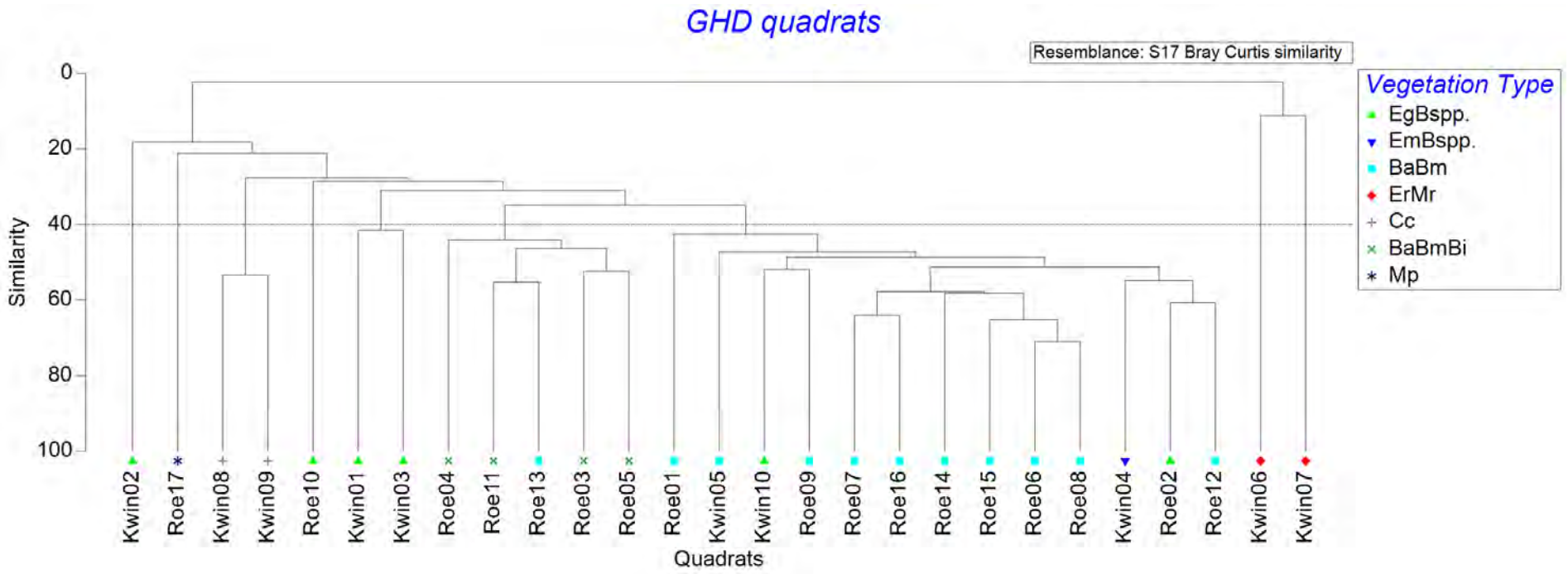
Significant flora	Abundance	Status	Easting	Northing
Grevillea curviloba	5	T (Planted)	392247	6439996
Jacksonia gracillima	1	P3	391909	6432023
Jacksonia gracillima	1	P3	391917	6431992
Jacksonia gracillima	1	P3	391912	6432013

SIGNIFICANT WEEDS

Significant weeds	Abundance	Status	Easting	Northing
Asparagus asparagoides	5	*DP and WoNS	392044	6445491
Asparagus asparagoides	2	*DP and WoNS	391431	6434628
Asparagus asparagoides	2	*DP and WoNS	391445	6435049
Asparagus asparagoides	2	*DP and WoNS	391453	6435099
Asparagus asparagoides	1	*DP and WoNS	391470	6435165
Asparagus asparagoides	1	*DP and WoNS	391464	6435180
Asparagus asparagoides	2	*DP and WoNS	391473	6435207
Asparagus asparagoides	7	*DP and WoNS	391475	6435212
Asparagus asparagoides	7	*DP and WoNS	391480	6435215
Asparagus asparagoides	7	*DP and WoNS	391477	6435224
Asparagus asparagoides	7	*DP and WoNS	391479	6435229
Asparagus asparagoides	7	*DP and WoNS	391480	6435233
Asparagus asparagoides	7	*DP and WoNS	391482	6435242
Asparagus asparagoides	7	*DP and WoNS	391492	6435332
Asparagus asparagoides	7	*DP and WoNS	391493	6435336
Asparagus asparagoides	7	*DP and WoNS	391494	6435345
Asparagus asparagoides	2	*DP and WoNS	391504	6435376
Asparagus asparagoides	2	*DP and WoNS	391516	6435421
Asparagus asparagoides	2	*DP and WoNS	391547	6435606
Asparagus asparagoides	5	*DP and WoNS	391905	6436597
Asparagus asparagoides	1	*DP and WoNS	391462	6435189
Asparagus asparagoides	3	*DP and WoNS	391463	6435200
Asparagus asparagoides	3	*DP and WoNS	391475	6435245
Asparagus asparagoides	1	*DP and WoNS	391477	6435287
Asparagus asparagoides	3	*DP and WoNS	391591	6435289
Asparagus asparagoides	3	*DP and WoNS	391546	6435108
Asparagus asparagoides	1	*DP and WoNS	391549	6435057
Asparagus asparagoides	2	*DP and WoNS	391530	6435059
Asparagus asparagoides	2	*DP and WoNS	391541	6435142
Asparagus asparagoides	2	*DP and WoNS	391547	6435174

Significant weeds	Abundance	Status	Easting	Northing
Asparagus asparagoides	1	*DP and WoNS	391552	6435213
Asparagus asparagoides	1	*DP and WoNS	391560	6435249
Asparagus asparagoides	2	*DP and WoNS	391583	6435354
Asparagus asparagoides	3	*DP and WoNS	391821	6431887
Asparagus asparagoides	10	*DP and WoNS	392062	6445410
Gomphocarpus fruticosus	2	*DP	391864	6436412
Gomphocarpus fruticosus	10	*DP	389497	6422717
Gomphocarpus fruticosus	3	*DP	389503	6422823
Gomphocarpus fruticosus	1	*DP	389500	6422868
Gomphocarpus fruticosus	2	*DP	389502	6422908
Gomphocarpus fruticosus	6	*DP	389503	6422932
Gomphocarpus fruticosus	1	*DP	389495	6422986
Gomphocarpus fruticosus	4	*DP	389503	6423067
Gomphocarpus fruticosus	10	*DP	389470	6422651
Gomphocarpus fruticosus	2	*DP	390330	6426563
Gomphocarpus fruticosus	1	*DP	391840	6431858
Gomphocarpus fruticosus	2	*DP	390495	6427111
Gomphocarpus fruticosus	4	*DP	390585	6427516
Gomphocarpus fruticosus	10	*DP	390587	6427523
Gomphocarpus fruticosus	1	*DP	390598	6427565
Gomphocarpus fruticosus	3	*DP	390315	6426537
Gomphocarpus fruticosus	1	*DP	390530	6427250
Gomphocarpus fruticosus	1	*DP	389990	6426466
Gomphocarpus fruticosus	1	*DP	389853	6426484
Gomphocarpus fruticosus	1	*DP	389792	6426503
Gomphocarpus fruticosus	10	*DP	392322	6437992
Gomphocarpus fruticosus	2	*DP	392322	6438001
Moraea flaccida	1	*DP	391914	6431883
Opuntia stricta	1	*DP and WoNS	391595	6434022
Opuntia stricta	1	*DP and WoNS	391587	6434169
Opuntia stricta	2	*DP and WoNS	391428	6434802
Opuntia stricta	1	*DP and WoNS	391438	6434947
Opuntia stricta	1	*DP and WoNS	391439	6434946
Solanum linnaeanum	1	*DP	391545	6433561
Zantedeschia aethiopica	4	*DP	392538	6442771
Zantedeschia aethiopica	3	*DP	392045	6445507
Zantedeschia aethiopica	1	*DP	391567	6433362
Zantedeschia aethiopica	1	*DP	391549	6433556
Zantedeschia aethiopica	1	*DP	391535	6433760
Zantedeschia aethiopica	1	*DP	391507	6435407
Zantedeschia aethiopica	1	*DP	391504	6435411

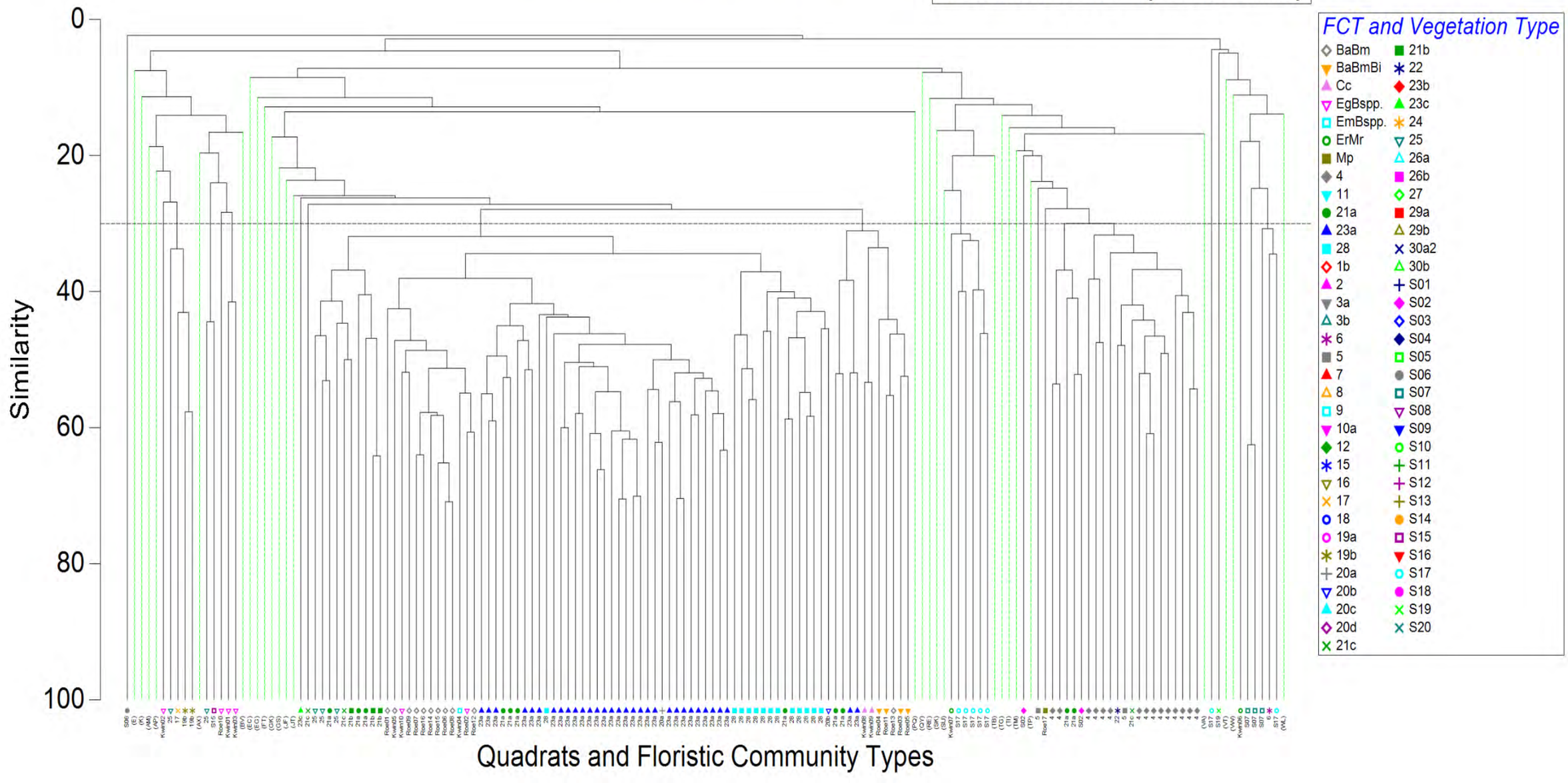
Significant weeds	Abundance	Status	Easting	Northing
Zantedeschia aethiopica	1	*DP	391536	6435587
Zantedeschia aethiopica	1	*DP	391540	6435606
Zantedeschia aethiopica	1	*DP	391545	6435606
Zantedeschia aethiopica	10	*DP	391905	6436596
Zantedeschia aethiopica	1	*DP	391523	6433910
Zantedeschia aethiopica	1	*DP	392270	6437446
Zantedeschia aethiopica	4	*DP	392268	6437437
Zantedeschia aethiopica	2	*DP	389497	6422719
Zantedeschia aethiopica	1	*DP	390416	6426827
Zantedeschia aethiopica	3	*DP	390450	6426918
Zantedeschia aethiopica	1	*DP	390486	6427077
Zantedeschia aethiopica	1	*DP	390532	6427305
Zantedeschia aethiopica	1	*DP	390547	6427337
Zantedeschia aethiopica	1	*DP	390580	6427474
Zantedeschia aethiopica	2	*DP	390585	6427521
Zantedeschia aethiopica	1	*DP	390053	6426463
Zantedeschia aethiopica	3	*DP	390025	6426455
Zantedeschia aethiopica	1	*DP	391902	6432054
Zantedeschia aethiopica	2	*DP	391994	6436536
Zantedeschia aethiopica	1	*DP	392064	6445408
Zantedeschia aethiopica	10	*DP	392229	6437251


GHD quadrats
Resemblance: S17 Bray Curtis similarity
Vegetation Type
EgBspp.
EmBspp.
BaBm
ErMr
Cc
BaBmBi
Mp
Similarity
0
20
40
60
80
100
Kwin02
Roe17
Kwin08
Kwin09
Roe10
Kwin01
Kwin03
Roe04
Roe11
Roe13
Roe03
Roe05
Roe01
Kwin05
Kwin10
Roe09
Roe07
Roe16
Roe14
Roe15
Roe06
Roe08
Kwin04
Roe02
Roe12
Kwin06
Kwin07
Quadrats

Gibson and GHD quadrats

Presence and absence of all species

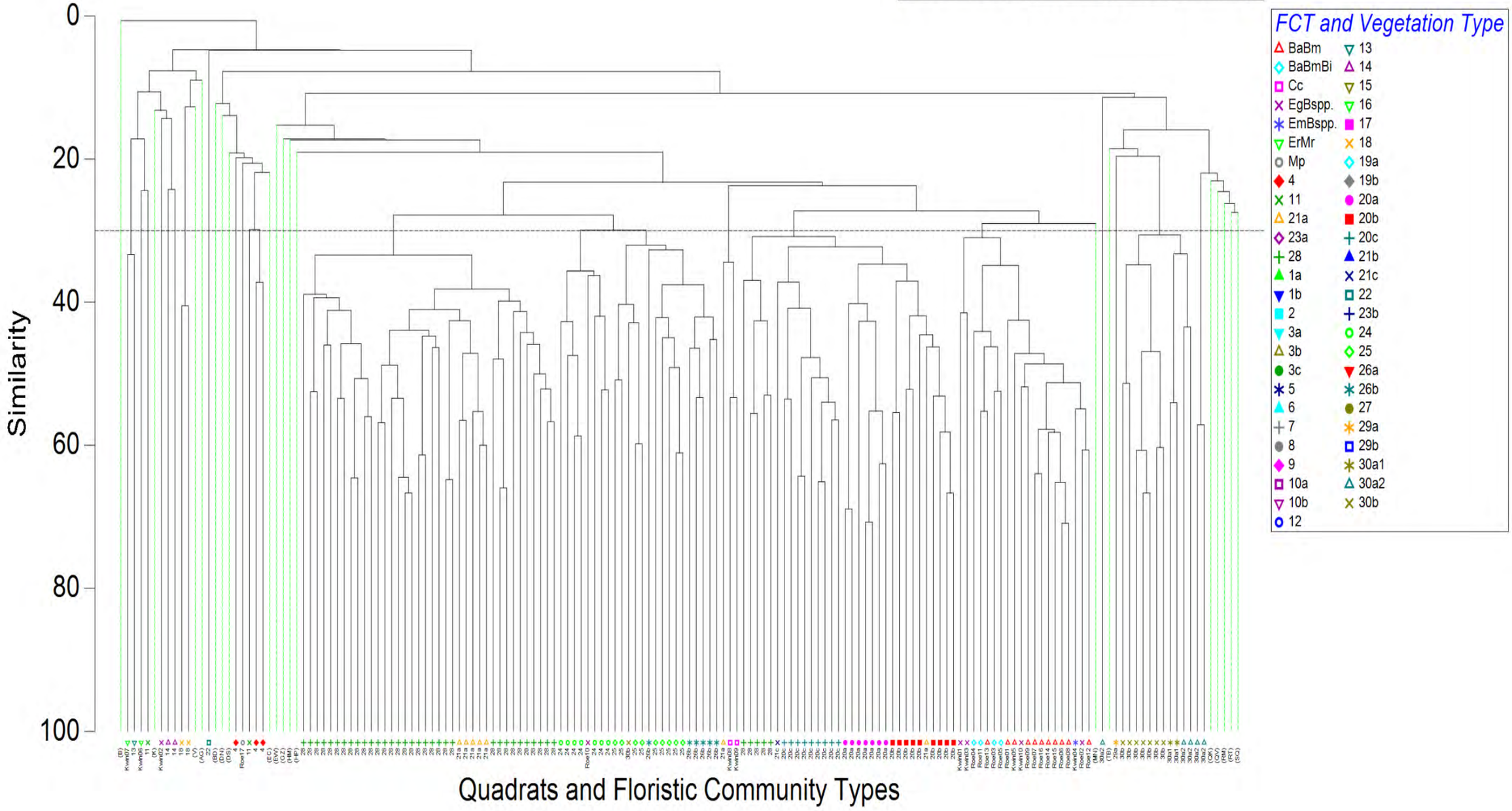
Resemblance: S17 Bray Curtis similarity



Keighery and GHD dataset

Presence and absence all species

Resemblance: S17 Bray Curtis similarity



Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded in current survey and/or previous recorded from desktop review
Likely	Species previously recorded within the study area and large areas of suitable habitat occur in the survey area.
Possible	Species previously recorded within the study area and areas of suitable habitat occur/may occur in the survey area.
Unlikely	Species previously recorded within the study area, but suitable habitat does not occur in the survey area.
Highly unlikely	Species not previously recorded within the study area, suitable habitat does not occur in the survey area and/or the survey area is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches
PMST – DEE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within the study area
TPFL and WAHERB – records of threatened flora from TPFL and WAHERB database searches within the study area
NM – DBCA *NatureMap* (accessed March 2024)

Flora likelihood of occurrence assessment for significant flora

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
Aponogetonaceae	*Aponogeton hexatepalus*	P4	-	This is a perennial aquatic herb species with tuberous floating leaves and white and green flowers. Habitat preference is for brown clay soils along claypans.	Likely. One historical record in study area and habitat potentially available.	Unlikely. No claypans within the survey area	TPFL, WAHERB, NM
Araliaceae	*Hydrocotyle striata*	P1	-	This is a species of prostrate, annually occurring herb reaching 30 cm in diameter with fleshy, lobed leaves. The species has a habitat and soil preference for black, sandy soils and undulating creek lines or open forests.	Unlikely. Only one historical record north of the survey area on the edge of study area.	Highly unlikely. Limited suitable habitat within survey area, with survey area to the south of known distribution.	WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
Celastraceae	*Tripterococcus* sp. Brachylobus (A.S. George 14234)	P4	-	Spreading herb or shrub to 60 cm, growing in low-lying sandy flats.	Unlikely. A WAHERB record from 1989 has been assigned coordinates that fall within the survey area boundary, however the locality attributed to the record suggests it lies several km east of the area along Roe Hwy. Habitat available, but species has not been recorded in the Perth area since 2000.	Unlikely. Potentially suitable habitat within the survey area, but unknown if previous record within survey area is valid.	TPFL, WAHERB, NM
Cyperaceae	*Cyathochaeta teretifolia*	P3	-	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown. Grey sand, sandy clay. Swamps, creek edges.	Possible. Historical records in study area, including one record within 500 m of the survey area. Small areas of habitat available.	Unlikely. Areas of suitable habitat within survey area, however unlikely due to survey efficacy and non-cryptic nature of the species	TPFL, WAHERB, NM
Cyperaceae	*Eleocharis keigheryi*	T	VU	This is an erect, annual, aquatic sedge species growing up to 45cm tall, with green to yellow-coloured flowers. It favours wet, grey clay soils and is typically found in wet, inundated flats and clay pans.	Highly unlikely. Habitat potentially unavailable and no records in study area.	Highly Unlikely. Areas of suitable habitat within survey area, however unlikely due to survey efficacy and non-cryptic nature of the species	PMST, NM
Cyperaceae	*Morelotia australiensis*	T	VU	This is a species of rhizomatous, tufted perennial herb reaching a maximum height of 30 cm. It prefers grey and brown sandy clay soils and is most often found on flat plains.	Unlikely. No records in study area and only five in the Perth metro area, but two are from post-2018.	Highly Unlikely. Areas of suitable habitat within survey area, however unlikely due to survey efficacy and non-cryptic nature of the species	PMST
Cyperaceae	*Netrostylis* sp. Chandala (G.J. Keighery 17055)	P2	-	This is an erect, clumping sedge species growing to 70 cm in height with very narrow leaves and green inflorescences and dark brown florets. The species has a particular preference for dark peaty soils and has typically	Likely. Nearby record from 2010 on edge of wetland that intersects survey area.	Unlikely. Areas of suitable habitat within survey area, however unlikely due to survey efficacy and non-cryptic nature of the species	WAHERB

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
				been found along the edges of freshwater bodies, swamps and wetlands.			
Ericaceae	*Andersonia gracilis*	T	EN	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Highly unlikely. No records in study area. Only two records in Perth metro area are from 2009 and 1992.	Highly unlikely. Areas of suitable habitat in survey area, however survey was completed during flowering period, therefore unlikely to have been overlooked based on survey effort.	PMST, NM
Ericaceae	*Styphelia filifolia*	P3	-	This is a species of erect, well-branched shrub with white flowers and distinctive, asymmetric green fruit. Fl. March to May. It has a preference for deep, yellow sands and is typically found along flat sandplains.	Likely. WAHERB record from 2002 within 20 m at the northern end of the survey area, large areas of habitat available.	Unlikely. Some suitable habitat within survey area. However these areas were traversed to search for this species.	WAHERB, NM
Fabaceae	*Acacia lasiocarpa* var. *bracteolata* long peduncle variant (G.J. Keighery 5026)	P1	-	This is an open, spiky and slender shrub species, growing up to 1.5m tall. Fl. yellow, May or Aug. The soil preference for this species varies from gravel-like sands to brown sandy loams and has been most often located along flat plains.	Likely. Historical record within study area and large areas of habitat available.	Unlikely. Areas of suitable habitat within survey area, however unlikely due to survey efficacy and non-cryptic nature of the species	WAHERB, NM
Fabaceae	*Acacia* sp. Binningup (G. Cockerton et al. WB 37784)	P1	-	Shrub to 0.8 to 1.5 m high, clonal habit. Fl. yellow, Aug. Sand over limestone, Tuart woodland, road verges, degraded habitats.	Unlikely. One record on outskirts of study area but no limestone habitat available. Species typically recorded closer to the coast.	Highly unlikely. No limestone habitat within survey area, may occur with road verge areas, but unlikely based on detail of survey.	WAHERB, NM
Fabaceae	*Dillwynia dillwynioides*	P3	-	Decumbent or erect, slender shrub, 0.3-1.2 m high. Fl. red & yellow/orange, Aug to Dec. Sandy soils. Winter-wet depressions.	Unlikely. No records within study area, small areas of suitable habitat available.	Highly unlikely. Limited suitable habitat available, no historical records within 5 km of the survey area and survey completed within species flowering period.	TPFL, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
Fabaceae	*Jacksonia gracillima*	P3	-	Spreading low shrub, 50 cm high. Jarrah and Banksia woodlands	Likely. Records in study area, including within 500 m of survey area. Plus large areas of habitat available.	**Known**. Three individuals of *Jacksonia gracillima* were recorded in the survey area.	WAHERB, NM
Fabaceae	*Jacksonia sericea*	P4	-	This is a multi-branched, low spreading shrub species, typically not exceeding 50cm in height. Fl. orange, Dec or Jan to Feb. It has a preference for dry and dark-coloured sandy soils, and is typically found along hillsides and limestone ridges.	Likely. Records in study area and large areas of habitat available.	Unlikely. Minimal areas of suitable habitat (calcareous soils) within survey area and a distinctive species that would have been recorded if present	WAHERB, NM
Fabaceae	*Kennedia beckxiana*	P4	-	A robust species of climbing shrub with notably long flowers and distinctively deep-red flowers with yellow “eye” centre. Fl. Sep to Dec. It has shown a preference for granite-type soils and has often been found along hillsides, slopes and various rocky outcrops.	Highly unlikely. Records in study area and smaller areas of habitat available. However, record in the study area is the only previous record within Perth region where the species is not a local native.	Highly unlikely. No suitable habitat available in study area, unlikely to have been overlooked due to distinctiveness of flowers and survey completed within species flowering period and not in species natural distribution.	WAHERB, NM
Goodeniaceae	*Dampiera triloba*	P3	-	This is an erect, spreading shrub species with noticeably clustered leaves and blue flowers. Fl. Aug. to Dec. It has a preference for dark and grey sandy soils and has been recorded in both sandy hillsides as well as outer parts of established wetlands.	Likely. Records in study area and large areas of habitat available.	Unlikely. Suitable habitat within survey area, however survey completed within species flowering period, therefore unlikely to have been overlooked based on detail of survey.	WAHERB, NM
Haemodoraceae	*Phlebocarya pilosissima* subsp. *pilosissima*	P3	-	Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white, Aug to Oct. White or grey sand, lateritic gravel.	Possible. Historical record within 100 m of survey area, but no records in the Perth area since 2000.	Unlikely. Suitable habitat within survey area, however survey undertaken during species flowering period, therefore unlikely to have been overlooked based on detail of survey.	WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
Macarthuriaceae	*Macarthuria keigheryi*	T	EN	This is a species of small, herbaceous, prostrate shrub with notable hairy stems. It has a strong reliance on deep white and grey sandy soils, and has most often been recorded on slopes and within gullies.	Unlikely. No records in study area; only six records in the Perth region since 2000.	Highly unlikely. Suitable habitat within survey area, but previous records > 5 km from survey area.	PMST, NM
Myrtaceae	*Eucalyptus foecunda* subsp. *foecunda*	P4	-	(Mallee) or tree (occasionally), to 5 m high, bark smooth above with rough flaky bark at base, grey over pale copper. Fl. white-cream, Aug or Jan to Feb. White, grey, yellow, brown, orange or red sand over limestone. Sand dunes and plains, limestone ridges, cliffs & hills, road verges.	Possible. Only one record in study area from 1997 in a managed reserve. Species is typically recorded close to the coast.	Unlikely. Suitable habitat within survey area, however species unlikely to have been overlooked based on growth form type.	WAHERB
Myrtaceae	*Eucalyptus x balanites*	T	EN	An erect, open mallee species averaging 2-5 m tall, with rough grey-brown bark and orange oil glands. Fl. white, Oct to Dec or Jan to Feb. The species prefers gravel-type, grey sands and has typically low abundance levels, with most recordings along gentle slopes of open woodland.	Unlikely. No records in study area and only one record in the Perth area from 2000.	Highly unlikely. Suitable habitat within survey area, however unlikely to have been overlooked based on growth form type.	PMST
Myrtaceae	*Verticordia lindleyi* subsp. *lindleyi*	P4	-	A species of slender, erect, dwarf shrub with low-spreading twigs reaching 50 cm tall and with pink and purple flowers. Fl. May or Nov to Dec or Jan to Feb. The species has a preference for deep, grey sandy soils and is most often found along flat sand-plains among Melaleuca and Eucalypt communities.	Likely. Records in study area and large areas of habitat available.	Unlikely. Suitable habitat within survey area, however survey undertaken during species flowering period, therefore unlikely to have been overlooked based on detail of survey.	TPFL, WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
Orchidaceae	*Caladenia huegelii*	T	EN	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	Likely. TPFL record from 2006 within 20 m near Beeliar Dr, large areas of habitat available.	Unlikely. Minimal suitable habitat occurs within survey area due to degradation of understorey and structure of woodlands present. The survey was undertaken during species flowering period which was confirmed by the species being recorded in nearby Roe Highway and offsets survey areas (GHD 2025)., Transects were performed in areas of suitable habitat targeting this species	PMST, TPFL, WAHERB, NM
Orchidaceae	*Diuris drummondii*	T	VU	A species of tall, erect, annual herb species reaching 70 cm tall with highly tuberous formation and yellow flowers. Fl. Nov to Dec or Jan. The species has a particular preference for brown loam soils and has most commonly been found within seasonally occurring floodplains and wetlands.	Possible. Historical record within study area and areas of habitat available.	Unlikely. Historically there may have been suitable habitat within survey area, however floodplain and wetland areas within the survey area represent highlight modified systems which are associated with road drainage and dominance by invasive species or *Typha* spp/*Pteridium esculentum* and are not considered to provide suitable habitat for this species.	PMST, WAHERB, NM
Orchidaceae	*Diuris micrantha*	T	VU	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown, Sep to Oct. Brown loamy clay. Winter-wet swamps, in shallow water.	Possible. A historical WAHERB record from 1977 has been assigned coordinates that fall within the survey area boundary, however the locality attributed to the record suggests it may lie just west of the survey area, south of Thomas Rd. Small areas of habitat available but species has not been recorded in the Perth area since 2000.	Unlikely. Historically there may have been suitable habitat within survey area, however floodplain and wetland areas within the survey area represent highlight modified systems which are associated with road drainage and dominance by invasive species or *Typha* spp/*Pteridium esculentum* and are not considered to	PMST, TPFL, WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
						provide suitable habitat for this species.	
Orchidaceae	*Diuris purdiei*	T	EN	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. Grey-black sand, moist. Winter-wet swamps.	Possible. Records in study area and smaller areas of habitat available.	Unlikely.Species distribution is to the east of the survey area, indicating that the survey area falls outside the currently known distribution. No suitable habitat recorded within the survey area.	PMST, NM
Orchidaceae	*Drakaea elastica*	T	EN	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow, Oct to Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Likely. Records in study area and large areas of habitat available.	Unlikely. Areas of potentially suitable habitat for this species were targeted during July (when the leaf is visible). No individuals recorded and areas of potentially suitable habitat were considered to be too disturbed to support this species.	PMST, TPFL, WAHERB, NM
Orchidaceae	*Drakaea micrantha*	T	VU	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow, Sep to Oct. White-grey sand.	Unlikely. Habitat available but no records in study area. Records in the Perth area are from pre-1985.	Highly unlikely. Suitable habitat within survey area, however unlikely on the basis that the survey was completed within the species flowering period and due to the detail of the survey.	PMST, NM
Orchidaceae	*Microtis quadrata*	P4	-	Perennial herb with underground tuber and a single erect, smooth tubular leaf, 0.2 to 0.8 m high. Fl. yellow/green, Dec to Jan. Seasonally wet depressions in swampy mounds.	Unlikely. Habitat available but no records in study area.	Highly unlikely. Some suitable habitat available within survey area but no historical records within 5 km.	WAHERB, NM
Orchidaceae	*Thelymitra variegata*	P2	-	This is a unique species of “leopard” orchid, with distinct orange sepals and purple coloured flower petals with reddish spots. Fl. June to Sep. It has a notable preference for sandy soils and has often been	Likely. Historical record within study area and large areas of habitat available.	Unlikely. Suitable habitat available within survey area, however less likely on the basis that the survey was completed within the species flowering period, the distinctiveness of the species	TPFL, WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
				found along slopes and areas featuring Allocasuarina and Banskia vegetation.		and due to the detail of the survey.	
Phyllanthaceae	*Poranthera moorokatta*	P2	-	A very small, annually occurring, glabrous herb species with white-green flower petals. The species prefers white and grey sandy soils, both wet or dry in nature, and is most commonly found along low woodlands and gentle sloping terrain.	Possible. Habitat available but only one record in the study area from within a reserve.	Possible. Suitable habitat within survey area. A very small annual species which is only visible for a short period of time, that can be cryptic.	WAHERB, NM
Proteaceae	*Banksia mimica*	T	EN	This is a rare species of prostrate shrub with underground rhizomes yellow flowers at soil level. It has a specific preference for dry, grey sandy soils and a habitat preference for open low heathlands.	Highly unlikely. No records in study area. Only two records in Perth area are from 1972.	Highly unlikely. Suitable habitat in survey area, however previous records > 5 km from survey area.	PMST, NM
Proteaceae	*Synaphea* sp. Fairbridge Farm (D. Papenfus 696)	T	CR	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely. No previous records within study area.	Highly unlikely. Limited suitable habitat in survey area, survey completed during species flowering time and less likely on the basis of the detail of the survey.	PMST, NM
Proteaceae	*Synaphea* sp. Pinjarra Plain (A.S. George 17182)	T	CR	Erect, clumped shrub (sub-shrub), to 0.8 m high. Fl. yellow, Sep to Nov. Grey sandy loam or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains.	Unlikely. No records in study area and minimal from the Perth metro area.	Highly unlikely. Limited suitable habitat available in survey area, survey completed within species flowering period and less likely on the basis of the detail of survey.	PMST
Proteaceae	*Synaphea* sp. Serpentine (G.R. Brand 103)	T	CR	This is a rare species of clumping, multi-stemmed and multi-branched shrub, growing to 0.6 m in height, with red	Unlikely. Only one record from the study area from 1991.	Highly unlikely. Limited suitable habitat within survey	PMST, WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
				peduncles and yellow flowers. It has shown a preference for loam soils, particularly darker coloured, and has most often been recorded in seasonally moist wetlands and inundated nature reserves on flatter terrain.	Currently known distribution lies inland of the survey area.	area and survey area outside of current known distribution.	
Rutaceae	*Boronia juncea* subsp. *juncea*	P1	-	This is a species of perennial, erect shrub growing up to 1 m tall with pink and purple flowers. Fl. April. It has shown a particular preference for dark peaty soils and has been recorded across a handful of Perth and South-West regions that feature swamps, wetlands and damp-lands.	Possible. Historical record within study area and smaller areas of habitat available.	Unlikely. No suitable habitat. The one Perth metro record was recorded in a wetland in Excellent to pristine condition in *Melaleuca* spp. woodland with *Astartea scoparia* heath. (2005).	WAHERB, NM
Sapindaceae	*Dodonaea hackettiana*	P4	-	This is a large, erect shrub species growing up to 3 m tall, with red-green fruits and orange flowers. Fl. July to Oct. It is most commonly found on grey, dry sandy soils and on a variety of flats, gentle slopes and hillsides.	Likely. Records in study area and large areas of habitat available.	Possible. A *Dodonaea* sp. was seen by the survey botanist on the edge of a slip lane for Roe/Kwinana.. However, due to safety could not pull over and identify.	TPFL, WAHERB, NM
Stylidiaceae	*Levenhookia preissii*	P1	-	An erect, single-stemmed, annually occurring herb, growing to less than 15 cm in height, and with distinctive pink flowers. Fl. Sep to Dec or Jan. The species prefers dry, grey-brown sandy soils, and has been recording along flats and gently undulating slopes.	Possible. Habitat available but only one record in the study area from within a reserve.	Unlikely. Suitable habitat within the survey area, however less likely on the basis that the survey was completed within the species flowering period and due to the detail of the survey.	WAHERB, NM
Stylidiaceae	*Stylidium ireneae*	P4	-	Lax perennial, herb, (0.06-)0.1-0.28 m high, leaves oblanceolate, 0.4-2 cm long, 1-3 (-5) mm wide, apex subacute	Unlikely. No records in study area and smaller areas of habitat available.	Unlikely. Limited suitable habitat within the survey area, and less likely on the basis that survey was completed	WAHERB, NM

Family	Taxon	BC Act/ DBCA	EPBC Act	Description	Pre-survey Likelihood of Occurrence within the survey area	Post-survey Likelihood of Occurrence within the survey area	Source
				to acuminate, margin entire, glandular. Scape glandular. Inflorescence racemose. Fl. pink, Oct to Dec. Sandy loam. Valleys near creek lines, woodland, often with Agonis.		within the species flowering period and due to the detail of the survey. Distribution of this species centres around Binningup. There is one disjunct occurrence within the perth metropolitan area	
Stylidiaceae	*Stylidium longitubum*	P4	-	A species of annually occurring, small erect shrub, not exceeding 10 cm in height, and with white and purple flowers. Fl. Oct. to Dec. The species has a preference for lightly coloured clay soils and seasonal wetlands and seasonally inundated flats.	Unlikely. No records in study area and smaller areas of habitat available.	Unlikely. Limited suitable habitat within the survey area, and less likely on the basis that survey was completed within the species flowering period and due to the detail of the survey.	TPFL, WAHERB, NM
Stylidiaceae	*Stylidium paludicola*	P3	-	A species of slender, erect, perennial herb, growing to 60 cm tall and with pink flowers. Fl. Oct to Dec. It has been shown to occur within grey and black sandy and clay soils, and most commonly within wetlands, swamps and seasonally flooded flats.	Possible. Records in study area and areas of habitat available.	Unlikely. Limited suitable habitat within the survey area, and less likely on the basis that survey was completed within the species flowering period and due to the detail of the survey.	WAHERB, NM
Thymelaeaceae	*Pimelea calcicola*	P3	-	Erect to spreading shrub, 0.2-1 m high. Fl. pink, Sep to Nov. Sand. Coastal limestone ridges.	Unlikely. One record on outskirts of study area but no habitat available.	Highly unlikely. No suitable habitat within the survey area, less likely on the basis that the survey was completed within species flowering period and due to the detail of the survey.	WAHERB, NM

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Jaksonia gracillima **TPFL Pop. No:**

OBSERVATION DATE: 15/11/2025 **CONSERVATION STATUS:** P3 **New population** ☐

OBSERVER/S: Angela Benkovic **PHONE** 0439 777 583

ROLE: Botanist **ORGANISATION:** GHD

EMAIL: Angela.benkovic@ghd.com

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

Kwinana freeway within wetland ufi 15970

Reserve No:

DBCA DISTRICT: Swan Coastal **LGA:** City of Kwinana Land manager present: ☐

DATUM:

GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)

DecDegrees ☐ DegMinSec ☐ UTMs ☒

Lat / Northing: see attached

Long / Easting:

ZONE:

METHOD USED:

GPS ☐ Differential GPS ☒ Map ☐

No. satellites: ___ Map used: _____

Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☒	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole _____ to _____	Specify other: _____

AREA ASSESSMENT: Edge survey ☒ Partial survey ☐ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): 60 No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____ (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive	3			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒

Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: _____%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
•			
•			
•			

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☒
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: _____

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☐
Loam ☒
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: _____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☒
Black ☐
Specify other: _____

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☒ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Corymbia calophylla tall woodland over Kunzea glabrescens tall sparse shrubland
2. Xanthorrhoea preissii and X. gracilis mid shrubland
3. Phlebocarya ciliata, Dasypogon bromeliifolius and Desmocladus flexuosus herbland/ sedgeland
4.

ASSOCIATED SPECIES:

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☒

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Identified by WA Herbarium- accession number 11329

FLORA AUTHORISATION / LICENCE No: FB62000080-3 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: _____ WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other: _____

Submitter of Record: Angela Benkovic Role: Botanist Signed: Date: 24/06/2025

Please return completed form to **Species And Communities Program** DBCA,
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Significant flora	Abundance	Status	Easting	Northing
Jacksonia gracillima	1	P3	391909	6432023
Jacksonia gracillima	1	P3	391917	6431992
Jacksonia gracillima	1	P3	391912	6432013

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Appendix E

Fauna data

Fauna field sampling data

Fauna species list

Significant fauna observations

Black Cockatoo potential breeding habitat tree

Foraging quality scoring tool for Black Cockatoo

Fauna Likelihood of Occurrence

Field sampling - Habitat assessment data

Object ID Number	Date	Habitat type	Landform	Soil type	Litter cover (%)	Fire age (yr)	Vegetation condition	Notes: % canopy cover of foraging species	Eastings	Northings
25	30/09/2024	Banksia shrubland	Sand plain	Sand	10-30%	10+	Very Good	Occasional *Banksia menziesii* and *Banksia attenuata*, 30% cover	391458	6448661
187	12/11/2024	Banksia shrubland	Sand plain	Sandy loam	30-70%	10+	Very Good	30% *Banksia attenuata* and small *Pinus*. sp. 10% cover of Grass trees	391354	6448723
188	12/11/2024	Banksia shrubland	Sand plain	Sandy loam	30-70%	10+	Very Good	30% cover of *Banksia attenuata*, and *Banksia menziesii*	391367	6448602
193	12/11/2024	Banksia shrubland	Sand plain	Sandy loam	nr	nr	nr	*Banksia attenuata* present	391359	6448651
196	12/11/2024	Melaleuca dampland	Dampland	sand	nr	nr	Degraded	Paperbark Melaleuca sp. and mixed Eucalyptus (Marri and others) and Acacia sp.	392066	6445380
205	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	Mostly Acacia trees and shrubs, some *Banksia menziesii* scattered 2% and Hakea sp. and *Eucalyptus camaldulensis* and some Marri	392522	6442835
206	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	One tall *Banksia attenuata* and *Eucalyptus camaldulensis* and Marri	392471	6442358
207	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	Scattered 5 meter tall *Banksia attenuata* and 6 meter tall *Banksia menziesii* but mostly Geraldton Wax and Kunzea sp. and other shrubs	392240	6440327
208	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	10 to 30% cover of *Banksia menziesii* and *Banksia attenuata*, planted Eucalypts.and occasional Jarrah. occasional tall 7 meter high Hakea sp.	391683	6435585
209	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	30 to 50% cover *B. attenuata* and 10% *Banksia menziesii,* planted Eucalyptus sp. and occasional Jarrah.	391660	6435507
210	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	30 to 50% cover *B. attenuata* and 10% *Banksia menziesii*, occasional Pinus sp. and Casuarina sp. Hillslope.	391647	6435472

Object ID Number	Date	Habitat type	Landform	Soil type	Litter cover (%)	Fire age (yr)	Vegetation condition	Notes: % canopy cover of foraging species	Eastings	Northings
211	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	30 to 50% cover *B. attenuata* and 10% *Banksia menziesii*, 4 meters to 6 meters tall.	391760	6433161
212	13/11/2024	Myrtaceous shrubland	Sand plain	Sandy loam	30-70%	10+	Good	Calothamnus sp. dominated. Myrtaceous shrubs.	391808	6432580
213	13/11/2024	Marri woodland	Sand plain	Sandy loam	>70%	10+	Good	Marri woodland and *Banksia menziesii*, 10% cover. 5 tall plants of *Banksia sessilis*	391863	6432233
214	13/11/2024	Dampland	Dampland	Sandy loam	>70%	10+	Very Good	Marri and *Eucalyptus rudis* and Paperbark Melaleuca sp. and grasses.	391878	6432175
215	13/11/2024	Marri woodland	Sand plain	Sandy loam	>70%	10+	Good	Marri woodland and *Banksia menziesii* 10% cover and *B. attenuata* 20 to 30% cover.	392012	6430909
216	13/11/2024	Dampland	Dampland	Sandy loam	30-70%	10+	Good	Acacia sp. trees and shrubs and Kunzea sp. and bottlebrush shrubs and occasional Marri and Flooded gum.	392042	6430465
217	13/11/2024	Sand plain	Sand plain	Sandy loam	30-70%	10+	Good	Kunzea and bottlebrush shrubs and occasional Marri	391914	6430444
218	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	Marri woodland and *B. attenuatta* and *B. menziesii* 15% cover.	391890	6431083
219	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	Marri woodland and *B. attenuatta* and *B. menziesii* 15% cover.	391924	6430844
220	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	Marri woodland and 20% *B. attenuatta* and *B. menziesii* 15% cover.	391690	6432773
221	13/11/2024	Flooded Gum woodland	Dampland	Sandy loam	nr	10+	Good	*E. rudis* over bracken fern understorey. Paperbark Melaleuca trees.	391823	6431937
222	13/11/2024	Marri woodland	Sand plain	Sandy loam	nr	10+	Good	Marri over bracken ferns	391810	6432025
223	13/11/2024	Marri woodland	Sand plain	Sandy loam	nr	10+	Good	Marri and *B. menziesii* 10% cover, over Grass trees	391781	6432202
224	13/11/2024	Marri woodland	Sand plain	Sandy loam	nr	10+	Very Good	*B. menziesii* 2% and dense Melaleuca sp. shrubland	391765	6432324
225	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	30 to 50% cover of *B. attenuata* and 10% *B. menziesii.* 4m tall to 6m tall	391583	6434100
226	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Very Good	30 to 50% cover *B. menziesii* and 10% *Banksia grandis* 4m tall to 6m tall.	391564	6433469

Object ID Number	Date	Habitat type	Landform	Soil type	Litter cover (%)	Fire age (yr)	Vegetation condition	Notes: % canopy cover of foraging species	Eastings	Northings
227	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	30 to 50% cover *B. menziesii* and 10% *Banksia grandis* 4m tall to 6m tall	391605	6433414
228	13/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	30 to 50% cover *B. attenuata* and 10% *B. menziesii*. 4m tall to 6m tall	391535	6433775
229	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	*B. menziesii* 15 to 25% and 15% *B. attenuata* towards end at 6m tall and Grass trees 5% cover. occasional Eucalyptus sp. Really nice condition patch	392225	6438466
230	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	30% *B. attenuata* and 10% *B. menziesii* cover	392164	6439094
231	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	10% *B. attenuata* and *Adenthenos* sp. and Geraldton Wax and *Calothamnus* sp.	392171	6439178
232	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	20% *B. attenuata* and 10% *B. menziesii* 6 to 8 m tall and *Adenthenos* sp. and Geraldton Wax and *Calothamnus* sp. Grass trees 2% cover. Occasional Hakea trees and Pinus sp.	392182	6439295
233	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	10% *B. attenuata* and 20% *B. menziesii* 6 to 8m tall and *Adenthenos* sp. and Geraldton Wax and *Calothamnus* sp. Grass trees 2% cover. Occasional Hakea trees and Pinus sp.	392176	6439420
234	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Good	25% *B. attenuata* and 10% *B. menziesii* 6 to 8m tall and tall Pinus sp. at 20%	392172	6439462
235	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* and 10% *B. menziesii* 6 to 8m tall and tall Casuarina sp. 10%. and *B. sessilis* 5%	392164	6439501
236	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	10% *B. attenuata* and 10% *B. menziesii* and 10% grass trees	392177	6439572
237	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	10% *B. attenuata* and 10% *B. menziesii* and 10% grass trees and 5% b. sessilis, 5m tall. tall Hakea 5%	392159	6439616
238	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Degraded	2 *B. attenuata* plants and remained is mixed Acacia and Myrtaceous shrubland. one Casuarina sp.	392121	6441391
239	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Degraded	2 *B. attenuata* plants and a Nuytsia, and 3 plants *B. menziesii* , remained is mixed	392115	6441471

Object ID Number	Date	Habitat type	Landform	Soil type	Litter cover (%)	Fire age (yr)	Vegetation condition	Notes: % canopy cover of foraging species	Eastings	Northings
								Acacia and Myrtaceous shrubland. Some tall Casuarina sp.		
240	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	10-30%	10+	Good	Bottlebrush, Calothamnus sp, Acacia sp. shrubland and then *E. rudis* occasional small	392121	6441045
241	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Degraded	10% *B. menziesii* and and 8% *B. attenuata* and *Nuytsia floribunda.*	392152	6440079
242	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	10% *B. attenuata* and 10% *B. menziesii* and 10% Grass trees and 5% *Banksia sessilis*, 5m tall. tall Hakea 5%	392154	6439680
243	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* 6 to 8m tall and *B. menziesii* 5 to 6m tall	392250	6439881
244	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* 6 to 8m tall and *B. menziesii* 5 to 6m tall	392277	6439487
245	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* 6 to 8m tall and *B. menziesii* 5 to 6m tall	392262	6439667
246	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* 6 to 8m tall and *B. menziesii* 5 to 6m tall	392299	6439249
247	14/11/2024	Banksia shrubland	Sand plain	Sandy loam	>70%	10+	Very Good	40 to 50% *B. attenuata* 6 to 8m tall and *B. menziesii* 5 to 6m tall	392238	6440083
252	14/11/2024	Banksia shrubland	Sand plain	sand	nr	nr	nr	Banksia 50%	392173	6439085
253	14/11/2024	Banksia shrubland	Sand plain	sand	nr	nr	nr	Banksia 50%	392173	6439087
254	14/11/2024	Banksia shrubland	Sand plain	sand	nr	nr	nr	Banksia 30%	392173	6439275
255	14/11/2024	Banksia shrubland	Sand plain	sand	nr	nr	nr	Banksia 40%	392167	6439585

Field sampling – Field notes[7]

Object ID Number	Date	Notes: % canopy cover of foraging species	Easting	Northing
41	12/11/2024	*Banksia attenuata* and Marri	391681	6447111
52	12/11/2024	*Eucalyptus rudis* lined	391421	6447818
54	12/11/2024	*Pinus* sp. *Banksia attenuata* and *B. menziesii* and fruiting Corymbia.	391385	6448198
55	12/11/2024	*B. menziesii* and Corymbia patch. can't access by foot. rail construction in way	391361	6448486
56	12/11/2024	Nuytsia x2. remnant Eucalyptus woodland . wall blocking view/ access	391563	6447617
57	12/11/2024	Marri woodland	391634	6447263
58	12/11/2024	*E.camaldulensis* and Marri	391589	6447419
59	12/11/2024	Marri and *Banksia attenuata* (20% in)	391735	6446976
60	12/11/2024	Marri woodland	391491	6448131
61	12/11/2024	*Eucalyptus rudis* and *E. camaldulensis*	392012	6445958
62	12/11/2024	*B. menziesii* a small patch	392453	6444996
63	12/11/2024	Eucalyptus saplings and Acacia shrubland	392200	6445588
64	12/11/2024	*B. menziesii* and Marri small.	392495	6444571
65	12/11/2024	*E.camaldulensis*	392515	6443989
67	12/11/2024	Marri, *E.camaldulensis* and *B. menziesii*, 1 every 20m	392514	6442552
68	12/11/2024	Marri, *E.camaldulensis* and *B. menziesii*,1 every 20m and some *Banksia sessilis*.	392467	6442314
70	12/11/2024	*B. attenuata* 40% cover and *B. menziesii*	392219	6440772
71	12/11/2024	*B. attenuata* 40% cover and *B. menziesii*	392221	6440514
76	12/11/2024	*B. attenuata* 40% cover and *B. menziesii*	392298	6439053
77	13/11/2024	*B. menziesii* 40% cover and some *Banksia attenuata*. lots of young Marri. 5 to 8m	392331	6438412
78	12/11/2024	*Banksia attenuata* 40% cover and *B. menziesii*. lots of Marri	392323	6438162
79	13/11/2024	*Eucalyptus rudis* and Marri patch with scattered *Banksia grandis*	392194	6437138
80	12/11/2024	Paperbark Melaleuca and Eucalyptus	392004	6436554
81	12/11/2024	Eucalyptus sp.	391907	6436298
82	12/11/2024	40 to 50% *Banksia attenuata* and *B. menziesii*.	391627	6435436

[7] these points assisted in the Black Cockatoo foraging score mapping and are represented for the purpose of evidence of foraging plants and % canopy cover. These notes have not been applied to the Figure as they are field mapping notes designed to be used as a reference for the field staff to attain a foraging score.

Object ID Number	Date	Notes: % canopy cover of foraging species	Easting	Northing
83	12/11/2024	40 to 50% *Banksia attenuata* and *B. menziesii*.	391559	6434366
84	12/11/2024	40 to 50% *Banksia attenuata* and *B. menziesii*.	391530	6434933
85	12/11/2024	40 to 50% *Banksia attenuata* and *B. menziesii*.	391569	6435239
87	12/11/2024	20% *Banksia attenuata* and *B. menziesii*.	391787	6432730
90	12/11/2024	Marri woodland	391965	6431472
91	12/11/2024	Marri woodland	391972	6431129
94	12/11/2024	Marri woodland	391928	6430403
96	12/11/2024	Marri woodland	391872	6431370
99	12/11/2024	Marri woodland and *b. attenuata* 25%	391640	6433027
102	12/11/2024	*Banksia attenuata* 40%	391462	6434376
103	12/11/2024	*Banksia attenuata* 40%	391531	6433875
104	12/11/2024	*Banksia attenuata* 25% and Marri	391440	6434923
105	12/11/2024	*Banksia attenuata* 25% and Marri	391516	6435458
106	12/11/2024	*Banksia attenuata* 25% and Marri	391544	6435650
108	12/11/2024	Acacia shrubland	392064	6437018
109	12/11/2024	*E. camaldulensis*	392218	6437705
113	12/11/2024	*Banksia attenuata* 15% and *Banksia sessilis*. Burnt recently	392152	6440006
114	12/11/2024	Marri woodland with 5% *B. menziesii*.	392134	6440667
115	14/11/2024	one large *B. attenuata*	392156	6441360
116	12/11/2024	Acacia shrubland	392341	6442184
117	12/11/2024	Acacia shrubland	392447	6442733
118	12/11/2024	Acacia shrubland	392405	6444127
119	12/11/2024	Acacia shrubland and Euc woodland	392360	6444588
120	12/11/2024	Acacia shrubland	391648	6446765
121	12/11/2024	dead tall *Banksia attenuata* over mixed shrub layer incl. *Kunzea* sp.	392048	6445499
122	13/11/2024	*Adenanthos* dominated. some Marri. Mostly *Calothamnus* sp.	392114	6438929
123	13/11/2024	10% *Banksia attenuata* 6m tall. *Adenanthos* and *Calothamnus* dominated.	392108	6438995
124	12/11/2024	mixed Acacia shrubland	392310	6438997

Object ID Number	Date	Notes: % canopy cover of foraging species	Easting	Northing
125	12/11/2024	*Banksia menziesii* 5% and young Marri	392341	6438869
126	12/11/2024	young *E. camaldulensis*	392318	6438655
127	13/11/2024	mixed Acacia shrubs and trees	392301	6437775
128	13/11/2024	mixed Acacia and Melaleuca sp.	392271	6437528
129	13/11/2024	mixed Acacia and Melaleuca sp.	392152	6437015
130	13/11/2024	15% *Banksia attenuata* and *Banksia menziesii* and Marri	391760	6435676
131	13/11/2024	20% *Banksia attenuata* and *Banksia menziesii* and Marri	391549	6435703
132	13/11/2024	*Banksia menziesii* 10%	391756	6433466
133	13/11/2024	Acacia shrubland	391694	6433448
134	13/11/2024	*Banksia menziesii* 10%	391774	6433345
135	13/11/2024	Kunzea sp. and Myrtaceous shrubland and planted young Eucalypts and occasional Marri	391772	6432937
136	13/11/2024	Remnant native bushland	391564	6433460
137	12/11/2024	*Banksia attenuata* 40%	391474	6434255
138	12/11/2024	*Banksia attenuata* 40% and Marri	391478	6435261
139	14/11/2024	Bottlebrush and Acacia shrubs and occasional *E. camaldulensis* small	391662	6435939
140	14/11/2024	Paperbark melaleucas and *E.camaldulensis* drainage line	391834	6436350
141	14/11/2024	Mixed planted Eucalyptus and E. rudis and Marri	391935	6436617
142	14/11/2024	Bottlebrush and Acacia shrubs and occasional *E. camaldulensis* small	391974	6436733
143	14/11/2024	Bottlebrush and Melaleuca sp. shrubs	392257	6438185
144	14/11/2024	Bottlebrush and Calothamnus sp. and Melaleuca sp. shrubs and young Marri	392240	6438313
152	26/11/2024	Dampland habitat	391938	6431783
153	26/11/2024	Road kill Quenda	392214	6437535

Fauna survey results – Black Cockatoo potential breeding habitat tree data

Object ID	Date	Tree species	Tree DBH (mm)	Hollow diameter (mm)	Tree category (1-7)	Easting	Northing
46	12/11/2024	Flooded Gum	600	no hollow	7	391423	6447857
47	12/11/2024	Flooded Gum	600	no hollow	7	391422	6447849
48	12/11/2024	Flooded Gum	800	no hollow	7	391413	6447922
49	12/11/2024	Flooded Gum	500	no hollow	7	391412	6447926
50	12/11/2024	Flooded Gum	600	no hollow	7	391412	6447939
51	12/11/2024	Flooded Gum	600	no hollow	7	391409	6447956
52	12/11/2024	Flooded Gum	500	no hollow	7	391405	6448000
53	12/11/2024	Flooded Gum	500	no hollow	7	391403	6448016
54	12/11/2024	Flooded Gum	500	no hollow	7	391400	6448055
55	12/11/2024	Marri	500	no hollow	7	391399	6448060
56	12/11/2024	Marri	500	no hollow	7	391392	6448112
57	12/11/2024	Marri	600	no hollow	7	391394	6448155
58	12/11/2024	Tuart	800	no hollow	7	391370	6448303
59	12/11/2024	Marri	520	no hollow	7	391385	6448262
60	12/11/2024	Tuart	670	no hollow	7	391345	6448731
61	12/11/2024	Tuart	1600	no hollow	7	391346	6448729
62	12/11/2024	Tuart	600	no hollow	7	391346	6448730
63	12/11/2024	Tuart	800	no hollow	7	391344	6448676
66	12/11/2024	Marri	700	no hollow	7	392518	6443465
67	12/11/2024	Marri	500	no hollow	7	392398	6442064
68	12/11/2024	Marri	500	no hollow	7	392404	6442070
69	12/11/2024	Marri	500	no hollow	7	392370	6441900
70	12/11/2024	Marri	500	no hollow	7	392380	6441930
71	12/11/2024	Marri	500	no hollow	7	392404	6442081
72	12/11/2024	Marri	600	no hollow	7	392527	6442781
73	12/11/2024	Marri	600	no hollow	7	392243	6440219
74	13/11/2024	Jarrah	900	no hollow	7	391733	6435661
75	13/11/2024	Marri	800	no hollow	7	391524	6434602
76	13/11/2024	Marri	800	no hollow	7	391519	6434659
77	13/11/2024	Marri	600	no hollow	7	391530	6434544
78	13/11/2024	Marri	550	no hollow	7	391865	6432264
79	13/11/2024	Marri	600	no hollow	7	391864	6432265
80	13/11/2024	Tuart	670	no hollow	7	391831	6431879
81	13/11/2024	Marri	500	no hollow	7	391809	6432038
82	13/11/2024	Marri	800	no hollow	7	391805	6432048
83	13/11/2024	Marri	500	no hollow	7	391797	6432101
84	13/11/2024	Marri	500	no hollow	7	391797	6432124
85	13/11/2024	Marri	500	no hollow	7	391794	6432152

Object ID	Date	Tree species	Tree DBH (mm)	Hollow diameter (mm)	Tree category (1-7)	Easting	Northing
86	14/11/2024	River Red Gum	900	no hollow	7	392133	6440339
87	14/11/2024	River Red Gum	800	no hollow	7	392138	6440315
88	14/11/2024	River Red Gum	670	no hollow	7	392142	6440354
89	14/11/2024	River Red Gum	500	no hollow	7	392134	6440363
90	14/11/2024	River Red Gum	800	no hollow	7	392138	6440323
91	12/11/2024	Flooded Gum	650	no hollow	7	391846	6431789

Carnaby's Cockatoo foraging habitat scores

Fauna Habitat Type	Area (ha)	Condition (out of 6)	Context (out of 3)	Density (out of 1)	Foraging Score (out of 10)
Banksia woodland	10.30	4	1	1	6
Eucalyptus woodland over Banksia	14.40	4	1	1	6
Melaleuca Dampland	3.94	1	0	0	1
Marri woodland	1.97	3	1	1	5
Naturalised and native trees	13.29	1	0	0	1
Native and introduced shrubs	61.27	1	0	0	1
Modified wetland drainage area	6.40	1	0	0	1
Cleared land	173.87	0	0	0	0

Average Carnaby's Cockatoo foraging habitat score for DE

Fauna Habitat	Area(ha)	Foraging Score	Area x Score
Banksia woodland	10.30	6	61.80
Eucalyptus woodland over Banksia	14.40	6	86.40
Marri woodland	1.97	5	9.85
Total	**26.67**		**158.05**
Average FHQS			**5.93**

Forest Red Tailed Black Cockatoo foraging habitat scores

Fauna Habitat Type	Area (ha)	Condition (out of 6)	Context (out of 3)	Density (out of 1)	Foraging Score (out of 10)
Banksia woodland	10.30	2	0	0	2
Eucalyptus woodland over Banksia	14.40	3	1	0	4
Melaleuca Dampland	3.94	1	0	0	1
Marri woodland	1.97	5	1	1	7
Naturalised and native trees	13.29	1	0	0	1
Native and introduced shrubs	61.27	1	0	0	1
Modified wetland drainage area	6.40	1	0	0	1
Cleared land	173.87	0	0	0	0

Average Forest Red-tailed Black Cockatoo foraging habitat score for DE

Fauna Habitat	Area(ha)	Foraging Score	Area x Score
Banksia woodland	10.30	2	20.60
Eucalyptus woodland over Banksia	14.40	4	57.60
Marri woodland	1.97	7	13.79
Total	**26.67**		**91.99**
Average FHQS			**3.45**

Fauna likelihood of occurrence assessment guidelines

Likelihood category	Description
Known	Species recorded during the field survey or from recent, reliable records from within or close proximity to the survey area.
Likely	Species are likely to occur in the survey area where there is suitable habitat within the survey area and there are recent records of occurrence of the species in close proximity to the survey area. OR Species known distribution overlaps with the survey area and there is suitable habitat within the survey area.
Unlikely	Species assessed as unlikely include those species previously recorded within 10 km of the survey area however: There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the survey area. The suitable habitat within the survey area is isolated from other areas of suitable habitat and species has no capacity to migrate into the survey area. OR Those species that have a known distribution overlapping with the survey area however: There is limited habitat in the survey area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area.
Highly unlikely	Species that are considered highly unlikely to occur in the survey area include: Those species that have no suitable habitat within the survey area. Those species that have become locally extinct, or species are not known to have ever been present within the region of the survey area.

Definitions

Term	Description
study area	a 20 km buffer around the survey area
survey area	the area subject to the current survey
locality	the area within an approximate 20 km radius of the survey area
Conservation codes	
Cr	Critically endangered. Listed under BC Act and EPBC Act
En	Endangered. Listed under BC Act and EPBC Act
Vu	Vulnerable. Listed under BC Act and EPBC Act
Mi	Migratory. Listed under an international agreement
CD	Conservation dependant. Listed under BC Act
OS	Other specially protected fauna. Listed under BC Act
P1	Priority 1. Poorly known taxa. Not formally listed under BC Act but recognised as significant
P2	Priority 2. Poorly known taxa. Not formally listed under BC Act but recognised as significant
P3	Priority 3. Poorly known taxa. Not formally listed under BC Act but recognised as significant
P4	Priority 4 Rare, Near Threatened and other taxa in need of monitoring. Not formally listed under BC Act but recognised as significant

Fauna likelihood of occurrence assessment of conservation significant flora identified in the desktop assessment as potentially occurring within the Kwinana Freeway to Tonkin Highway Widening survey are

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
BIRDS							
Actitis hypoleucos	Common Sandpiper	MI	MI	The species utilizes a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. Generally the species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. Birds sometimes venture into grassy areas adjoining wetlands (Higgins & Davies 1996).	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines.	**Unlikely.** This species known to occur locally from database records including The Spectacles wetland reserve located within 1 km west of the survey area. The survey area is lacking specific habitat requirements such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to occasional flyover during the seasonal occurrence of birds visiting local wetlands.	PMST, NatureMap, DBCA.
Apus pacificus	Fork-tailed Swift	MI	MI	The Fork-tailed Swift is common in coastal and sub coastal areas between Carnarvon and Augusta including near and offshore islands. There are scattered records along south coast from Denmark east to Cocklebiddy on the Great Australian Bight, and sparsely scattered records inland. They are found across a range of habitats, from inland open plains to wooded areas. They are most often observed over inland plains in Australia, but sometimes recorded over coastal cliffs and beaches as well as urban areas. They have been recorded well out to sea as well as from offshore islands especially when on passage from Indonesia. This species is almost exclusively aerial (DCCEEW 2022).	**Unlikely.** Occurs locally on occasional/sporadic basis and only as aerial foraging.	**Unlikely.** Occurs locally on occasional basis however only aerial foraging or fly-over.	PMST, NatureMap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
Arenaria interpres	Ruddy Turnstone	MI	MI	The Ruddy Turnstone breeds in summer in the Arctic northern tundra areas of North America and Eurasia. During the Arctic winter (non-breeding season, it migrates to coastal southern and mid-latitude areas across the planet including many areas of the Australia coastline, and occasionally recorded in Perth-Peel area.	**Unlikely.** There are Database records for Woodman Point located approximately 10 km west of the survey area. Based on preliminary assessment from aerial imagery, the survey area is expected to lack suitable coastal habitat.	**Unlikely.** The survey area lacks suitable habitat namely coastal or near-coastal tidal shoreline. Occurrence would be limited to occasional flyover during the seasonal occurrence of birds within the region.	DBCA
Botaurus dubius	Australian Little Bittern	-	P4	In Australia, Australian Little Bitterns are found mostly in the lower Murray-Darling Basin (especially along the Murray River), but occasionally also elsewhere in the Murray-Darling Basin, up to south-eastern QLD. Occasionally they are also found in the Great Dividing Range and along the South and East coast of the continent, from about Cairns, QLD, in the North to about Adelaide, SA, in the South. There is also a small population on the south-western tip of WA, including Perth, and there are some reports of vagrants in various locations along the continent's North coast. Australian Little Bitterns are usually found in freshwater habitats, mostly in reeds around freshwater lakes, but also in reedbeds and other dense vegetation along creeks and in swamps. Sometimes they are also found in wetlands with brackish and saline water.	**Unlikely.** Based on preliminary assessment of aerial imagery, the survey area is expected to lack suitable habitat namely wetland with extensive dense emergent native reeds vegetation. There is a local record from South Lake approximately 3 km west of survey area.	**Unlikely.** Based on the field assessment, the survey area lacks suitable habitat namely wetland with dense emergent native vegetation.	DBCA
Botaurus poiciloptilus	Australasian Bittern	EN	EN	The Australasian bittern occurs in temperate southern Australian environments, New Zealand and some Pacific Islands. It is a large bittern species that inhabits extensive areas freshwater wetland and occasional brackish estuarine areas and rely on dense vegetation, particularly rushes, reeds, and sedges for shelter. They are found in the temperate southeast and southwest of Australia, including	**Unlikely.** Based on preliminary assessment of aerial imagery, the survey area is expected to lack	**Unlikely.** The survey area lacks suitable habitat namely wetland with extensive emergent native vegetation.	DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				Victoria, Tasmania, New South Wales, South Australia, Western Australia, and Queensland. Its distributing has contracted due to habitat low and degradation and introduced predators. Post 1980s it is restricted to very few wetlands such as Forrestdale and Thomsons Lake (DBCA 2018b). Although these wetlands are also threatened by climate changes causing reduced rainfall leading to further reduction in suitable local habitat in the medium to long-term.	suitable habitat namely wetland with extensive emergent native reeds vegetation Historical record (1981) from Approx. 7 km NE survey area.		
Calidris acuminata	Sharp-tailed Sandpiper	VU, MI	VU, MI	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry (DCCEEW 2022).	**Unlikely** Occurs locally during non-breeding season based on database records from Lake Thomsons Lake and historical records from North Coogee. The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines.	**Unlikely.** This species known to occur locally from database records including Thomsons Lake located approximately 3 km west of the survey area. However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands.	PMST, Naturemap, DBCA
Calidris alba	Sanderling	MI	MI	The Sanderling occurs in coastal areas around Australia during its non-breeding summer migration. Inland records are uncommon although the species may fly over the continental interior areas on its way to coastal areas (Higgins & Davis 1996). Prefers to forage along coastlines of open sandy beaches wave-wash zone and amongst rotting seaweed. Also forages on exposed sandbars and spits and wave-washed rocky shores. It is gregarious usually observed in small to large flocks and will forage with other waders. Migrating flock tend to be less than a thousand (Higgins & Davies 1996). It is known for ability to accumulate	**Unlikely.** There are historical records from Coogee area, and known to occur in the region, however pending on-ground assessment, the survey area is expected to lack	**Unlikely.** The survey area lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				fat reserves as much as 60% of its post-migration body mass, in preparation for long-distance migration flights they make between breeding and non-breeding foraging grounds (Pringle 1987).	suitable shoreline habitat given the location.		
Calidris canutus	Red Knot	EN	EN	The Red Knot occurs along most northern Australian coastlines but records are less common to scattered in south-west Australia (Lane 1987) and occasionally recorded inland in all regions. In Australia the Red Knot mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours. Occasionally recorded in recorded on artificial habitat such as sewage ponds and saltworks, but rarely use freshwater swamps, and rarely use inland lakes or swamps (Higgins & Davies 1996). Preferred foraging habitat is soft substrate near the edge of water on intertidal mudflats or sandflats exposed by low tide.	**Unlikely.** There are historical records from Coogee area, and known to occur in the region, however pending on-ground assessment, the survey area is expected to lack suitable shoreline habitat given the location.	**Unlikely.** The survey area lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	DBCA
Calidris falcinellus	Broad-billed Sandpiper	MI	MI	A small migratory wader species spending the non-breeding season from easternmost Africa, through south and south-east Asia to Australasia. It is highly gregarious and will form flocks with other waders. It forages for food in soft coastal and estuarine muddy flats and shallow, mainly picking up insects and other small invertebrates.	**Unlikely.** Recorded at Thomsons Lake within 2 km of survey area. There are historical records including from Coogee area, and known to occur in the region, however pending on-ground assessment, the survey area is expected to lack suitable coastal shoreline habitat given the location.	**Unlikely.** The survey area lacks suitable shoreline habitat. Occurrence would be limited to seasonal flyover of birds visiting local wetlands and coastal areas along the Perth-Peel region.	DBCA
Calidris ferruginea	Curlew Sandpiper	CR, MI	CR, MI	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. They are also recorded inland, though less often,	**Unlikely** The survey area is expected to lack suitable habitat:	**Unlikely.** This species known to occur locally from database records	PMST, Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (DCCEEW 2023).	such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Bore drains associated with road infrastructure may represent marginal habitat.	including Thompsons Lake located approximately 3 km west of the survey area. However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands. Sumps associated with road drainage may represent marginal foraging habitat.	
Calidris melanotos	Pectoral Sandpiper	MI	MI	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands including heavily vegetated shallows(Higgins & Davies 1996).	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Bore drains associated with road infrastructure may represent marginal habitat.	**Unlikely.** This species known to occur locally from database records such as Yangebup Lake – Beeliar Regional Park regionally located 2 km west of the survey area. However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to seasonal	PMST, Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						flyover during bird's visitation of local wetlands.	
Calidris pugnax	Ruff	MI	MI	The Ruff is a medium sized wader of the Calidridinae family that is a regular seasonal but rare visitor to Australia. Its preferred habitat in Australia is fresh, brackish of saline wetlands with exposed mudflats, lakes, swamps, pools, lagoons, tidal rivers, shallow swampy fields. The Ruff is insectivorous throughout the breeding grounds however, it is omnivorous elsewhere during non-breeding season including Australia where it also feeds on plant material such as moss and seeds (Higgins and Davies 1996). It is both diurnal and nocturnal.	**Unlikely** There are occasional and historical records for the Perth-Peel region such as Coogee Beach. The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines.	**Unlikely.** The survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	DBCA
Calidris ruficollis	Red-necked Stint	MI	MI	The Red-necked Stint breeds in north-eastern Siberia and northern and western Alaska. It follows the East Asian-Australasian Flyway to spend the southern summer months in Australia. It is found widely in Australia, except in the arid inland. In Australia, Red-necked Stints are found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores (Pizzey and Knight 2012).	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines.	**Unlikely.** This species known to occur in local wetlands including several database records from Beeliar Regional Park wetlands and Thompsons Lake Nature Reserve areas located within 2 to 3 km of the survey area. However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be	Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						limited to occasional flyover of birds during the seasonal local visits to wetlands.	
Calidris subminuta	Long-toed Stint	MI	MI	In WA the species is found mainly along the coast, with a few scattered inland records. On the south coast the Long-toed Stint is found from Esperance to Albany and inland to Lake Cassencarry and Dumbleyung. On the south-west coast the species is known from the Vasse River estuary, Guraga Lake and the Namming Nature Reserve. The species has occasionally been recorded in the Gascoyne Region, around Lake Wooleen, Meeberrie Station and McNeill Claypan. It is widespread around the Pilbara region and the Kimberley Division between Karratha and Wyndham-Kununurra (DEE 2019b). It occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds.	**Unlikely** This species known to occur locally such as recent record from Kogolup Lake in Beeliar Regional Park located approximately 3 km west of the survey area. The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines.	**Unlikely.** The survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	Naturemap, DBCA
Calidris tenuirostris	Great Knot	CR	CR	The largest of the Knots with wingspan attaining 58 cm (Higgins & Davies 1996). During the non-breeding season, the Great Knot forages along coastal or near-coastal shallow tidal mudflats, rarely inland areas. Birds that migrate to Australia probably stay in proximity of their arrival locations throughout the non-breeding season (Higgins & Davies 1996).	**Unlikely.** Known to occur locally from historical records from Coogee Beach area	**Unlikely.** The survey area is lacking preferred coastal shoreline habitat. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	DBCA
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	VU	VU	The Forest Red-tailed Black Cockatoo inhabits the dense jarrah, karri, and marri forests receiving more than 600 mm annual average rainfall but also occurs in a range of other forest and woodland types, including Blackbutt (E. patens), Wandoo (E. wandoo), Tuart (E. gomphocephala), Albany	**Present.** Confirmed local occurrence based	**Present**. Confirmed based on observations of birds and extensive	PMST, Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				Blackbutt (E. staeri), Yate (E. cornuta), and Flooded Gum (E. rudis) (DEE 2017). Habitats tend to have an understorey of balga (*Xanthorrhoea* spp.), kingia (*Kingia australis*), snottygobble (*Persoonia* spp.), parrot bush (*Banksia sessillis*), holly-leaved mirbelia (*Mirbelia dilatata*), bull banksia (*B. grandis*), bullich (*Taxandria spp.*) and sheoak (*Allocasuraina fraseriana*). They are most common in the jarrah forest region of the northern Darling Range from Collie north to Mundaring and are very local throughout the lower south-west. They can be found on the Swan Coastal Plain, mainly in search of food the exotic white cedar (*Melia azedarach*). There are also several small, isolated populations in the eastern parts of its range (DAWE 2022).	on numerous local database records.	foraging signs during the field survey.	
Chariadris cucullatus	Hooded Plover	-	P4	The hooded plover is a small Australian beach nesting bird. It mainly occurs on wide beaches backed by dunes with large amounts of seaweed and jetsam, creek mouths and inlet entrances. Nests are found above the high-water mark on flat beaches, on stony terraces, or on sparsely vegetated dunes. As the hooded plover occurs on beaches, it is easily disturbed by human activities, particularly off-leash domestic dogs.	**Unlikely** There are occasional and historical local records, however based on preliminary assessment of aerial imagery, the survey area lacks suitable wetland habitat such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines.	**Unlikely.** This species known to occur regionally however the field assessment confirmed that the survey area is lacking suitable habitat. Occurrence may be limited to occasional vagrant visitation, or flyover.	DBCA
Charadrius dubius	Little Ringed Plover	MI	MI	While the majority of the population of Little Ringed Plovers will spend the northern winters in Africa, southward of the Sahara Desert, a small number will migrate to northern Australia. In Australia they are occasionally found along the coastline, mostly of the northern part of the continent. Outside the breeding season Little Ringed Plovers have a preference for beaches with sand dunes and marshes. They are also regularly found in sewage treatment plants.	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or	**Unlikely.** This species known to occur locally from database records such as Yangebup Lake 2 km west of the survey area. However, the survey area is lacking	PMST, DBCA, Naturemap.

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
					tidal estuarine or coastal shorelines.	extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	
Charadrius leschenaultii	Greater Sand Plover	VU, MI	VU, MI	In Australia, the Greater Sand Plover occurs in coastal areas in all states, though the greatest numbers occur in northern Australia, especially the north-west (Marchant & Higgins 1993). In northern Australia, the species is especially widespread between Northwest Cape and Roebuck Bay in WA; there are sparsely scattered records from the largely inaccessible area between Roebuck Bay and Darwin, but it often occurs in the Top End of the Northern Territory, including on Groote Eylandt (DCCEEW 2022).	**Unlikely** There are historical records from 7 km northeast of the survey area. The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines.	**Unlikely.** This species known to occur regionally however the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional vagrant at best.	PMST, DBCA
Charadrius mongolus	Lesser Sand Plover	MI	MI	Within Australia, the Lesser Sand-Plover is widespread in coastal regions and has been recorded in all states. It mainly occurs in northern and eastern Australia, in southeastern parts of the Gulf of Carpentaria, western Cape York Peninsula and islands in Torres Strait, and along the entire east coast, though it occasionally also occurs inland. It is most numerous in Queensland and NSW. The species has also been recorded on Lord Howe Island, Norfolk Island and Christmas Island, Indian Ocean. In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbors 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. The species also	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines.	**Unlikely.** This species known to occur regionally however the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional vagrant at best.	PMST, DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in riverbeds (Marchant & Higgins 1993). In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches.			
Chlidonias leucopterus	White-winged Tern	MI	MI	White-winged Black Terns are non-breeding migrants to Australia from the North. They arrive anywhere along the tropical coast of Australia and disperse around basically the entire Australian seaboard, including the East coast of Tasmania and many small offshore islands. They can be found farther inland, in parts of the Great Dividing Range and in particular in the central part of the Murray-Darling Basin near the NSW/VIC border. There are also White-winged Black Terns in an area around Perth, WA. Elsewhere on the continent White-winged Black Terns are found only rarely, and never in the great deserts of WA/SA/NT or the Nullarbor. White-winged Black Terns live around lakes including ephemeral lakes, in estuaries and in coastal waters.	**Unlikely** The survey area is expected to lack suitable habitat: such as extensive lakes or flooded shallows.	**Unlikely.** This species known to occur including database record at Bibra Lake approximately 2km west of survey area regionally however the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional fly-over or vagrant visitation.	DBCA, Naturemap
Falco peregrinus	Peregrine Falcon	-	OS	The Peregrine Falcon is uncommon but wide ranging across Australia. Found everywhere from woodlands to open grasslands and coastal cliffs – though less frequently in desert regions – it feeds almost entirely on other birds. It also eats rabbits and other moderate sized mammals, bats and reptiles. The Peregrine Falcon is very territorial during breeding season, the male courting the female with an impressive display of aerobatics (DEE 2019b, Morcombe 2004).	**Likely.** Known to occurs locally from regular sightings and there are local database records including Bibra lake area 3 km west of survey area.	**Likely.** Trees within the survey area represent marginal nesting habitat. Likely to hunt within survey area on an occasional to regular basis.	DBCA, Naturemap
Glareola maldivarum	Oriental Pratincole	MI	MI	The Oriental pratincole has relatively short legs, long pointed wings and long forked tails. It hawks for insect prey in flight, although also feeding on the ground or occasionally coastal areas. It prefers open country, and they are often seen near water in the evening, hawking for insects. Within Australia the Oriental Pratincole is widespread in northern areas, especially the Pilbara, Kimberley regions, Northern Territory,	**Unlikely.** Occurs locally occasionally including historical records from Canning Vale	**Unlikely.** Occurs locally occasionally. Unlikely to occur but may hawk over the survey area on	DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				and the Gulf of Carpentaria. It is also widespread but scattered inland. There are occasional records in southern Australia, at sparsely scattered sites (Barrett et al. 2003).	Coogee Beach area.	occasional or vagrant basis.	
Limosa lapponica	Bar-tailed Godwit	MI	MI	The species has been recorded travelling over 13,000km from Alaska to Tasmania in only 11 days. During this flight they can lose almost half of their body weight. Adult birds mostly return to northern Arctic breeding grounds, although some birds (mostly young) remain for the year. Bar-tailed Godwits inhabit estuarine mudflats, beaches and mangroves. They are common in coastal areas around Australia. They are social birds and are often seen in large mixed flocks with other migratory waders.	**Unlikely** Occurs locally on locally based on two records from Swan River approx. 7 km NW of the survey area, and historical record from Coogee area Based on survey are location and preliminary aerial image assessment, the survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines	**Unlikely.** This species known to occur regionally however the survey area is lacking suitable coastal shorelines. Occurrence may be limited to occasional fly-over.	DBCA
Limosa limosa	Black-tailed godwit	EN, MI	EN, MI	Black-tailed Godwits arrive in Australia each year in August from breeding grounds in the northern hemisphere. Birds are more numerous in northern Australia. Black-tailed Godwits inhabit estuarine mudflats, beaches and mangroves. They are common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders (Birdlife Australia 2019). In Western Australia it is widespread around the coast, from Eyre to Derby, with a few scattered records elsewhere in the Kimberley Division. Populations have also been recorded in the Top End, from Darwin and Melville Island, east to the Alligator River and Croker Island (Marchant & Higgins, 1990). The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is	**Unlikely.** Occurs locally on locally based on historical record from Coogee area Based on survey are location and preliminary aerial image assessment, the survey area is expected to lack suitable habitat: such as extensive shallow wetlands, mudflats, seasonal	**Unlikely.** This species known to occur regionally however the survey area is lacking suitable coastal shorelines. Occurrence may be limited to occasional fly-over.	Naturemap DBCA, PMST

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats.	flooded shallows or tidal estuarine or coastal shorelines		
Motacilla cinerea	Grey Wagtail	MI	MI	A European and Asian species that migrates in winter south to Indonesia and New Guinea. Rarely reaches Australia. Occurs usually near fresh streams, but also on mown grass, ploughed land or near sewerage ponds. The Grey Wagtail is an opportunistic migrant to Australia. The species typically migrates to Indonesia occasionally landing in Australia. Most records for the species are from Northern Australia and South Australia (Morcombe 2004). The non-breeding habitat only of the Grey Wagtail has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes (DAWE 2021e). It can be found mainly in banks and rocks in fast-running freshwater habitats: rivers, creeks, streams, and around waterfalls, both in forest and open country; but occurs almost anywhere during migration (Johnstone & Storr 2004).	**Unlikely.** A vagrant visitor to southern Australia. Rarely recorded locally.	**Unlikely.** A vagrant visitor to southern Australia. Rarely recorded locally.	PMST
Numenius madagascarensis	Eastern Curlew	CR, MI	CR, MI	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. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, sometimes within the mangroves, and in coastal saltworks and sewage farms. In the South-West, Eastern Curlews are recorded from Eyre, and there are scattered records from Stokes Inlet to Peel Inlet (Marchant & Higgins 1993). They are uncommon further south of Geraldton, but can be spotted in Alfred Cove, Peel Inlet and the Albany region (Nevill 2013).	**Unlikely.** Occasional and historical records from the Peel Inlet area.	**Unlikely.** The survey area is lacking suitable coastal or estuarine shorelines. Occurrence may be limited to occasional fly-over.	PMST, DBCA, Naturemap.
Oxyura australis	Blue-billed Duck	-	P4	The blue-billed Duck is a small Australian almost entirely aquatic duck, with both the male and female growing to a length of 40 cm. The male has a slate-blue bill which changes to bright blue during the breeding season. The Blue-billed Duck is endemic to Australia's temperate regions, ranging from the South-West of WA, extending to southern	**Possible.** There are numerous local records from local wetlands in proximity of the	**Likely.** Based on the site field assessment, the survey area has suitable habitat: Modified wetland	Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				Queensland, through New South Wales and Victoria, to Tasmania. The species is readily seen on freshwater lakes and billabongs where deep fresh water is present (Morcombe 2004).	survey area including Bibra, Thompsons and Beeliar Lakes	drainage areas that have either permanent or seasonal moderately deep pond areas that provide foraging habitat. This duck occurs locally and likely to visit this habitat on at least an occasional or seasonal basis.	
Pandion haliaetus	Osprey	MI	MI	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays.	**Unlikely.** There are numerous local records from local wetlands in proximity of the survey area including Bibra, Thompsons and Beeliar Lakes, although the survey area in un	**Unlikely.** This species known to occur locally from database records from local lakes including Thompsons Lake located approximately 3 km west of the survey area. However, the survey area lacks extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would be limited to seasonal flyover of birds visiting local wetlands.	PMST, Naturemap, DBCA
Phaethon rubricauda	Red-tailed Tropic-bird	MI	MI	In Australia, it nests on Queensland's coral islands (including Raine Island and Lady Elliot Island), and Ashmore Reef and Rottnest Island off Western Australia, as well as Sugarloaf Rock at Cape Naturaliste and Busselton on the Western Australian coastline itself, and the offshore territories of the Cocos (Keeling) Islands, Norfolk and Lord Howe islands. In New Zealand territory it breeds on the Kermadec Islands. It	**Highly Unlikely.** Rare to vagrant visitor to southwest.	**Unlikely.** The survey area lacks suitable shoreline habitat. Occurrence would be limited to	DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				frequents areas of ocean with water temperatures from 24 to 30 °C (75 to 86 °F) and salinity under 35% in the southern hemisphere and 33.5% in the northern hemisphere. In the Pacific Ocean, the southern boundary of its range runs along the 22 °C (72 °F) summer surface isotherm The warm waters of the Leeuwin Current facilitate the species nesting at Cape Leeuwin in southwestern Australia, yet is only a rare visitor to New South Wales at corresponding latitudes on the Australian east coast (Higgens et al 1990).		seasonal flyover of birds visiting coastal areas along the Perth-Peel region.	
Plegadis falcinellus	Glossy Ibis	MI	MI	The Glossy Ibis' preferred habitat for foraging and breeding are freshwater marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes, and coastal lagoons. Within Australia, the largest contiguous areas of prime habitat are in inland and northern floodplain areas (Marchant and Higgins 1990).	**Possible.** Known to occur locally on regular basis with records from lakes and Swan River within 2-7km of the survey area.	**Unlikely.** The survey area lacks suitable shallow wetland habitat. Modified wetland drainage sumps/ponds associated with the Kwinana Freeway is marginal and species' occurrence will be occasional to vagrant at most.	DBCA, Naturemap
Pluvialis fulva	Pacific Golden Plover	MI	MI	The Pacific Golden Plover breeds on the Arctic tundra in western Alaska. It winters in South America and islands of the Pacific Ocean to India, Indonesia and Australia. In Australia it is widespread along the coastline. 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 saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks (DEE 2019b).	**Unlikely.** Occurs locally but survey area is not unlikely to have suitable coastal or tidal shoreline habitat based on location.	**Unlikely.** This species known to occur locally from database records including Thompsons Lake located approximately 3 km west of the survey area. However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence would	DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						be limited to seasonal flyover of birds visiting local wetlands. Sumps associated with road drainage may represent marginal foraging habitat.	
Pluvialis squatarola	Grey Plover	MI	MI	The Grey Plover breeds around the Arctic regions and migrates to the southern hemisphere, being a regular summer migrant to Australia, mostly to the west and south coasts. It is generally sparse but not uncommon in some areas. It is occasionally found inland. It is almost entirely coastal, being found mainly on marine shores, inlets, estuaries and lagoons with large tidal mudflats or sandflats for feeding, sandy beaches for roosting, and also on rocky coasts (Birdlife Australia 2019).	**Unlikely.** Occurs locally from database records such as Yangebup Lake – Beeliar Regional Park regionally located 2 km west but survey area is unlikely to have suitable coastal or tidal shoreline habitat based on location.	**Unlikely.** This species known to occur locally from database records However, the survey area is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to seasonal flyover during bird's visitation of local wetlands.	DBCA, Naturemap
Thalasseus bergii	Crested Tern	MI	MI	Crested Terns occur singularly or in flocks in coastal areas, estuaries, inlets, islands and occasionally on large inland lakes or rivers. They are often seen perching with gulls on beaches, sand spits or jetties. Crested Terns are widespread from the south coast of Africa north to Asia, south to Australia and east to Polynesia. They also occur on many islands in the Indian and Pacific Oceans (DEE 2018).	**Unlikely.** Local database records of this species from open water habitat such as Swan River and freshwater lakes. Based on preliminary aerial imagery, the survey area is not expected to have suitable wetland habitat.	**Unlikely.** This species known to occur in local wetlands including several database records from Beeliar Regional Park wetlands and Thompsons Lake Nature Reserve areas located within 2 to 3 km of the survey area. However, the survey area is lacking extensive shallow	DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	
Tringa glareola	Wood Sandpiper	MI	MI	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. Wood Sandpipers are more numerous in the north than the south of Australia and are also found in New Guinea, Africa, the Indian subcontinent and South-east Asia. They breed widely across the north of Europe and Asia, mostly in Scandinavia, Baltic countries and Russia. They are the most abundant migratory wader in non-coastal areas of Asia (DEE 2019b).	**Unlikely.** This species known to occur locally from database records such as occasionally within Peel region. The survey area not likely to have suitable shoreline habitat	**Unlikely.** The survey area found to be lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	Naturemap, DBCA, PMST
Tringa nebularia	Common Greenshank	EN, MI	EN, MI	The Common Greenshank is a heavily built, elegant wader, 30–35 cm in length, with a wingspan of 55–65 cm and weight up to 190 g for both males and females. The bill is long and slightly upturned and the legs are long and yellowish-green. In flight, all plumages show uniformly dark upper wing and contrasting white rump extending in a white wedge up the back, whitish tail and tips of toes projecting slightly beyond the tip of the tail. The sexes are alike (Higgins & Davies 1996). The species is seen singly or in small to large flocks (sometimes hundreds) in a variety of coastal and inland wetlands. The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia (Higgins & Davies 1996). It occurs around most of	**Unlikely.** This species known to occur locally from database records such as Swan River and Thomsons Lake. However, the survey area is expected to lack extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines.	**Unlikely.** The survey area found to be lacking shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	PMST Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				the coast from Cape Arid in the south to Carnarvon in the north-west. In the Kimberley it is recorded in the south-west and the north-east, with isolated records from the Bonaparte Archipelago (Higgins & Davies 1996).			
Tringa stagnatilis	Marsh Sandpiper	MI	MI	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. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats (Higgins & Davies 1996), although surveys in Kakadu National Park recorded more birds around shallow freshwater lakes than in areas influenced by tide. At the Top End they often use ephemeral pools on inundated freshwater and tidal floodplains (Higgins & Davies 1996). They are found infrequently around mangroves (Higgins & Davies 1996).	**Unlikely.** This species known to occur locally from database records such as Yangebup Lake 2 km west of the survey area. However, the survey area is expected to lack extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines.	**Unlikely.** The survey area found to be lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional flyover of birds during the seasonal local visits to wetlands.	Naturemap, DBCA
Zanda baudinii	Baudin's Cockatoo	EN	EN	Baudin's Black Cockatoo mainly occurs in eucalypt forests, especially jarrah, marri and karri forest that receives 750 mm of annual rainfall. The species is less frequently in woodlands of wandoo (*E. wandoo*), blackbutt (*E. patens*), flooded gum (*E. rudis*), yate (*E. cornuta*), partly cleared farmlands and urban areas. The range of the species extends from Albany northward to Gidgegannup and Mundaring (east of Perth), and inland to the Stirling Ranges and near Kojonup. Preferred roosts are in areas with a dense canopy close to permanent sources of water (DEE 2017).	**Unlikely.** Known to occur regionally on the Swan Coastal Plain including Perth Peel region based on foraging records, however not known to nest within or in proximity of the survey area.	**Unlikely.** Baudin's Cockatoo was not recorded during the survey but is known to occasionally forage and roost regionally. The survey area is located on the western edge of current known foraging distribution and lies outside the known breeding range of this species, which has a bearing on the habitat suitability and value for this cockatoo. Baudin's	PMST, Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						Cockatoo should be considered an occasional visitor; however, this is only likely to be in the context of temporary fly-over activity or rare foraging activity.	
Zanda latirostris	Carnaby's Cockatoo	EN	EN	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum, wandoo, marri, jarrah and karri, and in shrubland or kwongan heathland dominated by Hakea, Dryandra, Banksia and Grevillea species. Breeding activity is restricted to eucalypt woodlands mainly in the semiarid and subhumid interior, from Kalbarri in the north, Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning. The species has expanded its breeding range westward and south into the jarrah-marri forests of the Darling Scarp and into the tuart forests of the Swan Coastal Plain, including the Yanchep area, Lake Clifton and near Bunbury. It nests in trees older than 120-150 years (DEE 2017).	**Known.** Known to occur within the survey area based on database records.	**Known.** Recorded during the field survey within survey area at several locations including birds sighted and extensive foraging evidence.	PMST, Naturemap, DBCA
MAMMALS							
Dasyurus geoffroii	Chuditch	VU	VU	The Chuditch inhabits eucalypt forest (especially Jarrah, *E. marginata*), dry woodland, mallee shrublands, heaths, and desert, particularly in the south coast of WA. They also occur at lower densities in drier woodland and mallee shrubland in the goldfields and wheatbelt, as well as in Kalbarri National Park (translocated). Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) to survive (DEC 2012). In Jarrah Forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest (Van Dyck and Strahan 2008). The species can travel large distances, and for this reason requires habitats that are of a suitable size and not excessively fragmented.	**Possible.** There is a database record from the vicinity of Jandakot Regional Park approximately 3 km east of the survey area.	**Unlikely.** There is a recent database record from the survey area. This species is re-appearing in some areas of its former range in the wider Perth-Peel area due to feral predator control. However, the lack of extensive and connected suitable habitat on local scale obviates occurrence within survey area,	PMST, Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
						although may occur as transient of vagrant visitation.	
Falsistrellus mackenziei	Western False Pipistrelle	-	P4	The Western False Pipistrelle occurs in wet sclerophyll forest dominated by Karri (*Eucalyptus diversicolor*), and in the high rainfall zones of the Jarrah (*E. marginata*) and Tuart (*E. gomphocephala*) forests. The species is restricted to areas in or adjacent to stands of old growth forest. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (*E. calophylla*), Sheoak (*Casuarina huegeliana*) and Peppermint (*Agonis flexuosa*) trees are often co-dominant at its collection localities (Churchill, 2008).	**Possible.** There are occasional and historic local database records such as Harry Waring Marsupial Park. The survey area represents the north-western edge of the species' range.	**Unlikely.** The survey area lacks suitable and growth forest favoured by this species. However it is highly mobile and may occur occasional of vagrant fly-over.	DBCA, Naturemap
Hydromys chrysogaster	Rakali, Water-rat	-	P4	The Water Rat (Rakali) lives in the vicinity of permanent bodies of fresh, brackish, or marine water, lakes and farm dams, and on sheltered coastal beaches, mangroves and offshore islands. In the south-west of WA they have been shown to prefer areas with riparian vegetation, better water quality and a degree of habitat complexity. Woody debris, rock ledges and wetland islands are likely to be important areas for feeding and refuge (DEC 2012). It is an occasional vagrant to temporary waters. Water Rat's dens are made at the end of tunnels in banks and occasionally in logs (Van Dyck and Strahan 2008).	**Unlikely.** There are local records from attributed to database records along the Swan River and tributaries within 10 km of the survey area. However preliminary assessment of aerial imagery indicates survey area lacks suitable riparian habitat.	**Unlikely.** Based on the field assessment, the survey area lacks suitable riparian habitat.	DBCA, Naturemap
Isoodon fusciventer	Quenda	-	P4	The Quenda prefers dense scrubby, often swampy, vegetation with dense cover up to one metre high. However, it also occurs in woodlands, and may use less ideal habitat where this habitat occurs adjacent to the thicker, more desirable vegetation. The species often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland close to dense cover (Van Dyck & Strahan 2008).	**Known.** Numerous local DBCA records including locations within the survey area.	**Known.** Recorded during field survey from several foraging digs and scat.	Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
Myrmecobius fasciatus	Numbat	EN	EN	Current Numbat populations occupy several different habitat types: upland Jarrah Forest, open eucalypt woodland, banksia woodland and tall closed shrubland. The only remaining original subpopulations are at Dryandra Woodland and the Upper Warren area (including Tone Perup Nature Reserve, Greater Kingston National Park, and adjoining State Forest). In WA there are nine translocation sites, including Boyagin Nature Reserve, Tutanning Nature Reserve, Batalling block and Karroun Hill Nature Reserve (see DPaW 2015 for complete list and details). At Dryandra, numbats inhabit brown mallet (*Eucalyptus astringens*) plantations. Habitats usually have an abundance of termites in the soil, and hollow logs, tree hollows, burrows and branches for shelter (DEE, 2017; Van Dyck & Strahan, 2008).	**Highly Unlikely.** There are historical regional records, although the survey area is beyond the current range the species.	**Highly Unlikely.** There are historical regional records, although the survey area is beyond the current range the species.	Naturemap, DBCA
Notamacropus irma	Western Brush Wallaby	-	P4	The Western Brush Wallaby is found primarily in open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DEC, 2012b; Van Dyck & Strahan, 2008).	**Unlikely.** There are regional database records, however based on preliminary aerial assessment, there is no extensive connected remnant bushland intersecting with the survey area.	**Unlikely.** There is a lack of suitable connected habitat within the survey area. Occurrence would be vagrant occurrence at best.	Naturemap, DBCA
Phascogale tapoatafa wambenger	Brush-tailed Phascogale	-	CD	This species favours dry sclerophyll forests and open woodlands with a generally sparse ground-storey, which contain suitable nesting resources such as tree hollows, rotted stumps and tree cavities (Van Dyck and Strahan, 2008). It occurs more rarely in wetter forests. Dated sub-fossil remains (210 ± 300 years BP) from Balladonia (WA) and an isolated record from Kalgoorlie (WA) implies that its previous extent of occurrence was more extensive than currently thought in Wildlife Australia.	**Possible.** There is a historical local record from Harry Warring Marsupial Reserve 2km west of the survey area.	**Unlikely.** The survey area lacks sufficient extensive connected bushland to support this species. Any occurrence would be vagrant or occasional at best.	DBCA, Naturemap
Pseudocheirus occidentalis	Western Ringtail Possum	CR	CR	The Western Ringtail Possum occurs in and near coastal Peppermint Tree (*Agonis flexuosa*) forest and Tuart (*Eucalyptus gomphocephala*) dominated forest with a Peppermint Tree understorey from Bunbury to Albany. Also	**Highly Unlikely.** There are no local records and survey	**Highly Unlikely.** There are no local records and survey	PMST, DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				occurs in Jarrah (*Eucalyptus marginata*) forest and Jarrah-Marri (*Corymbia calophylla*) forest associated with Peppermint Tree (Van Dyck & Strahan 2008).	area is beyond the species' range.	area is beyond the species' range.	
Setonix brachyurus	Quokka	VU	VU	The current distribution of the Quokka includes Rottnest and Bald Islands, and at least twenty-five sites on the mainland, including Two Peoples Bay Nature Reserve and Torndirrup, Mt Manypeaks and Walpole-Nornalup National Parks, and swamp areas through the south-west forests from Jarrahdale to Walpole. The last known population on the Swan Coastal Plain occurs in Muddy Lakes near Bunbury. Quokkas have also been reintroduced to Karakamia Sanctuary (DEC 2012). They occupy dense forests and thickets, streamside vegetation, heaths, shrublands, Agonis linearifolia-dominated swamps in the Jarrah (*Eucalyptus marginata*) forest, and sometimes tea-tree thickets on sandy soils along creek systems. The northern extent on the mainland is in the Jarrah forest immediately south-east of the Perth metropolitan area, from where it extends southward through the southern Jarrah, Marri and Karri forests to the south coast, but largely confined throughout to areas receiving an annual rainfall of 1,000 mm or more (DEC 2012; Van Dyck and Strahan 2008).	**Highly Unlikely.** There are no local records and survey area is beyond the species' range.	**Highly Unlikely.** There are no local records and survey area is beyond the species' range.	PMST,
REPTILES							
Lerista lineata	Perth Slider	-	P3	A slender species of skink endemic to Western Australia with two digits on forelimbs, three on hindlimbs, fused eyelids and broad, black lateral stripe. This species has a strong habitat preference for sandy, coastal heath and shrubland, particularly between Perth and Mandurah (Wilson & Swan, 2013). Occurs in remnant bushland areas and also recorded in disturbed areas such as residential land.	**Likely.** Several database records in close proximity to survey area (within and suitable remnant bushland habitat likely to occur.	**Likely.** Several database records in close proximity to survey area (within 1-3 km) and suitable remnant bushland habitat to occur.	Naturemap, DBCA
Neelaps calonotos	Black Striped Snake	-	P3	A small species of mildly venomous, burrowing snake species, reaching a maximum length of 280mm. Body colour is bright orange with a distinct black dorsal stripe extending full length from nape to tail tip. Feeds on fossorial skinks such as Lerista species that it hunts in loose sand and leaflitter. Given the strong burrowing characteristics of the species, it is restricted to sandy dune and sand plain, in areas which are dominated by Eucalypt and Banksia	**Possible.** Known to occur locally including recent database record 5km NE of the survey area.	**Likely.** Locally recorded and suitable habitat occurs within the survey area such as The Spectacles bushland reserve where area native	Naturemap, DBCA

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				woodlands (Wilson & Swan, 2013). Suitable habitat includes remnant bushland areas of sufficient habitat quality and area to support a subpopulation. It is endemic to the Coastal Plain between Mandurah and Lancelin (Wilson & Swan, 2013).		vegetation is of adequate size to support this species.	
INVERTEBRATE							
Idiosoma sigillatum	Swan Coastal Plain Shield-backed Spider	-	P3	This spider was recently described as part of a revision of Shield-back Trapdoor spider group (Rix et.at 2018). It has a relatively widespread distribution along the Swan Coastal Plain (SCP) of south-western Western Australia, from Dalyellup north to at least Ledge Point (including Rottnest Island and Garden Island. The eastern limit of its range along the sandy foothills of the Darling Escarpment, from Boyanup north to at least Gingin. Preferred habitat appears to be Banksia woodland and heathland on sandy soils. The vertical burrows are enhanced with a typical 'moustache-like' arrangement of twig-lines (Figs 16, 17). There are many early WAM since 1939 spread widely across the SCP but the expansion of Perth has significantly reduced and fragmented its former habitat area.	**Possible.** Several local and regional records including Beeliar area located 3 km northwest of the survey area.	**Likely.** The survey area intersects with suitable banksia woodland habitat in Anketell in the vicinity of the Spectacles Wetland area. Even thought it was not detected during the field survey, it is likely to occur in remnant patches of Banksia woodland such as The Spectacles.	DBCA, Naturemap
Leioproctus contrarius	Short-tongued bee species	-	P3	The ecology of this little native bee is not well documented. It is known to be associated with *Scaevola repens* and *Lechenaultia* spp. (Houston 2000).	**Possible.** There is a recent record from Forrestdale approximately 8 km east of survey area.	**Likely.** Based on field assessment host plants *Scaevola repens* is present, and *Leschenaultia* species also present within the survey area.	DBCA
Synemon gratiosa	Graceful Sun Moth	-	P4	This sun moth is endemic to the Swan Coastal Plain. Previously thought to be restricted to a the Perth-Peel, its range has been extended from about Bunbury to Kalbarri. Host plants include *Lomandra hermaphrodita* found in *Banksia* woodlands of Bassendean Dunes, and *Lomandra matitima* which is common on coastal Quindalup Dunes. The moth completes its metamorphosis and emerges as adult moth in early Autumn (early March) and is active for several weeks to mate and complete life cycle before mortality. Eggs	**Possible.** Several local records from Perth-Peel region in areas of remnant Banksia woodland.	**Likely.** Host plants species namely *Lomandra hermaphrodita* recorded within the survey area, therefore the species is likely to occur.	DBCA, Naturemap

Taxon	Common Name	Status		Description and Habitat Requirements	Pre-survey likelihood	Post-survey likelihood	Source
		EPBC Act	BC Act /DBCA				
				are laid on host plants, and the larvae (grubs) remain in the plant for several years before reaching maturity.			
Throscodectes xiphos	Stylet Bush Cricket	-	P1	The ecology of this species is poorly known. The Stylet Cricket is a member of the diverse Katydid Family: Tettigoniidae and is endemic to the Swan Coastal Plain. The holotype of *Throscodectes xiphos* was collected from Banksia woodland located at Cutler Road, Jandakot on the Bassendean complex where it was originally collected in the axial leaf bases of grass trees (*Xanthorrhoea preissei*). It is a Confirmed SRE species and is currently classified by DBCA as a Priority 1 species (Rentz.1993).	**Possible.** Known to occur locally.	**Likely.** Potentially suitable Banksia woodland habitat within the survey area.	DBCA, Naturemap
Westralunio carteri	Carter's Freshwater Mussel	VU	VU	Carter's Freshwater Mussel is usually found in freshwater river pools. They are most common in areas with muddy, silty and sandy bottoms and flowing permanent water. Environmental tolerances of *W. carteri* are not precisely known but they can be found where water temperatures range from 4° C to over 30° C. The species has a low tolerance to salinity. It formerly occurred widely through the southwest including interior rivers of southwest such as Avon, Murray and Blackwood, however Salination of many waterways has rendered these waterways unsuitable which has severely reduced this species' distribution.	**Possible.** There are local records within 10 km of the survey area, however Based	**Unlikely.** The survey area lacks suitable waterway habitat.	PMST, Naturemap, DBCA

Appendix F

Wetland assessment

Wetlands of the survey area

Preliminary wetland assessment

Wetlands of the survey area

No.	UFI	Name	Category	Evaluated	Reason not evaluated
1	6664	Mandogalup Swamp Mid Nth	Resource Enhancement	Yes	N/A
2	12981	Mandogalup Swamp South	Conservation	Yes	N/A
3	14663	Mandogalup Swamp Mid Sth	Conservation	Yes (as part of neighbouring wetland 15584)	N/A
4	15397	Unknown	Conservation	Yes	N/A
5	15399	Unknown	Conservation	Yes (as part of neighbouring wetland 15397)	N/A
6	15584	Mandogalup Swamp Mid Sth	Conservation	Yes	N/A
7	15968	Unknown	Conservation	Yes	N/A
8	15970	Unknown	Conservation	Yes	N/A
9	15973	Unknown	Conservation	Yes	N/A
10	6530	Mandogalup Swamp South	Multiple Use	No	Aerial imagery shows the wetland has been cleared for agriculture
11	6652	Unknown	Multiple Use	No	Aerial imagery and ground truthing showed the wetland has been predominately cleared and is now a modified drainage area.
12	6655	Unknown	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads
13	6656	Unknown	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads.
14	6665	Unknown	Resource Enhancement	No	Aerial imagery shows the wetland has been predominantly cleared for housing and roads. The remaining remnant portion of the wetland is not reliant on the portion that occurs within the survey area.
15	6719	Mandogalup Swamp North	Resource Enhancement	No	Aerial imagery shows the wetland has been predominantly cleared for housing and roads. The remaining remnant portion of the wetland is not reliant on the portion that occurs within the survey area..
16	6724	Mandogalup Swamp North	Resource Enhancement	No	Aerial imagery shows the wetland has been predominantly cleared for housing and roads. The remaining remnant portion of the wetland is not

No.	UFI	Name	Category	Evaluated	Reason not evaluated
					reliant on the portion that occurs within the survey area.
17	13966	Unknown	Multiple Use	No	Aerial imagery shows the portion of the wetland within the survey area has been already cleared and is revegetation
18	14662	Mandogalup Swamp North	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads.
19	15297	Unknown	Resource Enhancement	No	Aerial imagery shows the wetland has been cleared for housing and roads.
20	15298	Unknown	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads.
21	15395	Unknown	Not Applicable	No	Aerial imagery shows the wetland has been cleared for housing and roads..
22	15398	Unknown	Multiple Use	No	Aerial imagery shows the wetland has been predominantly cleared for housing and roads. The remaining remnant portion of the wetland is not reliant on the portion that occurs within the survey area..
23	15521	Baler Court	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads.
24	15583	Mandogalup Swamp Mid Sth	Multiple Use	No	Aerial imagery shows the wetland has been cleared for housing and roads.
25	15585	Mandogalup Swamp Mid Sth	Conservation	No	Aerial imagery shows the portion of the wetland within the survey area has been already cleared and is revegetation
26	15799	Unknown	Multiple Use	No	Aerial imagery shows the portion of the wetland within the survey area has been already cleared and is revegetation or road.
27	15801	Unknown	Resource Enhancement	No	The portion of the wetland within the survey area is dryland revegetation. The remaining remnant portion of the wetland is not reliant on the portion that occurs within the survey area

No.	UFI	Name	Category	Evaluated	Reason not evaluated
28	15967	Unknown	Not Applicable	No	Dryland; assigned category N/A.
29	15969	Unknown	Not Applicable	No	Dryland; assigned category N/A.
30	15971	Unknown	Not Applicable	No	Dryland; assigned category N/A.
31	15972	Unknown	Not Applicable	No	Dryland; assigned category N/A.
32	15976	Unknown	Multiple Use	No	Aerial imagery shows the wetland has been cleared and is now vacant grassland
33	15981	Unknown	Multiple Use	No	A highly modified drainage area. That aerial imagery and ground truthing showed holds no remaining wetland functions.
34	16021	Unknown	Multiple Use	No	A larger MUW that has been cleared for urban development.

Preliminary wetland evaluation

No.	Criteria	Wetland UFI							Comments
		6664	12981	15397 (inc. 15399)	15584 (inc. 14663)	15968	15970	15973	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include: The Ramsar Convention on Wetlands State Government endorsed candidate sites for the Ramsar Convention on Wetlands Directory of Important Wetlands in Australia National Heritage List or equivalent.	N	N	N	N	N	N	N	A search of the EPBC Protected Matters Database did not identify any of these features within the survey area (DCCEEW, 2024a). There are no Directory of Important Wetlands in Australia (DBCA, 2018) or National Heritage List sites (DCCEEW, 2024b) located within the survey area, however Spectacles Swamp (0.2 km west of the survey area) is listed on the Directory of Important Wetlands of Australia. The closest Ramsar-listed wetland is Thomson Lake (1.3 km west) (DBCA, 2017c).
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined by Keighery (1994) and is identified as significant for its natural values under one or more of the following: Conservation Reserves for Western Australia Systems 1, 2, 3, 5 Conservation Reserves for Western Australia, The Darling System – System 6 A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries	N	N	N	N	N	N	N	There are no Conservation Reserves for Western Australian Systems 1 to 6 within the survey area, however there are several EPA Redbook Recommended Conservation Reserves within two kilometres of the survey area (DBCA, 2017b, 2024b). The survey area is not located in the Busselton-Walpole region. No sites listed in The Environmental Significance of Wetlands in the Perth to Bunbury Region intersect the survey area (LeProvost,

No.	Criteria	Wetland UFI							Comments
		6664	12981	15397 (inc. 15399)	15584 (inc. 14663)	15968	15970	15973	
	of the Busselton – Walpole Region The Environmental Significance of Wetlands in the Perth to Bunbury Region Bush Forever, Swan Bioplan (including Peel Regionally Significant Natural Areas) or equivalent.								Semeniuk & Chalmer Environmental Consultants, 1987). The survey area does intersect Bush Forever site 270, however this site is not mapped as a geomorphic wetland (DBCA, 2024c; DPLH, 2019). No sites listed in the Swan Bioplan intersect the survey area (EPA, 2013).
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, *Environment Protection and Biodiversity Conservation Act 1999*, migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the *Wildlife Conservation Act 1950*).	N	N	N	N	N	N	N	Of all State or Federally listed fauna species which have been previously recorded or are considered likely to occur in the survey area, none are likely to extensively use the wetland habitats available. Peregrine Falcon (OS) and the three black cockatoo species (EN, VU) may utilise the habitat for occasional feeding, but no evidence of breeding or roosting was observed. There are 23 species of Migratory shorebirds known to occur in local RAMSAR sites and other local wetlands, however this habitat is not extensive shallow water or tidal coastal/estuarine shoreline. Therefore, occurrence is considered unlikely.
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale	N	N	N	N	N	N	N	All wetlands evaluated are at least partially intersected by DBCA mapping of the Banksia Woodlands of the

No.	Criteria	Wetland UFI							Comments
		6664	12981	15397 (inc. 15399)	15584 (inc. 14663)	15968	15970	15973	
	outlined by Keighery (1994) and supports one or more of the following: an occurrence of a threatened ecological community a confirmed occurrence of a priority 1 or priority 2 ecological community a confirmed occurrence of a declared rare (threatened) flora species.								Swan Coastal Plain TEC buffer, however the field survey and statistical analysis of quadrats associated with these areas showed no affinities to the TEC. UFI 12981 is also intersected by mapping of the Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) TEC, however after a review of the field survey data and statistical analysis, the extent within the survey area is not considered representative of the TEC. No State or Federally listed flora were recorded within the survey area.
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined by Keighery (1994).	Y	Y	Y	Y	Y	Y	Y	As the shape of the survey area is a narrow road corridor, each wetland which intersects the survey area is not completely contained within it, and instead wetland-associated quadrats were installed near the perimeter of a given wetland in roadside vegetation. The vegetation condition at these roadside locations is negatively affected by proximity to the road, and as such is typically not representative of the entire wetland. For each wetland assessed, at least 90% of the area supported

No.	Criteria	Wetland UFI							Comments
		6664	12981	15397 (inc. 15399)	15584 (inc. 14663)	15968	15970	15973	
									vegetation in Good or better condition.
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined by Keighery (1994) and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	N	N	N	N	N	N	A search of the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) Geoheritage Sites database did not identify any geoheritage sites within the survey area (DEMIRS, 2024). The closest mapped Geoheritage Site is approximately 16 km to the east of the Mundijong Road site (Point Peron) (DEMIRS, 2024). A search of the EPBC Protected Matters Database did not identify any of these features within the survey area (DCCEEW, 2024a).
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined by Keighery (1994) and meets one of the following:	N	N	N	N	N	N	N	All wetlands assessed are dominated by vegetation in Good or better condition, however:

No.	Criteria	Wetland UFI							Comments
		6664	12981	15397 (inc. 15399)	15584 (inc. 14663)	15968	15970	15973	
	≤ 10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	46.8%	32.8%	46.8%	46.8%	46.8%	46.8%	46.8%	46.8% of sumplands and 32.8% of damplands are assigned Conservation management category within the Swan Coastal Plain (DBCA, 2024c).
	≤ 10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	27.4%	27.4%	27.4%	27.4%	27.4%	27.4%	27.4%	27.4% of wetlands within the Jandakot consanguineous suite are assigned Conservation management category (DBCA, 2024c).
	≤ 10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	36.5%	37.0%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5% of sumplands and 37.0% of damplands within the Jandakot consanguineous suite are assigned Conservation management category (DBCA, 2024c).
	Best representative of its type within its consanguineous suite domain.	N	N	N	N	N	N	N	For all wetlands assessed, there are many larger wetlands within the associated consanguineous suite which would make better representatives (DBCA, 2024c).
Pre-existing category		REW	CCW	CCW	CCW	CCW	CCW	CCW	UFI 6664 meets the criteria to be upgraded from REW to CCW. All remaining wetlands fit within their pre-existing categories.
Re-evaluated category		**CCW**	CCW	CCW	CCW	CCW	CCW	CCW	

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Appendix 3: Risk Assessment

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
Direct impact causing loss of up to: • 3.04 ha Tuart TEC • 7.24 ha Banksia TEC • 16.24 ha of Moderate quality Carnaby's foraging habitat • 0.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC • 12 Potential Black Cockatoo trees, without hollows	Authorised clearing of vegetation and fauna habitat with the PAA.	The scale and nature of the potential impact is known and predictable based on surveys within the PAA, undertaken in accordance with EPA and Commonwealth guidance (GHD, 2025a,b). High confidence in prediction of direct impacts within PAA. Potential to reduce clearing impacts during detailed design, planning and construction; however, this cannot be quantified at this stage.	Reduction of direct impacts through planning, design and construction to minimise impacts to MNES within the PAA.	Likely	Moderate	Medium
Direct impact causing loss exceeding: • 3.04 ha of Tuart TEC • 7.24 ha of Banksia TEC • 16.24 ha of Moderate quality	Unauthorised clearing of native vegetation outside of PAA.	The nature of potential impact is known and predictable based on surveys in land adjacent to the PAA, undertaken in accordance with EPA and Commonwealth guidance (GHD, 2025a,b). The scale of potential impacts is unpredictable as it relates to unauthorised clearing; however, should it occur it is only likely to be isolated and of a much smaller scale than the	Identification and demarcation of clearing area boundaries. Pre-clearing inspection of boundaries prior to clearing works. Temporary construction areas will be located in	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
Carnaby's foraging habitat • 10.92 ha of Moderate – High, 8.43 ha of Low – Moderate and 6.89 ha of Low quality foraging habitat for FRTBC • 12 Potential Black Cockatoo trees, without hollows		authorised clearing. Rehabilitation will be undertaken in impacted areas so the impacts are reversed. Black Cockatoo foraging habitat is expected to establish within rehabilitated areas in the mid-term (10+ years) and breeding trees in the long term (100+ years). Tuart TEC and Banksia TEC can be established in the mid-term (15-20 years). High confidence in prediction of nature of impacts and moderate confidence in prediction of scale of impacts.	existing cleared areas, areas to be cleared for permanent works, or in areas devoid of MNES.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Organic Mounds TEC • Habitat for Black Cockatoos	Construction plant, equipment and soil movement introducing or spreading weeds to uninfested vegetation. Unauthorised site access introducing or spreading weeds to uninfested vegetation.	The nature of potential impact is known and predictable based on surveys undertaken in PAA and Contextual area (GHD, 2025a,b). GHD identified Declared Plants, WONS and environmental weeds, and mapped locations of Declared Plants and WONS within the PAA. There is an existing high weed load in the local environment. The scale of the potential impact is expected to be within the area of vegetation that lies between the PAA and un-vegetated areas (e.g. roads, cleared land) in the urban environment. The impact from weeds is reversible with using established methods (e.g. mechanical removal, targeted herbicide, replanting native species).	Declared Plants within the PAA will be treated according to WA Government advice, with the aim of eradication where possible but as a minimum prevent off site movement. WoNS and environmental weeds within the PAA will be treated according to Weeds Australia guidance with the aim of controlling off-site movement. Topsoil containing	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
		High confidence in prediction of nature of impacts and moderate confidence in prediction of scale of impacts.	Declared Pests or WoNS will not be reused in landscaping or revegetation, without prior treatment. Hygiene controls will be applied to machinery and vehicles to manage spread of weeds within and outside the PAA.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Habitat for Black Cockatoos	Construction plant, equipment and soil movement introducing or spreading dieback to uninfested vegetation. Unauthorised site access introducing or spreading dieback to uninfested vegetation.	The nature of potential impact is unknown and unpredictable as no dieback surveys have been undertaken for PAA and adjacent land. A survey has been commissioned to confirm this and will inform management actions during construction and operation. The scale of the potential impact is expected to be within the area of native vegetation that lies adjacent to and offsite from the PAA. The impact from dieback is considered effectively irreversible. Phosphite treatment is effective at controlling the spread and impact of dieback in infested areas for periods of up to five years. Low confidence in prediction of nature of impacts and low confidence in prediction of scale of impacts.	Hygiene controls will be applied to machinery and vehicles (including inspection and preventative treatment) to manage to potential spread of dieback containing material (vegetation and soil).	Unlikely	Moderate	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
Indirect impacts to condition of adjacent native vegetation including: • Banksia TEC • Organic Mounds TEC • Habitat for Black Cockatoos	Construction water abstraction and dewatering causing groundwater drawdown.	The nature of the potential impact is known as Conservation Advice (TSSC, 2016) states the dominant Banksia species of the Banksia TEC are vulnerable to impact from groundwater lowering. Assemblages associated with Organic Mounds TEC are also vulnerable to decline in groundwater levels (DCCEEW, 2023). The impact is expected to be temporary only and reversible as groundwater levels will recover once groundwater abstraction and/or dewatering ceases. Water abstraction and dewatering is not expected within proximity to adversely impact Organic Mounds TEC in proximity to the PAA. Potential impacts to ecological communities are expected to recover as groundwater levels return to baseline levels within intensive efforts. Moderate confidence in prediction of nature and scale of impacts.	Groundwater level baseline monitoring is occurring with the PAA to inform construction methods and management requirements. Required licence applications for groundwater abstraction and dewatering will consider potential impacts. Construction groundwater abstraction will not occur within 800 m of the Organic Mounds TEC occurrence Wandi01 or CSQ2 to ensure a negligible impact occur. If groundwater drawdown is found to be adversely impacting ecological communities, remedial measures (e.g. infiltration trenches, diaphragm walls) will be implemented to restore groundwater levels.	Unlikely	Minor	Low
Indirect impacts to condition of adjacent	Surface water runoff and spills	The nature of the potential impact is known as construction will involve ground disturbance,	Temporary erosion and sediment controls will be	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
native vegetation including: • Tuart TEC • Banksia TEC • Organic Mounds TEC • Habitat for Black Cockatoos	during construction causing erosion, sedimentation and/or contamination.	generation of wastes and use of hazardous materials (e.g. diesel fuel), and may occur adjacent to MNES habitat. The scale of the potential impact is unpredictable as it relates to major storm or spill events, however it is expected to be localised to land in the vicinity of the PAA and readily manageable as impacts will be immediately evident. The impact is expected to be reversible as erosion; sediment deposition and contamination can be remediated with established technologies. Moderate confidence in prediction of nature and scale of impacts.	maintained within the PAA during construction to prevent stormwater runoff from construction areas from eroding or causing sediment deposition in adjacent native vegetation. Waste and hazardous materials management measures will be implemented in construction to prevent contaminant discharges to adjacent native vegetation. No storage of waste or hazardous materials within 50 m of drainage lines to avoid potential for impact in an unplanned event (e.g. spill or storm).			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Organic Mounds	Accidental fires caused by construction activities.	The nature of the potential impact is known, as the Banksia TEC are known to be vulnerable to more frequent/intense fire regimes. Organic Mounds TEC as also sensitive to altered fire regimes. Other MNES are expected to be resilient to fire in the urban environment. The scale of the potential impact is expected to	Hot work will be undertaken in accordance standard construction site procedures. Vehicles, plant and equipment to be fitted with fire extinguishers and	Rare	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
TEC • Habitat for Black Cockatoos		be within vegetated areas immediately adjacent and connected to the PAA, with un-vegetated areas (e.g. roads, cleared land) acting as an effective firebreak and fire suppression lines in the urban environment. Construction fires resulting from hot works are expected to be immediately bought under control with standard construction site and procedural controls. The locality of the PAA is such that fire emergency response for large scale fires would be prompt so as to minimise the risk of a large scale bushfire. The impact from fires is expected to be reversible through recovery of most vegetation that is adapted to fires. Moderate confidence in prediction of nature and scale of impacts.	restricted to designated cleared areas unless involved in clearing operations. Fire danger ratings and Local Government vehicle movement bans will be followed during the construction works. These ratings and bans are not relevant to operation.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Habitat for Black Cockatoos	Disturbance of known or existing ASS and/or contaminated sites caused by construction activities.	The nature of the potential impact is known as existing contaminated sites and areas of high risk ASS are known within the PAA and are adjacent to MNES habitat. There is no known contamination present in the PAA, and any present is likely to be associated with fly tipping based on land use adjacent to the PAA. The scale of the potential impact is unpredictable for ASS as it is dependent on the location and extent of excavation, dewatering	Excavation and dewatering will be avoided where possible in areas of high risk ASS. Where these activities are required, appropriate controls will be incorporated to manage potential adverse impacts. Construction bore locations to be outside of high and	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
		and groundwater abstraction activities in relation to higher risk ASS occurrence. However, the scale of the impact is expected to be localised to land in the vicinity of the PAA and managed with established methodology. The impact is expected to be reversible as ASS (and contamination) can be remediated/managed with established technologies. Moderate confidence in prediction of nature and scale of impacts.	moderate risk areas. Unexpected contamination finds will trigger an appropriate response consistent with the *Contaminated Sites Act 2003* (WA).			
Injury or mortality to Black Cockatoo individuals.	Vehicle collision with birds during construction.	The nature of the potential impact is known, as the PAA contains and lies adjacent to Black Cockatoo habitat, and Black Cockatoos have been known to be killed through vehicle strike. The potential scale of the impact is unpredictable as it relates to unplanned events and bird/flock behaviour. Collisions are expected to impact individuals or small numbers of birds; however, the number of collisions is unpredictable. Construction controls such as limiting vehicles speeds and reducing water pooling on site are effective at reducing the likelihood and consequence of vehicle strike. The loss of a limited number of birds to mortality/injury over a temporary period is	Speed limits between 40-60km/hr will be applied throughout the construction site for safety purposes which will consequently reduce the risk of fauna strikes during construction. A list of local wildlife rescue organisations and carers will be maintained on site to contact in the event of fauna injury. Induction of construction personnel on reducing the risk of fauna injury and the	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
		considered reversible, as the population is expected to recover over time once construction is completed. Moderate confidence in prediction of nature and scale of impacts.	procedure in the event of fauna injury or death.			
Injury or mortality to Black Cockatoo individuals.	Clearing of active breeding trees during construction.	The nature of the potential impact is known, as the PAA contains no trees with hollows suitable for Black Cockatoo nesting that could potentially be used during construction. Furthermore, there are no known breeding records within the proximity of the PAA that are likely to be impacted by the Proposed Action. The scale of the potential impact is considered insignificant given the lack of breeding records in the vicinity. The likelihood of the of unknown Black Cockatoo breeding occurring is expected to be rare. The low risk of loss of a small numbers of birds to mortality/injury over a temporary period is considered reversible, as the population is expected to recover over time once construction is completed. High confidence in prediction of nature and scale of impacts.	Fauna observers will be employed for vegetation clearing.	Rare	Minor	Low
Disturbance of Black	Construction	The nature of the potential impact is known as	Construction works will be	Possible	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
Cockatoo individuals.	activities causing noise, light, vibration and dust emissions.	the PAA is adjacent to Black Cockatoo habitat and construction activities will result in noise, light, vibration and dust emissions. The scale of the potential impact is predictable as no Black Cockatoo breeding activity nor definitive evidence of breeding was observed within the PAA or surrounds during the surveys (GHD, 2025a,b). It is unlikely breeding will occur in adjacent vegetation during construction. Furthermore, no evidence of roosting was recorded within the PAA, with only one roost tree identified near the northern extent of the PAA, so limited exposure to the majority of the construction works. The disturbance of a limited number of birds from noise, light, vibration and dust emissions over a temporary period is considered reversible, as no population impacts are expected. High confidence in prediction of nature and scale of impacts.	undertaken in accordance with the Environmental Protection (Noise) Regulations 1997. Lighting will be directed toward the construction area and not into adjacent native vegetation, particularly The Spectacles. Dust emissions will be controlled through appropriate measures where practicable including hydro mulch, water application through water carts and chemical dust suppressants.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC	Surface water runoff from road surface during operation causing erosion,	The nature of the potential impact is known as the PAA will comprise upgraded freeway that will generate stormwater runoff, and lie adjacent to MNES habitat. The scale of the potential impact is	Drainage design will integrate Water Sensitive Urban Design principles. Drainage design will be implemented to maintain	Rare	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
• Banksia TEC • Organic Mounds TEC • Habitat for Black Cockatoos	sedimentation and/or contamination (additional impact above and beyond existing road).	unpredictable as it relates to major storm or spill events, however it is expected to be localised to land in the vicinity of the PAA, with the design giving consideration to infrequent storm events. The impact is expected to be reversible as erosion; sediment deposition and contamination can be remediated with established technologies and maintenance works. Moderate confidence in prediction of nature and scale of impacts.	existing modified hydrological flow regimes and control stormwater run-off.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Organic Mounds TEC • Habitat for Black Cockatoos	Fires intensity increased by weed growth or fuel build up in road verge during operation.	The nature of the potential impact is known, as the Banksia TEC and Organic Mounds TEC is known to be vulnerable to more frequent fire regimes. Other MNES are expected to be resilient to fire in the urban environment. The scale of the potential impact is expected to be within vegetated areas immediately adjacent and connected to the PAA, with un-vegetated areas (e.g. roads, cleared land) acting as an effective firebreak and fire suppression lines in the urban environment. The locality of the PAA is such that fire emergency response for large scale fires would be prompt so as to minimise the risk of a large scale bushfire.	Regular maintenance of road verge during operations to treat weeds and reduce fuel build up consistent with current maintenance programs. Incorporation of Intelligent Transport Systems in the freeway network, including the Proposed Action will improve response times for notifying and information emergency fire services.	Rare	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
		The impact from fires is expected to be reversible through recovery of most vegetation that is adapted to fires. Moderate confidence in prediction of nature and scale of impacts.				
Injury or mortality to Black Cockatoo individuals	Vehicle collision with birds during operations (additional impact above and beyond existing road)	The nature of the potential impact is known, as the PAA lies adjacent to Black Cockatoo habitat and Black Cockatoos have been known to be killed through vehicle strike. The scale of the potential impact is unpredictable as it relates to unplanned events and bird/flock behaviour. Collisions are expected to impact individuals or small numbers of birds; however, the frequency of collisions is unpredictable. The ongoing loss of birds to mortality/injury is considered to be effectively irreversible, as the population will be continually affected by vehicle movements over the long term. However, the additional impact above the existing road attributed to the Proposed Action is expected to be insignificant. Moderate confidence in prediction of nature and scale of impacts.	Revegetation within the PAA that is within 10 m of the road seal will not be planted with Black Cockatoo foraging species. Road design will avoid water pooling on the road surface and shoulders to minimise vehicle aquaplaning, which will remove a potential water source for birds.	Unlikely	Minor	Low
Disturbance of Black Cockatoo individuals.	Operation of the road causing	The nature of the potential impact is known as the PAA is adjacent to Black Cockatoo habitat	Road lighting will be implemented in accordance	Unlikely	Minor	Low

Impact	Cause	Is the scale and/or nature of the impact unknown, unpredictable or irreversible? Level of uncertainty	Summary of Mitigation	Residual Risk		
				Likelihood	Consequence	Risk rating
	noise and light emissions (additional impact above and beyond existing road).	and operation of the road will result in noise (traffic) and light (headlights and street lighting) emissions. No significant vibration or dust emissions are anticipated during operation. The scale of the potential impact is predictable as no Black Cockatoo breeding activity nor definitive evidence of breeding was observed within the PAA or surrounds during the surveys (GHD 2025a.b). Furthermore, no evidence of roosting was recorded within the PAA, with only one roost tree identified near the northern extent of the PAA, in close proximity to the existing road. The ongoing disturbance is considered to be effectively irreversible, as the population will be continually affected by vehicle movements over the long term. However, the incremental increase in impact associated with the Proposed Action is considered negligible. High confidence in prediction of nature and scale of impacts.	with Main Roads Lighting Design Guideline for Roadway and Public Space and relevant Australian Standards.			