



mainroads
WESTERN AUSTRALIA

*We're working for
Western Australia.*

Kwinana Freeway Upgrade (Roe Highway to Mortimer Road)

EPBC 2015/10266 Preliminary Documentation

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) 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) of approximately 175 ha has been established. Although the Proposed Action will require the clearing of approximately 66.52 ha of vegetation, only 13.54 ha is native vegetation, 5.51 ha of the vegetation within the PAA is considered to be in good or better condition, with more than 90% of the PAA being Cleared or Completely Degraded. The majority of the vegetation within the PAA is revegetation, following the construction of previous freeway works during the 1990s and 2000s.

The Proposed Action will impact up to 3.04 ha of Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain Threatened Ecological Community (Tuart TEC), of which 2.17 ha is mapped as Degraded to Completely Degraded. All Tuart trees within the Tuart TEC within the PAA are less than 500mm DBH and occur mostly within degraded roadside vegetation with the remainder located within the 30 m Tuart canopy buffer. Impact will occur only along the edges of three Tuart TEC patches and will not fragment or significantly affect the quality or viability of the TEC..

The Proposed Action will impact up to 10.58 ha of Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC), with 6.67 ha mapped as Degraded to Completely Degraded condition. The Banksia TEC clearing will be contained to the edges of five patches. The Proposed Action will not fragment any patches, with all patches remaining viable.

The Proposed Action will not impact any High-quality foraging, roosting or breeding habitat. Avoidance and minimisation measures have resulted in only 16 large trees (DBH above 500 mm) being impacted within the 20 km corridor. Although all High-quality foraging habitat has been avoided, the Proposed Action will impact 0.15 ha of Moderate – High, and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for Forest Red-tailed Black Cockatoo. While the majority of the PAA is already cleared or degraded, the impacts to MNES, may be considered significant, accordingly offsets are proposed to mitigate these impacts.

Contents

EXECUTIVE SUMMARY	2
1 INTRODUCTION	7
1.1 Overview of the Proposed Action	7
1.1.1 Background and justification	7
1.2 Purpose and Scope of this Documentation	7
1.3 Variations to the Proposed Action	8
1.4 Proponent	9
2 PRELIMINARY DOCUMENTATION	10
2.1 Overview	10
2.2 Key definitions	10
3 DESCRIPTION OF THE ACTION	11
3.1 Location and extent	11
3.2 Components and Phases	11
3.3 Phase Activities	11
3.3.1 Preconstruction	11
3.3.2 Construction	11
3.3.3 Operation	12
3.4 Commencement of Proposed Action	12
3.5 Description and timing of rehabilitation activities	12
3.6 Feasible Alternatives to the Proposed Action	12
4 DESCRIPTION OF THE ENVIRONMENT	14
4.1 Existing land use	14
4.1.1 Conservation reserves and estates	14
4.2 Topography	14
4.3 Geology	14
4.4 Soils	15
4.5 Groundwater	15
4.6 Wetlands	15
4.7 Vegetation and Flora	16
4.7.1 Broad vegetation	16
4.7.2 Vegetation types and condition	18
4.7.3 Flora	25
4.7.4 Introduced and invasive species	25
4.7.5 Dieback	25
4.8 Fauna	25
5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	30
5.1 Surveys and studies	30

5.2	Consideration of Matters within the PAA	32
5.2.1	Threatened orchids – further discussion to support likelihood assessment.....	43
5.2.2	Organic Mounds TEC– further discussion to support likelihood assessment	44
5.3	Threatened Ecological Communities	46
5.3.1	Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the SCP TEC.....	46
5.3.2	Banksia Woodlands of the Swan Coastal Plain TEC	48
5.4	Threatened Flora	50
5.4.1	Grand Spider Orchid (<i>Caladenia huegelii</i>)	50
5.4.2	Dwarf Bee Orchid (<i>Diuris micrantha</i>)	51
5.4.3	Gloss-Leaved Hammer Orchid (<i>Drakaea elastica</i>)	53
5.5	Threatened Fauna	55
5.5.1	Carnaby’s Cockatoo	55
5.5.2	Forest Red-tailed Black Cockatoo.....	57
6	ASSESSMENT OF IMPACTS	60
6.1	Summary of impacts	60
6.1.1	Direct impacts	60
6.1.2	Indirect impacts	60
6.1.3	Cumulative impacts	61
6.2	Tuart TEC	64
6.2.1	Direct impacts	64
6.2.2	Indirect impacts	65
6.2.3	Assessment of significance.....	68
6.3	Banksia TEC.....	71
6.3.1	Direct impacts	71
6.3.2	Indirect impacts	73
6.3.3	Assessment of significance.....	76
6.4	<i>Caladenia huegelii</i> , <i>Diuris micrantha</i> and <i>Drakaea elastica</i>	79
6.4.1	Direct impacts	79
6.4.2	Indirect impacts	79
6.4.3	Assessment of significance.....	80
6.5	Black Cockatoos	80
6.5.1	Direct impacts	80
6.5.2	Indirect impacts	82
6.5.3	Assessment of significance.....	85
7	RISK ASSESSMENT	92
8	AVOIDANCE AND MITIGATION MEASURES.....	94
8.1	Application of the mitigation hierarchy	94
8.2	Impact avoidance.....	94
8.3	Performance standards	96
8.4	Management measures	98

8.5	Effectiveness of avoidance and mitigation measures	102
9	RESIDUAL IMPACTS AND OFFSETS	103
9.1	Residual impacts	103
9.2	Acceptability of residual impacts.....	103
9.3	Proposed offset strategy.....	103
10	ECOLOGICALLY SUSTAINABLE DEVELOPMENT	104
11	ECONOMIC AND SOCIAL MATTERS	106
11.1	Projected Economic Costs and Benefits and Basis for Estimation	106
11.1.1	Costs and Benefits	106
11.2	Potential Employment Opportunities	106
11.3	Aboriginal Peoples Participation	106
11.4	Details of Public and Stakeholder Consultation Activities.....	108
11.4.1	Stakeholders	108
11.4.2	Stakeholder engagement process	108
12	ENVIRONMENTAL RECORD OF THE PERSON PROPOSING TO TAKE THE ACTION	111
13	INTERNATIONAL OBLIGATIONS	112
14	OTHER APPROVALS AND CONDITIONS	113
14.1	<i>Environmental Protection Act 1986, Part IV</i>	113
14.1.1	Ministerial Statement 663.....	113
14.1.2	Ministerial Statement 069.....	113
14.2	<i>Environmental Protection Act 1986, Part V Environmental Regulation – Clearing of Native Vegetation</i>	113
14.3	Other approvals and regulation	113
14.4	Planning approvals	114
15	APPLICATION OF RECOVERY PLANS AND THREAT ABATEMENT PLANS	115
16	INFORMATION SOURCES.....	126
17	REFERENCES	128
18	APPENDICIES	134
	Appendix 1: Figures.....	135
	Appendix 2: RFI Tables	137
	Appendix 3: Risk Assessment	152
19	ATTACHMENTS	169

Document Control

Report Compilation & Review	Author	Approved	Document Revision	Date
Final	WR IPT	Main Roads (reviewed)	0	April 2026
Revised	WR IPT	Main Roads (reviewed)	1	June 2026

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) 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 Proposed Action Area (PAA) is shown in Figure 1.

1.1.1 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. 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 growth and facilitate future economic opportunities.

The upgrade will:

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

1.2 Purpose and Scope of this Documentation

In August 2025, Main Roads referred the Kwinana Freeway Upgrade (Roe Highway to Mortimer Road) to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 5 December 2025, the Proposed Action was determined to be a controlled action, to be assessed by Preliminary Documentation (PD). The relevant Matters of National Environmental Significance (MNES) were listed as threatened species and communities (sections 18 and 18A). On 19 November 2025, DCCEEW requested additional information (RFI) to support the PD. This document addresses the RFI and PD requirements and includes RFI items from:

- Table A – information received in response to requests for additional information under Section 95A(2)
- Table B – specified information included in the original referral application
- Table C – DCCEEW's content, style and formatting requirements.

The RFI items and specific sections of this report where they are addressed is provided in Appendix 2.

1.3 Variations to the Proposed Action

Subsequent to the controlled action decision, Main Roads requested an amendment to the PAA in February 2026 which was subsequently approved in April 2026.

The PAA was originally developed early in the design process with design being further refined since the referral was submitted. In addition the PAA is within an already constrained urban environment with residential and commercial properties surrounding the existing Freeway as well as intersecting rail infrastructure limiting the addition of design elements to the median. Existing infrastructure will be optimised where possible to minimise MNES impacts, with a large portion of the PAA still located within existing cleared areas.

This amendment was required to allow for:

- Increased ramp storage, accommodating predicted future traffic volumes
- Inclusion of noise walls, reducing the impact of noise to nearby sensitive receptors
- Construction of items such as ramp metering signals in the ultimate design location, avoiding abortive works
- Optimisation of existing drainage basins and their storage capacity to accommodate predicted stormwater flows.

The amendment to the PAA resulted in an increase in the impact to Banksia TEC, particularly Patch BT03 and the request for variation was submitted to DCCEEW on 23 February 2026 and approved on 1 April 2026.

. The design north of Rowley Road was developed based on the following:

- Staying within the existing road reservation to limit impacts to adjacent vegetation, limit land acquisition and minimise impacts on existing Western Power infrastructure
- Main Roads and the Public Transport Authority worked together to minimise the width of the rail corridor where possible to reduce verge-side impacts due to inability to widen the Freeway into the median due to the Perth-Mandurah passenger rail line
- The on and off ramps are required to be reconstructed to ensure safe geometric standards due to the widening of the Freeway. The ramps need to transition from bridge level to freeway level while maintaining appropriate site lines in accordance with Austroads and Main Roads standards
- The provision for ramp signals is required for the realigned ramps to manage traffic flow onto the Freeway and support reliable journey times
- Incorporating a retaining wall into the design along the west side of the Rowley Road on-ramp in lieu of a typical 1:3 batter
- Relocation of the principal shared path (PSP) to the top and adjacent to the retaining wall for the Rowley Road on-ramp to minimise the width of infrastructure footprint and utilising the excavation area required for the construction of the ramp.

Plate 1 presents a typical cross section of the concept design at the Kwinana Freeway and Rowley

Road northbound entry ramp. This concept design is subject to change and will be further developed during the detailed design phase of the Proposed Action.

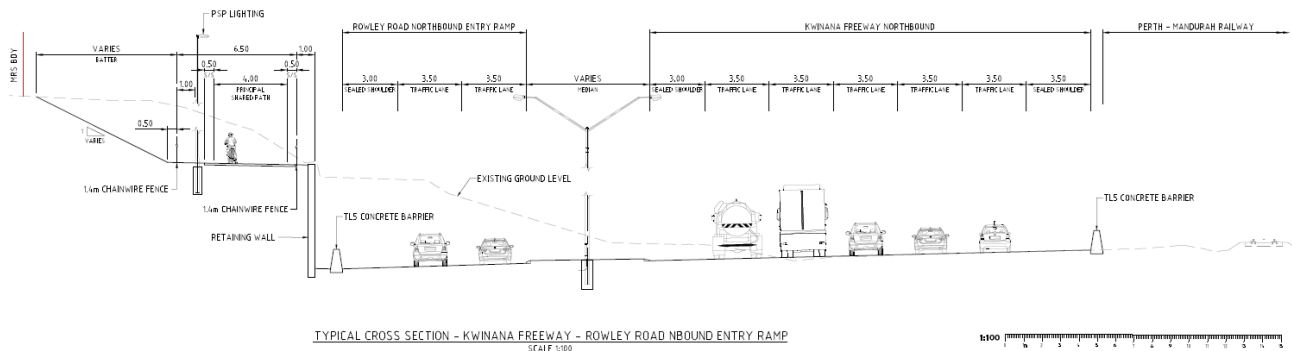


Plate 1 Typical cross section – Kwinana Freeway – Rowley Road north bound entry ramp

1.4 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.

Table 1-12: 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 PRELIMINARY DOCUMENTATION

2.1 Overview

Table 2-1 presents an overview of the key RFI items and responses. A detailed list of required information and responses is provided in Appendix 2.

Table 2-1: Request for Further Information

Content to be included	DCCEW (2024) RFI	Additional information attached	PD section number
Description of the action	Table A. 1 Table B. 1	Figure 1	Section 3
Description of the environment	Table B. 2	Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Attachment 7.	Section 4
Relevant Matters of National Environmental Significance	Table B. 3	Attachment 1, Attachment 2, Attachment 3, Attachment 4, Attachment 5, Attachment 6	Section 5
Baseline information	Table A. 1 Table B. 4	Attachment 1, Attachment 2, Attachment 3, Attachment 4, Attachment 5, Attachment 6	Section 5
Likely impacts	Table A. 2 Table B. 5	Attachment 9	Section 6
Proposed avoidance and mitigation measures	Table A. 3	Attachment 8	Section 8
Residual impacts and offsets	Table A. 4	Attachment 10	Section 9
Ecologically Sustainable Development	Table C. 1	-	Section 10
Economic and social matters	Table C. 2	-	Section 11
Environmental record of the person proposing the action	Table C. 3	-	Section 12
International obligations	Table C. 4	-	Section 13
Other approvals and conditions	Table C. 5	-	Section 14

2.2 Key definitions

Proposed Action area (PAA): The PAA comprises an area of 174.53 hectares (ha) and represents the boundary surrounding the Proposed Action within which all development will be contained. The PAA also represents the disturbance footprint for the Proposed Action. The PAA varies in width to accommodate intersection upgrades, drainage and vertical profile requirements and encompasses the existing Kwinana Freeway alignment. Biological surveys have been completed across the entirety of the PAA. The PAA is shown on Appendix 1 Figure 1.

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. The Proposed Action location and PAA are shown in Figure 1.

The Proposed Action comprises a PAA of 174.53 ha, including 13.54 ha of native vegetation, 57.74 ha of roadside revegetation and 103.73 ha of cleared areas. The Proposed Action will impact the following MNES:

- Clearing of up to 0.87 ha of Very Good condition and 2.17 ha of Degraded or worse condition Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain Threatened Ecological Community (Tuart TEC), .
- Clearing of up to 0.86 ha of Very Good to Excellent, 1.70 ha of Very Good condition, 2.19 ha of Good condition and 6.67 ha of Degraded or worse condition Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC), .
- Clearing of up to 0.15 ha of Moderate – High, and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo (*Zanda latirostris*)
- Clearing of up to 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptrorhynchus banksii naso*)
- Clearing of up to 16 Potential Black Cockatoo Breeding Trees (>500 mm at breast height), none with hollows.

The Proposed Action will not impact any trees suitable for Black Cockatoo breeding, or roosting , and will not impact any High quality Black Cockatoo foraging habitat. Although Tuart TEC will be impacted, this impact is limited to the vegetation within the 30 m buffer of the canopy of tuart trees. All large Tuarts (DBH greater than 500 mm) that form the Tuart TEC have been avoided.

3.2 Components and Phases

The Proposed Action involves the construction of additional northbound and southbound lanes, improvements to on and off ramps and the installation of safety barriers and drainage. The Proposed Action accommodates for noise mitigation works, improving the Principal Shared Path network and undertaking utility works.

3.3 Phase Activities

3.3.1 Preconstruction

The design will continue to be refined during the preconstruction phase, in order to minimise 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 that provide foraging habitat for Black Cockatoos, including but not limited to, *Banksia* spp., *Hakea* spp., *Grevillea* spp. and *Eucalyptus* spp.

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. 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. Increasing the capacity of the freeway is the only solution, as the surrounding development on both sides of Kwinana Freeway significantly restricts available space for an alternative route. The Metropolitan Region Scheme (MRS) road reserve has been in place for many decades, effectively locking in the alignment and preventing any substantial deviation or expansion beyond the existing corridor. Additionally, all interconnecting roads in the vicinity are already heavily utilised and experience regular congestion,

leaving them unable to accommodate further diverted traffic. As such, the existing freeway corridor remains the only viable option for addressing both current and future transport needs.

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 Proposed Action 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	172.14	98.64%
Urban (Land Tenure designated 'Road')	2.38	1.36%

4.1.1 Conservation reserves and estates

No conservation reserves intersect the PAA.

A total of 43 Department of Biodiversity Conservation and Attractions (DBCA) managed lands occur within 5 km buffer of the PAA, comprising 33 Crown freehold DBCA-managed lands, 3 conservation parks, six nature reserves and one Section 5(1)(h) reserve (DBCA, 2024a).

A group of reserves between the Spectacles and the Freeway are adjacent to the PAA 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 (160.43 ha of the PAA (91.92%))
- Warnbro Group: Interbedded sandstone, siltstone, and shale; minor conglomerate (14.10 ha of the PAA (8.08%)).

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 (139.19 ha of the PAA (79.75%)).
- Perth Coastal Zone (211): Coastal sand dunes and calcarenite. Late Pleistocene to Recent age. Calcareous and siliceous sands and calcarenite (35.34 ha of the PAA (20.25%)).

4.5 Groundwater

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

- Jandakot Groundwater Area (118.60 ha (67.96% of PAA))
- Serpentine Groundwater Area (55.93 ha (32.04% 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 identified 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). Thomsons 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.

Modelling of groundwater drawdown associated with groundwater abstraction during construction indicates the drawdown contour would not intersect the Thomsons Lake Ramsar site boundary and the risk of any impact to Thomsons Lake associated with groundwater abstraction is low (Main Roads, 2026). 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.

The desktop study identified 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). Thomsons 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.

Detailed groundwater modelling confirms predicted drawdown during construction remains well below thresholds that could impact Thomsons Lake ecological values (Main Roads 2026).

Additionally, the assessment found that the local aquifer is separated from Thomsons Lake by a combination of distance, geological barriers, and urban infrastructure, which significantly reduces

the potential for any indirect effects. No significant change in groundwater flow direction or volume towards the lake is expected, and monitoring during similar projects in the region has shown negligible impacts when best practice mitigation measures are applied. The lake's water regime is primarily sustained by rainfall and local runoff, further minimising any risk from the proposed works (Main Roads, 2026).

The groundwater modelling also showed changes to groundwater flow direction are predicted to be restricted to within approximately 300 m of the groundwater abstraction for construction water production bore location and would no influence groundwater flow within approximately 1000 m of the Ramsar site boundary.

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 wetlands in the vicinity of the PAA shown in Figure 5.

4.7 Vegetation and Flora

4.7.1 Broad vegetation

The PAA lies within the Swan Coastal Plain (SCP) 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.	3.63	23.72
1001: Medium very sparse Jarrah woodland with low woodland of Banksia and Casuarina.	170.90	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 <i>Eucalyptus gomphocephala</i> (Tuart) and open forest of <i>Eucalyptus gomphocephala</i> (Tuart) - <i>Eucalyptus marginata</i> (Jarrah) - <i>Corymbia calophylla</i> (Marri); closed heath on the Limestone outcrops.	13.92
Herdsmen Complex	Sedgeland and fringing woodland	Aeolian deposits	Sedgeland and fringing woodland of <i>Eucalyptus rudis</i> (Flooded Gum) - <i>Melaleuca</i> species.	8.34
Bassendean Complex – Central and South	Woodland to low woodland and sedgeland	Aeolian deposits	Vegetation ranges from woodland of <i>Eucalyptus marginata</i> (Jarrah) - <i>Allocasuarina fraseriana</i> (Sheoak) - <i>Banksia</i> species to low woodland of <i>Melaleuca</i> species, and sedgeland on the moister sites. This area includes the transition of <i>Eucalyptus marginata</i> (Jarrah) to <i>Eucalyptus tottiana</i> (Pricklybark) in the vicinity of Perth.	152.26

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
Herdsmen 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 with the survey report presented in Attachment 1. 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 and are presented in Attachment 2, Attachment 3 and Attachment 4. Biota (2025) produced a consolidated report assessing the vegetation values of the PAA at the Anketell Road interchange, including type, condition, and extent of native vegetation. The Biota (2025) consolidated report is presented in Attachment 5. Where there is an overlap in survey effort between GHD and Biota surveys, the Biota (2025) data has been used for vegetation and condition. A consistent approach has been applied to fauna habitat mapping.

Infrastructure such as roads and urban development were mapped as Cleared and made up the majority of the PAA (103.73 ha, 59.43%). The vegetation within the PAA occurs either side of the Kwinana Freeway and consists mostly of roadside revegetation (57.74 ha, 32.81%), from circa 2002 or earlier, with isolated patches of native vegetation (13.54 ha, 7.76%).

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 EgB spp. - *Eucalyptus gomphocephala* and *Banksia* spp. woodland with 5.29 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 raphiophylla* 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 (EgB spp). 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 32.89 ha.

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

The vegetation of the surveys was variable and ranged from Very Good to Completely Degraded. Native vegetation ranged from Very Good to Completely Degraded, with 50.53% in Degraded or worse condition. Roadside revegetated areas also ranged from Very Good to Completely Degraded with the majority (92.98%) 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 possess characteristics or features that are similar to, or closely resemble, those found in Banksia TEC and Tuart TEC. In other words, these vegetation types share some ecological traits or elements with the Banksia and Tuart Threatened Ecological Communities but may not fully meet all the criteria required to be officially classified as such. As a result, 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 (GHD, 2025a, b and Biota, 2025)

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Photograph
BmBa (GHD, 2025a, b) / B2 (Biota, 2025) - <i>Banksia menziesii</i> <i>B. attenuata</i> woodland	<i>Banksia menziesii</i> and <i>Banksia attenuata</i> woodland over <i>Hibbertia hypericoides</i> <i>Scholtzia involucrata</i> <i>Styphelia conostephioides</i> low shrubland over <i>Patersonia occidentalis</i> , <i>Desmocladius flexuosus</i> and <i>Lyginia barbata</i> open herb/sedgeland	Bassendean system	Very Good to Completely Degraded	2.93 ha	
Cc – <i>Corymbia calophylla</i> woodland	<i>Corymbia calophylla</i> tall woodland over <i>Kunzea glabrescens</i> tall sparse shrubland over <i>Xanthorrhoea preissii</i> and <i>X. gracilis</i> mid shrubland over <i>Phlebocarya ciliata</i> , <i>Dasypogon bromeliifolius</i> and <i>Desmocladius flexuosus</i> herbland/sedgeland	Bassendean system	Very Good to Good	0.12 ha	
EgBspp. - <i>Eucalyptus gomphocephala</i> and <i>Banksia</i> spp. woodland	+/- <i>Eucalyptus gomphocephala</i> tall open woodland over <i>Banksia attenuata</i> and <i>B. menziesii</i> woodland over <i>Acacia pulchella</i> var <i>pulchella</i> , <i>Xanthorrhoea preissii</i> and <i>Hibbertia hypericoides</i> low open shrubland over <i>Mesomelaena pseudostygia</i> and <i>*Ehrharta calycina</i> sedgeland/ grassland	Spearwood system and Bassendean system	Very Good to Degraded	5.29 ha	

Vegetation type	Vegetation Type Description	Landform and soils	Condition Range	Extent (ha)	Photograph
EmBspp <i>Eucalyptus marginata</i> and <i>Banksia</i> spp. Woodland	+/- <i>Eucalyptus marginata</i> tall open woodland over <i>Banksia attenuata</i> , <i>B. menziesii</i> and <i>Allocasuarina fraseriana</i> woodland over <i>Acacia pulchella</i> var <i>pulchella</i> <i>Hibbertia hypericoides</i> , <i>Bossiaea eriocarpa</i> low open shrubland over weedy grasses	Bassendean system	Good to Completely Degraded	3.12 ha	
ErMr - <i>Eucalyptus rudis</i> over <i>Melaleuca raphiophylla</i> +/- <i>M. preissiana</i> woodland	<i>Eucalyptus rudis</i> over <i>Melaleuca raphiophylla</i> +/- <i>M. preissiana</i> over <i>Kunzea glabrescens</i> tall sparse shrubland over <i>Xanthorrhoea preissii</i> low shrubland over <i>Lepidosperma longitudinale</i> sedgeland	Bassendean system	Very Good to Completely Degraded	2.08 ha	

Table 4-6: Roadside revegetation types within the PAA (GHD, 2025a, b and Biota, 2025)

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Isolated <i>Corymbia calophylla</i>	Isolated stands of <i>Corymbia calophylla</i> over scattered natives and weeds	Completely Degraded	1.24 ha	

OFFICIAL

Kwinana Freeway Upgrade (Roe Highway to Mortimer Road) Preliminary Documentation

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Isolated <i>Eucalyptus</i> spp.	Native and planted naturalised <i>Eucalyptus</i> spp. over scattered natives and weeds	Completely Degraded	5.85 ha	
Isolated <i>Banksia</i> spp.	Isolated <i>Banksia menziesii</i> and <i>B. attenuata</i> over scattered natives and weeds	Degraded to Completely Degraded	6.31 ha	
Mixed shrubs	Native and Introduced shrubs	Completely Degraded	37.61 ha	

Roadside Vegetation Type	Description	Condition Range	Extent (ha)	Photograph
Modified wetland	Modified wetland/ drainage area	Completely degraded	3.45 ha	
BmBa	<i>Banksia menziesii</i> and <i>B. attenuata</i> woodland	Good to Completely Degraded	1.55 ha	
EgBspp.	<i>Eucalyptus gomphocephala</i> and <i>Banksia</i> spp. woodland	Good to Degraded	1.26 ha	

Table 4-7: Vegetation condition extent and percentage per vegetation type within the PAA (GHD, 2025a,b, Biota, 2025)

Vegetation Condition	Vegetation type							Extent in PAA ha	Extent in PAA (%)
	BmBa	EgBspp.	EmBspp	ErMr	Cc	Roadside revegetation	Cleared		
Very Good to Excellent	0.86							0.86	0.49%
Very Good	0.19	1.25		0.10	0.03	0.26		1.83	1.05%
Good - Very good						0.00			
Good	1.10	1.09	0.23	0.07	0.09	0.25		2.83	1.62%
Good - Degraded				0.29				0.29	0.17%
Degraded	0.27	2.95	2.84	0.78		3.51		10.35	5.93%
Degraded to Completely Degraded								0.00	0.00%
Completely Degraded	0.51		0.06	0.84		53.25		54.66	31.32%
Cleared							103.73	103.73	59.43%
Total	2.93	5.29	3.12	2.08	0.12	57.28	103.73	174.53	100.00%

4.7.3 Flora

No EPBC Act listed flora were recorded within the PAA (GHD, 2025a, b and Biota, 2025). The likelihood of occurrence assessment post-field survey concluded no EPBC Act listed flora are considered likely to occur in the PAA.

GHD (2025a) recorded 220 vascular flora taxa representing 54 families and 153 genera in the survey area, of which 148 were native flora taxa. The dominant families within the survey area included Myrtaceae (18 taxa), Fabaceae (16 taxa) and Poaceae (14 taxa).

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 10 presents historic MNES flora records within 5km of the PAA.

4.7.4 Introduced and invasive species

Two species listed as Weeds of National Significance (WoNs) (Australian Weeds Committee, 2012), **Asparagus asparagoides* (Bridal Creeper) and **Opuntia stricta* (Prickly Pear) were recorded in the PAA (GHD, 2025a; Biota, 2025). 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.

4.7.5 Dieback

The PAA contained 16.86 ha (9.66%) of interpretable vegetation, which was classed as Uninfested, with adequate amounts of susceptible species being present, with the majority of the PAA (133.74 ha, 76.63%) classed as Excluded due to the presence of Kwinana Freeway and associated infrastructure. A large number of areas were classified as Permanently Uninterpretable due to the absence of sufficient coverate by reliable indicator species, totalling an area of 15.19 ha (8.70%). Two locations within the PAA were identified as infested with Phytophthora Dieback, 250 m south of Gibbs Road on the eastern side of Kwinana Freeway and north of North Lake Road on the western side of the Freeway; totalling an area of 5.22 ha (2.99%). The presence of dieback within the PAA is shown in Figure 9b.

4.8 Fauna

A fauna survey, including a desktop assessment and targeted Black Cockatoo survey, 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 (2025c, d) along Roe Highway. Biota (2025) consolidated biological surveys undertaken between 2020 and 2024 for the Anketell Road Upgrade project; including basic fauna surveys, targeted significant fauna surveys and Black Cockatoo habitat assessment, with the results specific to the Kwinana Freeway and Anketell Road interchange included in this assessment.

Eight broad fauna habitat types including cleared areas have been delineated and described as described in Table 4-8 and mapped in Figure 11. 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, Biota, 2025)

Habitat Type	Description	Extent (ha)	Representative photograph
Banksia woodland	This habitat type corresponds with vegetation types BmBa and Isolated <i>Banksia</i> spp. It is present as several small areas and includes isolated scattered patches. Floristically characterised by <i>Banksia attenuata</i>, <i>B.menziesii</i> and scattered areas of <i>B.ilicifolia</i> woodland over <i>Hibbertia</i> species, <i>Scholtzia involucrata</i> <i>Styphelia conostephioides</i> over, <i>Patersonia occidentalis</i> <i>Desmocladius flexuosus</i> <i>Lyginia barbata</i>. Patches of understory include <i>Xanthorrhoea preissii</i> and <i>Hibbertia subvaginata</i> over <i>Dasypogon bromeliifolius</i>, <i>Phlebocarya ciliata</i>, <i>Schoenus caespititius</i> shrub layer. Substrate is pale grey deep sand. Habitat condition varies widely from degraded too very good. But retention of upper stratum <i>Banksia</i> 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 (<i>Zanda latirostris</i>), and Low quality foraging habitat for FRTBC (<i>Calyptorhynchus banksii naso</i>).	10.17 5.83%	
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 <i>Allocasuarina</i> over <i>Banksia attenuata</i> and <i>B.menziesii</i> woodland over <i>Acacia</i>, <i>Xanthorrhoea</i> and <i>Hibbertia</i> 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 <i>Banksia</i> 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 (<i>Zanda latirostris</i>), and Low – Moderate quality foraging habitat for FRTBC (<i>Calyptorhynchus banksii naso</i>).	9.67 5.54%	

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 <i>Melaleuca raphiophylla</i> and / or <i>M. preissiana</i> over <i>Kunzea glabrescens</i>, <i>Xanthorrhoea preissii</i> and <i>Lepidosperma longitudinale</i>. 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 1.19%	
Marri woodland	This habitat type corresponds with the Isolated <i>Corymbia calophylla</i> vegetation type and comprises relatively small remnant patches and isolated stands of tall <i>Corymbia calophylla</i> 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 (<i>Zanda latirostris</i>) and Low – Moderate and Moderate - High quality foraging habitat for FRTBC (<i>Calyptorhynchus banksii naso</i>).	1.37 0.78%	
Naturalised and native trees	This habitat type corresponds with the Isolated Eucalyptus spp vegetation type and comprises a range of <i>Eucalyptus</i> 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.	6.31 3.61%	

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.	37.77 21.64%	
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.	3.45 1.98%	
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.	103.72 59.43%	

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

5.1 Surveys and studies

A number of surveys and studies have been undertaken 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) (Attachment 1)	<u>Scope:</u> 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 (<i>Idiosoma sigillatum</i>) and Targeted Black Cockatoo Habitat Assessment of the survey area (survey area). <u>Survey area:</u> 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. <u>Report date:</u> August 2025
Roe Highway widening – Targeted Flora, Vegetation and Wetland Assessment (GHD, 2025b) (Attachment 2)	<u>Scope:</u> 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. <u>Survey area:</u> 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). <u>Report date:</u> unpublished
Roe Highway widening – Basic Fauna and SRE Survey (GHD, 2025c) (Attachment 3)	<u>Scope:</u> GHD was commissioned by Main Roads to undertake a Basic fauna survey and targeted Swan Coastal Plain Shield-back Trapdoor Spider survey. <u>Survey area:</u> 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). <u>Report date:</u> unpublished
Roe Highway widening – Targeted Black Cockatoo Survey (GHD, 2025d) (Attachment 4)	<u>Scope:</u> GHD was commissioned by Main Roads to undertake a targeting black cockatoo habitat focussing on breeding, foraging and roosting habitat. <u>Survey area:</u> 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). <u>Report date:</u> unpublished
Targeted Orchid Survey Kwinana Freeway Upgrade (GHD, 2025e) (Attachment 5)	<u>Scope:</u> GHD was commissioned by Main Roads to conduct a targeted survey for three orchid species: Glossy-leaved Hammer Orchid (<i>Drakaea elastica</i>) (Endangered), King Spider-orchid (<i>Caladenia huegelii</i>) (Endangered) and Dwarf Bee-orchid (<i>Diuris micrantha</i>) (Vulnerable), listed under the Commonwealth EPBC Act. <u>Survey area:</u> The survey area covers 25.43 hectares (ha). All five remnant native vegetation types and two roadside revegetation types (based on the mapping in GHD 2025a) were included in the search area for the targeted survey in the PAA. These vegetation/revegetation types were considered potential/may be potential habitat for one or more of the target orchids. No orchids were recorded during the survey. <u>Report date:</u> December 2025

Survey / Report	Details
Anketell Road Upgrade Biological Survey (Biota, 2025) (Attachment 6)	<u>Scope:</u> Biota was commissioned by Main Roads to consolidate the biological surveys undertaken between 2020 and 2024 including detailed and targeted flora and vegetation surveys, floristic community type assessment, basic fauna surveys, targeted significant fauna surveys, an SRE invertebrate survey and Black Cockatoo habitat assessment for the Anketell Road Upgrade project. <u>Survey area:</u> The results and associated spatial data have been consolidated into a single report for a survey area covering 224.83 ha. Results specific to the Kwinana Freeway and Anketell Road interchange have been included in this document. <u>Report date:</u> September 2025
Phytophthora Dieback Occurrence Report for Kwinana Freeway Upgrade Assessment (Glevan Consulting, 2025) (Attachment 7)	<u>Scope</u> Glevan Consulting was commissioned by West Port Roads IPT to conduct a Phytophthora Dieback assessment of remnant bushland for the Kwinana Freeway Upgrade project. The assessment was completed by an interpreter that is accredited in the detection, diagnosis and mapping of the Dieback disease. All Phytophthora Dieback detection, diagnosis and mapping was undertaken to standards and procedures defined in FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department (Department of Parks and Wildlife (DPaW) 2015). <u>Survey area</u> The survey area covers 347.62 ha along Kwinana Freeway spanning from Farrington Road in the north to Safety Bay Road in the south. Portions of the Project Area had previously been assessed by Glevan Consulting, with the most recent surveys taking place in 2013 and 2014. <u>Report date</u> September 2025

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) and Biota (2025). 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 EPBC Act listed 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			
<i>Banksia ilicifolia</i> 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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
<i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> 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) Biota (2025)
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.	Critically Endangered	Not present in the PAA. Nearest record of this community is approximately 5 km southeast of the PAA.	GHD (2025a) Biota (2025)
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) Biota (2025)
Low lying <i>Banksia attenuata</i> 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) Biota (2025)
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion / <i>Melaleuca huegelii</i> - <i>Melaleuca systema</i> 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) Biota (2025)
Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19a as originally described 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) Biota (2025)
Southern <i>Eucalyptus gomphocephala</i> - <i>Agonis flexuosa</i> 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) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
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) Biota (2025)
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) Biota (2025)
Woodlands over sedgeland in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).(SCP19b)	Endangered	Not present in the PAA. Nearest record of this community occurs approximately 1.9 km west of the PAA.	GHD (2025a) Biota (2025)
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 <i>Typha</i> spp/ <i>Pteridium esculentum</i> and are not considered to provide suitable habitat for this species.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)
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) Biota (2025)
Keighery's Eleocharis	Vulnerable	Highly unlikely. Identified by PMST only, no known occurrence within PAA.	PMST (DCCEEW, 2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		Areas of suitable habitat within PAA, however unlikely due to survey efficacy and non-cryptic nature of the species.	GHD (2025a) Biota (2025)
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 offsets survey areas. Transects were performed in areas of suitable habitat targeting this species and it was not recorded.	PMST (DCCEEW, 2025) GHD (2025a) GHD (2025b) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
Southern Tetraria	Vulnerable (listed as <i>Tetraria australiensis</i>)	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) Biota (2025)
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) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
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 <i>Typha spp/Pteridium esculentum</i> and are not considered to provide suitable habitat for this species.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
Fauna			
Australasian Bittern	Endangered	Unlikely. The PAA lacks suitable habitat namely wetland with extensive emergent native vegetation.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo	Endangered (listed as <i>Calyptorhynchus baudinii</i>)	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) Biota (2025)
Black-tailed Godwit	Endangered, Migratory	Unlikely. This species known to occur regionally however the PAA is lacking suitable coastal	GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		shorelines. Occurrence may be limited to occasional fly-over.	
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) Biota (2025)
Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Endangered (listed as <i>Calyptrorhynchus latirostris</i>)	Present Recorded during the field survey within PAA at several locations including birds sighted and extensive foraging evidence.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		road drainage may represent marginal foraging habitat.	
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) Biota (2025)
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) Biota (2025)
Fork-tailed Swift	Migratory	Unlikely. Occurs locally on occasional basis however only aerial foraging or fly-over.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
Grey Wagtail	Migratory	Unlikely. A vagrant visitor to southern Australia. Rarely recorded locally.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
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) Biota (2025)
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) Biota (2025)
Long-toed Stint	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) Biota (2025)
Malleefowl	Vulnerable	Unlikely The PAA lacks suitable habitat.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)
Oriental Pratincole	Migratory	Unlikely. Occurs locally occasionally. Unlikely to occur but may hawk over the PAA on occasional or vagrant basis.	GHD (2025a) Biota (2025)
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) Biota (2025)
Pacific Golden Plover	Migratory	Unlikely.	GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		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.	
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) Biota (2025)
Red-necked Stint	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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
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) Biota (2025)
Ruff	Migratory	Unlikely. The PAA is lacking extensive shallow wetlands, mudflats, seasonal flooded shallows or tidal estuarine shorelines. Occurrence may	GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
		be limited to occasional flyover of birds during the seasonal local visits to wetlands.	
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) Biota (2025)
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) Biota (2025)
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, mudflats, seasonal flooded shallows or tidal estuarine or coastal shorelines. Occurrence may be limited to occasional fly-over or vagrant visitation.	GHD (2025a) Biota (2025)
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) Biota (2025)
Mammals			
Chuditch, Western Quoll	Vulnerable	Highly unlikely. The lack of extensive and connected suitable habitat on local scale obviates occurrence within PAA. The Chuditch is considered highly unlikely to occur in the PAA and surrounds following targeted survey work by Biota (2024a) for the Anketell Road Upgrade project. As the Chuditch is highly unlikely to occur and there is a lack of connection(s) from the PAA to existing Chuditch populations, the PAA is not considered Chuditch habitat.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025) Biota (2024)
Numbat	Endangered	Highly Unlikely. There are historical regional records, although the PAA is beyond the current range for the species.	GHD (2025a) Biota (2025)

Community / Taxon	EPBC Act Status	Likelihood of occurrence	Source
Quokka	Vulnerable	Highly Unlikely. There are no local records and PAA is beyond the species' range.	GHD (2025a) Biota (2025)
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) Biota (2025)
Invertebrate			
Carter's Freshwater Mussel	Vulnerable	Unlikely. The PAA lacks suitable waterway habitat.	PMST (DCCEEW, 2025) GHD (2025a) Biota (2025)
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) Biota (2025)

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 PAA including *Caladenia huegelii*, *Diuris drummondii*, *Diuris micrantha*, *Diuris purdiei* and *Drakaea elastica*. Post-survey all species were determined to be unlikely to occur due to the fragmentation and degradation of potential habitats that occur within the survey area. An additional targeted orchid survey was undertaken in October 2025 (Attachment 5). *Caladenia huegelii*, *Diuris micrantha* and *Drakaea elastica* are further discussed in Section 5.4 below. No individuals were identified despite sufficient survey effort during the optimal season for identification. Historic records within a 5 km buffer of the PAA are presented in Figure 10.

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).

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)
- Wandii01, 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 Wandii01 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.

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	<u>Ecology</u> The Tuart TEC occurs on the SCP, along the Spearwood or Quindalup dunes. The primary defining feature is the presence of the <i>Eucalyptus gomphocephala</i> (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 <i>Agonis flexuosa</i>. The understorey is often relatively open, including many non-woody species from the Asteraceae, Cyperaceae, Restionaceae and Orchidaceae families (DEE, 2016a; 2019). <u>Abundance</u> 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 20,834.20 ha remaining of Tuart Woodlands across the SCP. <u>Distribution</u> 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 14. <u>Critical Habitat</u> 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. <u>Threats</u> 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.

	<u>Description and extent within the PAA</u> The Tuart TEC mapped by GHD (2025a, 2025b) have an extent of 3.04 ha in the PAA.				
	Keighery scale vegetation condition	Vegetation Type			Area (ha)
		EgBspp	Isolated Banksia species	Mixed Shrubland	
	Very good	0.87			0.87
	Degraded	1.38			1.38
	Completely Degraded		0.66	0.13	0.79
	Total all conditions	2.25	0.66	0.13	3.04
Quality and importance of known or potential habitat within the proposed action area and surrounds	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 proposed action 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.				
Extent within the PAA and Contextual Area	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 13 provides mapping of Tuart TEC within the PAA.				
Adequacy of any surveys undertaken	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.				
Methods, data analysis and scientific literature used to identify and assess the environmental values	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).				

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	<u>Ecology</u> 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). <u>Abundance</u> 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). <u>Distribution</u> 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 16. <u>Critical Habitat</u> 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. <u>Threats</u> 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 <i>Phytophthora</i> species) • Invasive species • Fire regime change

Aspect	Description																																						
	- 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) and Biota (2025) have an extent of 10.58 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 to excellent</td><td>0.86</td><td>-</td><td>-</td><td>0.86</td></tr><tr><td>Very good</td><td>0.37</td><td>1.33</td><td>-</td><td>1.70</td></tr><tr><td>Good</td><td>1.34</td><td>0.6</td><td>0.23</td><td>2.19</td></tr><tr><td>Degraded</td><td>1.03</td><td>2.87</td><td>1.03</td><td>4.93</td></tr><tr><td>Completely degraded</td><td>0.91</td><td>-</td><td>-</td><td>0.91</td></tr><tr><td>Total all conditions</td><td>4.50</td><td>4.82</td><td>1.26</td><td>10.58</td></tr></table>	Keighery scale vegetation condition	Vegetation Type			Area (ha)	BmBa	EgBspp.	EmBspp.	Very good to excellent	0.86	-	-	0.86	Very good	0.37	1.33	-	1.70	Good	1.34	0.6	0.23	2.19	Degraded	1.03	2.87	1.03	4.93	Completely degraded	0.91	-	-	0.91	Total all conditions	4.50	4.82	1.26	10.58
Keighery scale vegetation condition	Vegetation Type			Area (ha)																																			
	BmBa	EgBspp.	EmBspp.																																				
Very good to excellent	0.86	-	-	0.86																																			
Very good	0.37	1.33	-	1.70																																			
Good	1.34	0.6	0.23	2.19																																			
Degraded	1.03	2.87	1.03	4.93																																			
Completely degraded	0.91	-	-	0.91																																			
Total all conditions	4.50	4.82	1.26	10.58																																			
Quality and importance of known or potential habitat within the proposed action area and surrounds	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. Proposed Action likely to impact on mostly degraded vegetation on the edge of five Banksia TEC patches.																																						
Extent within the PAA and Contextual Area	There is 10.58 ha of Banksia TEC in the PAA and 299.17 ha within the survey contextual area, which is a 500m buffer of the PAA. 651.10 ha of Banksia TEC occurs within a 1 km buffer of the PAA. Figure 15 provides mapping of Banksia Woodlands TEC within the survey contextual area.																																						
Adequacy of any surveys undertaken	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.																																						
Methods, data analysis and scientific literature used to identify and assess the environmental values	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).																																						

5.4 Threatened Flora

5.4.1 Grand Spider Orchid (*Caladenia huegelii*)

A description of the Grand Spider Orchid (*Caladenia huegelii*), in relation to the Proposed Action is presented in Table 5-5.

Table 5-5: Grand Spider Orchid (*Caladenia huegelii*)

Aspect	Description
Ecology, abundance, distribution and habitat preferences	<u>Ecology</u> <i>Caladenia huegelii</i> is listed as Endangered under the EPBC Act. This orchid grows up to 60 cm tall with a single erect, pale green, hairy leaf and one or two (rarely three) predominantly pale greenish-cream flowers 7–10 cm across, with variable suffusions, lines and spots of red-maroon (DEC 2008b). It typically flowers from September to October. The sepals end in slender light brown to yellow clubs. It generally occurs on grey or brown sand or clay loam (WA Herbarium 2025). <u>Abundance</u> <i>Caladenia huegelii</i> was currently known from 33 extant populations with surveys conducted in the 2000's and over 1,614 mature plants recorded (DEC 2008b). A search of the WA TPFL (DBCA 2023) identifies six populations with an estimated 48 plants within a 5 km buffer of the PAA. These are shown in Appendix 1, Figure 10. <u>Distribution and habitat preferences</u> <i>Caladenia huegelii</i> is found on the SCP within 20 km of the coast, from just north of Perth to the Busselton area over a distance of 250 km. Throughout its range the species tends to favour areas of dense undergrowth. Soil is usually deep grey-white sand usually associated with the Bassendean sand-dune system. However, rare plants have been known to extend into the Spearwood system (in which calcareous yellow sands dominate) in some areas (DEC 2008b). <i>Caladenia huegelii</i> occurs in areas of mixed Banksia – Jarrah woodland over dense shrubs such as <i>Stirlingia latifolia</i>, <i>Hypocalymma robustum</i>, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i> and <i>Conostylis</i> spp. (DEC, 2009a). As areas of suitable habitat become more degraded, they are less likely to support the orchids associated <i>mycorrhizal fungus</i> 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 <i>Caladenia huegelii</i> due to loss of understorey and structural changes to canopy. Four vegetation units were considered as potential habitat for <i>Caladenia huegelii</i> (GHD 2025e) (Error! Reference source not found.). Extensive targeted searches were undertaken within these potential <i>C. huegelii</i> habitats, and this species was not recorded. It is considered unlikely that <i>C. huegelii</i> would be present within the survey area (GHD 2025a,e). <u>Critical Habitat</u> The <i>C. huegelii</i> recovery plan (DEC 2008b) states the following areas are critical to the survival of <i>C. huegelii</i>: • Area of occupancy of important populations

Aspect	Description
	• Areas of similar habitat surrounding important populations • All known habitat and populations for wild and translocated populations. The habitat present within the PAA is not considered to represent critical habitat for <i>C. huegelii</i>, as it does not support an area of occupancy or provide surrounding habitat for an important population. <u>Threats</u> Threats to <i>C. huegelii</i> identified in the Recovery Plan include clearing, weed invasion, grazing, firebreak maintenance, inappropriate fire, recreational activities, dumping of rubbish, disease and poor recruitment (DEC 2008b). <u>Species presence and habitat within the PAA</u> There is a record of <i>Caladenia huegelii</i> from 2006 within 30 m of the PAA near Beeliam 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 and October 2025 did not find the species.
Adequacy of any surveys undertaken	The targeted survey was conducted in late October from 27 to 30 October 2025. Survey timing was considered suitable based on recorded flowering time documented in relevant plans/advice, the weather conditions recorded in the lead up to the survey and during 2025, and the flowering status of Grand Spider Orchid at other locations (GHD, 2025e). Survey methods involved traverses spaced between 5 and 20 m apart. In areas of potentially suitable habitat, where vegetation condition was Good or better traverse distance was approximately 5 to 10 m apart as per Draft Survey Guidelines for Australia's Threatened Orchids (DCCEEW, 2013). In areas where vegetation condition was Degraded or worse, traverse distance was spaced between 10 and 20 m depending on ground cover density.
Methods, data analysis and scientific literature used to identify and assess the environmental values	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) – Grand Spider Orchid (<i>Caladenia huegelii</i>) Recovery Plan (DEC, 2008b) – Draft survey guidelines for Australia's threatened orchids (Commonwealth of Australia, 2013).

5.4.2 Dwarf Bee Orchid (*Diuris micrantha*)

A description of the Dwarf Bee Orchid (*Diuris micrantha*), in relation to the Proposed Action is presented in Table 5-6.

Table 5-6: Dwarf Bee Orchid (*Diuris micrantha*)

Aspect	Description
Ecology, abundance, distribution and habitat preferences	<u>Ecology</u> <i>Diuris micrantha</i>, also known as Dwarf Bee-orchid, is listed as Vulnerable under the EPBC Act. This orchid has a basal tuft of narrow, linear leaves and a loose, slender inflorescence up to 60 cm high. The yellow flowers, which can number up to seven, have reddish-brown markings and are the smallest in the genus, measuring up to 1.3 cm across (DEWHA 2008a). Flowers typically appear from August to early October. The

Aspect	Description
	species typically occurs on brown loamy clay in inter-wet swamps and shallow water (WA Herbarium 2025). <i>Diuris micrantha</i> are known to occur within 2.2 km of the PAA, suitable habitat is present within the PAA, however none were recorded throughout several targeted searches over multiple years within the PAA or Contextual area. <u>Abundance</u> <i>Diuris micrantha</i> was known from seven populations in 2008 (DEWHA 2008a). A search of the WA TPFL (DBCAs 2023) identifies two populations with only one record recording abundance within a 5 km buffer of the PAA. These are shown in Appendix 1, Figure 10. <u>Distribution and habitat preferences</u> <i>Diuris micrantha</i> occurs within the South West of WA from east of Kwinana and south towards the Frankland area. It is found in small populations, on dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps, with the bases of the flowering plants often covered with shallow water (DEWHA 2008a). Four vegetation units were considered as potential habitat for <i>D. micrantha</i> (GHD 2025e). <u>Critical Habitat</u> The <i>Diuris micrantha</i> Conservation Advice (DEWHA 2008a) indicates that the critical habitat of <i>Diuris micrantha</i> is still being researched, however, the habitat present within the PAA is unlikely to represent critical habitat as it does not support an area of occupancy or provide surrounding habitat for an important population. It is also acknowledged wetlands would provide habitat for the species based on the conservation advice. <u>Threats</u> Threats to <i>Diuris micrantha</i> identified in the Conservation Advice include clearing, weed invasion, grazing, firebreak maintenance, inappropriate fire, recreational activities, dumping of rubbish, disease and poor recruitment (DEWHA, 2008). <u>Species presence and habitat within the PAA</u> <i>Diuris micrantha</i> 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 <i>Wurmbea dioica</i> and <i>Tribonanthes</i> sp. and sedges bordered by <i>Melaleuca raphiophylla</i> (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 <i>D. micrantha</i> due to presence of dense <i>Pteridium esculentum</i> (approximately 90% cover) (GHD, 2025a,e).
Adequacy of any surveys undertaken	The targeted survey was conducted in late October from 27 to 30 October 2025. Survey timing was considered suitable based on recorded flowering time documented in relevant plans/advice, the weather conditions recorded in the lead up to the survey and during 2025, and the flowering status of Grand Spider Orchid at other locations (GHD, 2025e). Survey methods involved traverses spaced between 5 and 20 m apart. In areas of potentially suitable habitat, where vegetation condition was Good or better traverse distance was approximately 5 to 10 m apart as per Draft Survey Guidelines for

Aspect	Description
	Australia's Threatened Orchids (DCCEEW, 2013). In areas where vegetation condition was Degraded or worse, traverse distance was spaced between 10 and 20 m depending on ground cover density.
Methods, data analysis and scientific literature used to identify and assess the environmental values	The survey methodology and data collection by GHD (2025e) was consistent with relevant aspects of: – Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016) – Approved Conservation Advice for <i>Diuris micrantha</i> (Dwarf Bee-orchid) (DEWHA, 2008) – Draft survey guidelines for Australia's threatened orchids (Commonwealth of Australia, 2013).

5.4.3 Gloss-Leaved Hammer Orchid (*Drakaea elastica*)

A description of the Gloss-Leaved Hammer Orchid (*Drakaea elastica*), in relation to the Proposed Action is presented in Table 5-7.

Table 5-7: Gloss-Leaved Hammer Orchid (*Drakaea elastica*)

Aspect	Description
Ecology, abundance, distribution and habitat preferences	<u>Ecology</u> <i>Drakaea elastica</i> is listed as Endangered under the EPBC Act. This orchid has a slender flower stem up to 30 cm high and a single distinctively glossy, bright green, prostrate, heart-shaped leaf 1 to 2 cm in diameter. The leaf emerges in May and starts to wither by the time the orchid flowers in September. The single flower is 3 to 4 cm long with a hinged labellum. Flowers are first seen in late September and continue flowering until late October or more rarely early November. Individual plants may not flower every year. The plant dies back to a dormant underground tuber over summer (DEC 2008c). <u>Abundance</u> <i>Drakaea elastica</i> was known from forty-two populations in 2009, twenty-seven of which contain fewer than fifteen plants. More than half of all known plants are located in just one population, while almost 90% of plants occur within seven populations (DEC 2008c). A search of the WA TPFL (DBCA 2023) and WAHERB database (WA Herbarium 2023) identifies three populations (Population IDs 97391, 97392 and 97393 considered one population) within a 5 km buffer of the PAA. These are shown in Appendix 1, Figure 10. <u>Distribution and habitat preferences</u> <i>Drakaea elastica</i> is currently known only from the SCP over a range of approximately 350 km between Cataby in the north and Busselton in the south. The species grows on bare patches of grey-white sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps and flats, typically in banksia woodland or spearwood thicket vegetation (DEC 2008c). The species grows on bare patches of white or grey sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps, typically in banksia (<i>Banksia menziesii</i>, <i>B. attenuata</i> and <i>B. ilicifolia</i>) woodland or spearwood (<i>Kunzea glabrescens</i>) thicket vegetation (WA Herbarium 2025; DEC 2008c). <i>Drakaea elastica</i> are known to occur within 600 m of the PAA, suitable habitat is

Aspect	Description
	present within the PAA, however none were recorded throughout several targeted searches over multiple years within the PAA or Contextual area. <u>Critical Habitat</u> The <i>D. elastica</i> recovery plan (DEC 2008c) states that the following areas are critical to the survival of <i>D. elastica</i>: • Area of occupancy of important populations • Areas of similar habitat surrounding important populations • Additional occurrences of similar habitat that may contain important populations of the species or be suitable sites for future translocations or other recovery actions • All known habitat and populations for wild and translocated populations The habitat present within the PAA is not considered to represent critical habitat for <i>D. elastica</i>, as it does not support an area of occupancy or provide surrounding habitat for an important population. Population 2 is marked as extinct by DBCA (2023), whereas population 31 and the population 1.4 km east is fragmented from habitat within the PAA by existing land uses and cleared areas. <u>Threats</u> Threats to <i>D. elastica</i> identified in the Recovery Plan include land clearing, degradation and fragmentation of habitat, edge effects, density of ground level vegetation, inappropriate disturbance, construction and maintenance work, rubbish dumping, weed invasion, disease, inappropriate fire regimes, poor recruitment and salinity (DEC 2008c). <u>Species presence and habitat within the PAA</u> <i>Drakaea elastica</i> 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 and again in October 2025, 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. <i>D. elastica</i> 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. The recovery plan notes that the leaf emerges in May and starts to wither by the time the orchid flowers in September, which would be the optimal time for flora surveys for <i>D. elastica</i>. Targeted flora surveys have been undertaken yearly in the PAA since

Aspect	Description
	September 2020, with the most recent being in September 2024. A total of 224 in person days have been conducted across all flora and vegetation surveys. Multiple targeted surveys for the winter-emerging orchid were undertaken in the winter months of 2020, 2021, 2022, and 2023. Targeted surveys for <i>D. elastica</i> were undertaken in prospective Banksia woodland vegetation units within the PAA. Suitable habitat pertaining to <i>D. elastica</i> was searched utilising transects spaced at approximately 5 to 10 m. Orchid identification texts and reference images were used to determine any potential orchid species of significance, with assistance also sought from orchid taxonomy experts/specialists Andrew Brown (ex-DBCA) and Mark Brundrett (University of WA) for identification of images. Locations of any orchid species of significance or unknown taxa were recorded using a Unistrong tablet with a GPS accuracy of +/- 1.5 m. The number of individuals and extent of the population were also recorded.
Adequacy of any surveys undertaken	The targeted survey was conducted in late October from 27 to 30 October 2025. Survey timing was considered suitable based on recorded flowering time documented in relevant plans/advice, the weather conditions recorded in the lead up to the survey and during 2025, and the flowering status of Grand Spider Orchid at other locations (GHD, 2025e). Survey methods involved traverses spaced between 5 and 20 m apart. In areas of potentially suitable habitat, where vegetation condition was Good or better traverse distance was approximately 5 to 10 m apart as per Draft Survey Guidelines for Australia's Threatened Orchids (DCCEEW, 2013). In areas where vegetation condition was Degraded or worse, traverse distance was spaced between 10 and 20 m depending on ground cover density.
Methods, data analysis and scientific literature used to identify and assess the environmental values	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) – Glossy-leafed Hammer Orchid (<i>Drakaea elastica</i>) Recovery Plan (DEC, 2008a) – Draft survey guidelines for Australia's threatened orchids (Commonwealth of Australia, 2013).

5.5 Threatened Fauna

5.5.1 Carnaby's Cockatoo

A description of Carnaby's Cockatoo in relation to the Proposed Action is presented in Table 5-8.

Table 5-8: Carnaby's Cockatoo

Aspect	Description
Ecology, abundance, distribution and habitat preferences	<u>Ecology</u> 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

Aspect	Description
	(DPaW, 2013). <u>Abundance</u> 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). <u>Distribution</u> Carnaby's Cockatoo distribution extends into the Wheatbelt north to Kalbarri and east to Esperance (DPaW 2013). <u>Habitat Preferences</u> Black Cockatoos are known to utilise a range of habitats and plant species for foraging (including introduced species such as pines, <i>*Pinus</i> spp.) Proteaceous plant species (i.e. shrublands dominated by <i>Banksia</i>, <i>Hakea</i> and <i>Grevillea</i> 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: • 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). The breeding timing for this species is as follows (DAWE, 2022): • Localised breeding may occur from July to December on the SCP <u>Species presence and habitat within the PAA</u>

Aspect	Description										
	There is 21.21 ha of Carnaby's Cockatoo foraging habitat in the PAA (Figure 17) (GHD, 2025a; b). <table> <tr> <th>Bamford Impact Quality Score</th><th>Area (ha)</th></tr> <tr> <td>7 (Moderate-high)</td><td>0.15</td></tr> <tr> <td>6 (Moderate)</td><td>19.69</td></tr> <tr> <td>5 (Moderate)</td><td>1.37</td></tr> <tr> <td>Total</td><td>21.21</td></tr> </table> Sixteen suitable DBH trees occur within the PAA, all without hollows, see Figure 21.	Bamford Impact Quality Score	Area (ha)	7 (Moderate-high)	0.15	6 (Moderate)	19.69	5 (Moderate)	1.37	Total	21.21
Bamford Impact Quality Score	Area (ha)										
7 (Moderate-high)	0.15										
6 (Moderate)	19.69										
5 (Moderate)	1.37										
Total	21.21										
Extent of habitat across distribution	The Proposed Action is located within the mapped distribution of Carnaby's Cockatoo (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. It is estimated there is approximately 499,563.41 ha of Carnaby's Cockatoo foraging habitat across the SCP. Suitable foraging habitat available for Black Cockatoos within the local contextual area of the PAA is shown in Figure 18. Black Cockatoo confirmed and unconfirmed roosting sites in the vicinity of the PAA are presented in Figure 22.										
Adequacy of any surveys undertaken	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).										
Methods, data analysis and scientific literature used to identify and assess the environmental values	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) .										

5.5.2 Forest Red-tailed Black Cockatoo

A description of FRTBC in relation to the Proposed Action is presented in Table 5-9.

Table 5-9: Forest Red-tailed Black Cockatoo

Aspect	Description
Ecology, abundance, distribution and habitat preferences	<u>Ecology</u> 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). <u>Abundance</u> FRTBC occurs in one population of approximately 15,000 individuals (DEWHA, 2009). <u>Distribution</u> 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). <u>Habitat Preferences</u> Black Cockatoos are known to utilise a range of habitats and plant species for foraging (including introduced species such as pines, <i>*Pinus</i> spp.), although Marri and Jarrah woodlands are particularly important to FRTBC. Proteaceous plant species (i.e. shrublands dominated by <i>Banksia</i>, <i>Hakea</i> and <i>Grevillea</i> 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: • 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,

Aspect	Description										
	feral Honeybees are the most significant current threat to the ability of Black Cockatoos to survive and breed (DEC, 2008). <u>Breeding Parameters</u> 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 for this species is as follows (DAWE, 2022): 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 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality FRTBC foraging habitat in the PAA (Figure 19)(GHD, 2025a; b). <table border="1"> <thead> <tr> <th>Bamford Impact Quality Score</th><th>Area (ha)</th></tr> </thead> <tbody> <tr> <td>7 (Moderate – High)</td><td>1.52</td></tr> <tr> <td>4 (Low – Moderate)</td><td>9.52</td></tr> <tr> <td>2 (Low)</td><td>9.13</td></tr> <tr> <td>Total</td><td>20.17</td></tr> </tbody> </table> Sixteen suitable DBH trees occur within the PAA, all without hollows, see Figure 21.	Bamford Impact Quality Score	Area (ha)	7 (Moderate – High)	1.52	4 (Low – Moderate)	9.52	2 (Low)	9.13	Total	20.17
Bamford Impact Quality Score	Area (ha)										
7 (Moderate – High)	1.52										
4 (Low – Moderate)	9.52										
2 (Low)	9.13										
Total	20.17										
Extent of habitat across distribution	The Proposed Action is located within the mapped distribution of 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 FRTBC. It is estimated there is approximately 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 20. Black Cockatoo confirmed and unconfirmed roosting sites in the vicinity of the PAA are presented in Figure 22.										
Adequacy of any surveys undertaken	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).										
Methods, data analysis and scientific literature used to identify and assess the environmental values	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) and Forest Red tailed Black Cockatoo Recovery Plan (DEC, 2008).										

6 ASSESSMENT OF IMPACTS

6.1 Summary of impacts

6.1.1 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 implementation of 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 10.58 ha (0.86 ha Very Good to Excellent, 1.7 ha Very Good, 2.19 ha Good, 4.93 ha Degraded and 0.87 ha Completely Degraded)
Black Cockatoo Species	Loss of 0.15 ha of Moderate – High, and 21.05 ha of Moderate and quality Carnaby's Cockatoo foraging habitat Loss of 1.52 ha of Moderate – High, 9.52 ha of Low - Moderate and 9.14 ha of Low quality FRTBC foraging habitat Loss of 16 suitable DBH trees, all without hollows
Grand Spider Orchid (<i>Caladenia huegelii</i>)	All three species were considered unlikely to occur by GHD (2025a,e). There is potential habitat present, however there is no current or historical known occupation by these species. The areas of higher quality habitat coincide with areas of TEC (Banksia Woodland) and as such the impact assessment and mitigation applied to this community is applicable to the habitat for these threatened orchid species. No further assessment of impacts for the three threatened orchid species has been completed.
Dwarf Bee Orchid (<i>Diuris micrantha</i>)	
Glossy-Leaved Hammer Orchid (<i>Drakaea elastica</i>)	

6.1.2 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	<i>Caladenia huegelii</i> , <i>Diuris micrantha</i> and <i>Drakaea elastica</i>	Black Cockatoo habitat
Loss of patch (threshold not met)	Unlikely	Unlikely		

Fragmentation and edge effect	Unlikely	Unlikely	Unlikely	Unlikely
Weeds	Unlikely	Unlikely	Unlikely	Unlikely
Dieback	Unlikely	Unlikely	Unlikely	Unlikely
Fire regimes	Unlikely	Unlikely	Unlikely	Unlikely
Vehicle strike				Unlikely
Movement barriers				
Abiotic (hydrology, salinity, soils)	Unlikely	Unlikely	Unlikely	Unlikely
Noise, light, vibration and dust				Unlikely

6.1.3 Cumulative impacts

Cumulative effects to the environment result from multiple activities whose direct impacts may be relatively minor, but in combination with other activities can result in significant environmental and social effects.

Reasonably foreseeable future activities are defined as third party (or proponent) activities which are already approved, are in a government approvals process, or are otherwise reasonably likely to proceed (EPA, 2021):

- For proposals assessed at the level of environmental review – at the time an Environmental Review Document for a proposal is accepted
- For proposals assessed at the level of assessment on referral information – at the time the final referral or required additional information is accepted
- Existing activities that are reasonably expected to be ongoing.

Cumulative impacts to MNES values resulting from the Proposed Action and other proposals in the surrounding area (within 10 km of the PAA) and across the SCP were assessed, focusing on MNES impacted by the Proposed Action, including:

- Tuart Woodlands
- Banksia Woodlands
- Carnaby's Cockatoo foraging habitat
- FRTBC foraging habitat.

Datasets from DataWA were used to predict cumulative impacts. Proposals that have the potential to impact the listed MNES values were identified using the EPA Referred Significant Proposals (DWER-120) dataset (DWER, 2026a). Proposals currently under assessment or having recently been approved by the EPA (2022 to current) were included in the assessment. Impacts resulting from clearing permits issued by the DWER were identified using the Clearing Instruments Activities (Areas Approved to Clear) (DWER-076) dataset (DWER, 2026c). Clearing permits with a status of 'Amended' or 'Granted' were included in the assessment. The Anketell Road Upgrade (Leith Road

to Kwinana Freeway) (EPBC Number: 2024/09841) has been added to the cumulative assessment. Foreseeable cumulative impacts associated with the current Proposed Action are summarised in Table 6-3. Key findings associated with MNES values are outlined below.

The Proposed Action will clear up to 3.04 ha of the Tuart Woodlands of the SCP TEC. It is estimated there is approximately 20,834.20 ha of Tuart Woodlands across the SCP, with a large percentage of this likely to represent the Tuart Woodlands of the SCP TEC. The Proposed Action and other identified proposals will result in the combined removal of approximately 83.71 ha of Tuart Woodlands locally and 679.40 ha across the SCP. This represents a reduction of 0.35% locally and 3.26% at a SCP scale.

The Proposed Action will impact 10.58 ha of the Banksia Woodlands of the SCP TEC. 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. The Proposed Action and other identified proposals will result in a reduction of Banksia Woodlands by 1.96% locally and 3.17% across the SCP.

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) and foraging habitat for Carnaby's Cockatoo and FRTBC. It is estimated there is approximately 528,893 ha of Carnaby's Cockatoo foraging habitat and 205,647 ha of FRTBC foraging habitat across the SCP. Future development across the SCP (proposals and clearing permits) may result in a foreseeable cumulative clearing of up to 9,162.29 ha of native Carnaby's Cockatoo foraging habitat and 4,656.87 ha of native FRTBC foraging habitat. This clearing represents a reduction of approximately 1.73% of native Carnaby's Cockatoo foraging habitat and 2.26% of native FRTBC foraging habitat across the SCP.

Across the SCP, the Gnangara, Pinjar and Yanchep pine plantations provide Black Cockatoo foraging habitat. The total extent of these plantations was estimated at 23,000 ha, with approximately 16,530 ha (71.9%) having already been cleared. It is anticipated that the remaining 6,470 ha will be removed by 2025/2026 (Curtin University 2022). The Proposed Action does not involve the clearing of any pine plantation.

With consideration to both native and non-native (pine plantation) vegetation, clearing for foreseeable future developments across the SCP may result in the loss of up to 15,632.29 ha of Carnaby's Cockatoo foraging habitat (native and non-native), representing a cumulative reduction of 2.92% (based on an estimated total extent of 535,363 ha) of native and non-native Carnaby's Cockatoo foraging habitat across the SCP. The Proposed Action will impact only 0.004% of native and non-native Carnaby's Cockatoo foraging habitat across the SCP.

Table 6-3: Foreseeable cumulative impacts associated with the Proposed Action and other proposals in the surrounding area (within a 10 km buffer of the PAA) and across the SCP on Tuart and Banksia TEC

Environmental value	Kwinana Freeway Upgrade Proposed Action	EPA Proposals and DWER clearing permits within 10 km of the PAA	Foreseeable cumulative impact within 10 km of the PAA	EPA Proposals and DWER clearing permits across the SCP	Foreseeable cumulative impact across the SCP	Estimated total extent within 10 km of the PAA	Estimated total extent across the SCP	% of impact from foreseeable cumulative impacts within 10 km of the PAA	% of impact from foreseeable cumulative impacts across the SCP	% of impact from Current Proposed Action across the SCP
Tuart Woodlands	3.04 ha	83.71 ha	86.75 ha	676.36 ha	679.40 ha	25,057 ha	20,834.20 ha	0.35%	3.26%	0.015%
Banksia Woodlands	10.58 ha	1,599.77 ha	1,609.48 ha	6,022.14 ha	6,031.85 ha	81,987 ha	190,260.18 ha	1.96%	3.17%	0.005%

Table 6-4: Foreseeable cumulative impacts associated with the Proposed Action and other proposals in the surrounding area (within a 12 km buffer of the PAA) and across the SCP on black cockatoos

Environmental value	Kwinana Freeway Upgrade Proposed Action	EPA Proposals and DWER clearing permits within 12 km of the PAA	Foreseeable cumulative impact within 12 km of the PAA	EPA Proposals and DWER clearing permits across the SCP	Foreseeable cumulative impact across the SCP	Estimated total extent within 12 km of the PAA	Estimated total extent across the SCP	% of impact from foreseeable cumulative impacts within 12 km of the PAA	% of impact from foreseeable cumulative impacts across the SCP	% of impact from Current Proposed Action across the SCP
Carnaby's Cockatoo foraging habitat	21.2 ha	255.17 ha	276.37 ha	9,141.09 ha	9,162.29 ha	15,968 ha	528,893 ha	1.73%	1.73%	0.004%
FRTBC foraging habitat	20.17 ha	370.75 ha	390.92 ha	4,636.70 ha	4,656.87 ha	15,968 ha	205,647 ha	2.45%	2.26%	0.010%
Gnangara pines (non-native Black Cockatoo foraging habitat)	0 ha	0 ha	0 ha	6,470 ha	6,470 ha	0 ha	6,470 ha	0.00%	100.00%	0.000%

6.2 Tuart TEC

6.2.1 Direct impacts

Up to 3.04 ha of Tuart TEC will be impacted by the proposed action, with 2.17 ha of this mapped as Degraded to Completely Degraded. All the Tuart trees within the Tuart TEC impacted by the proposed action are relatively small (less than 500mm DBH), with the majority within roadside vegetation of degraded condition.



Plate 2: Photo showing the degraded condition of the roadside revegetation along Roe Highway captured within the 30 m buffer of the Tuart TEC.

6.2.1.1 Tuart TEC Patch assessment

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. Results from the habitat quality scoring (HQS) assessment using the DCCEEW HQS tool for Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain threatened ecological community is presented in Attachment 9. As shown Table 6-5, all three patches will be reduced in size but still meet the size and condition thresholds to remain Tuart TEC patches. While not all patch areas outside the PAA were surveyed as part of the biological surveys, based on field observations it is assumed patch condition is good or better in remaining patch areas (GHD, 2025a), the exception is RoeTT01 where the full extent of the patch was surveyed (GHD, 2025b).

Table 6-5: 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)		HQS	Extent within PAA (ha)	Extent within PAA (%)	Comments
RoeTT01	4.94	Very Good	0.87	4.20	1.66	33.60	Clearing northern portion of patch. Patch size reduced to <5 ha. Remaining part of 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	3.28	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	2.53	0.70	8.62	Clearing on eastern edge of patch. Patch will meet size threshold (>5 ha) post clearing. Remains Tuart TEC patch.

6.2.2 Indirect impacts

6.2.2.1 Loss of patch viability (threshold no longer met)

All Tuart TEC patches impacted by the PAA will retain the 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 Tuart TEC patch to determine if the patch extent remaining still meets the thresholds (section 6.2.1.1).

6.2.2.2 Fragmentation and edge effects

Clearing for the Proposed Action is 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 Proposed Action is widening an existing linear freeway no existing patches will be fragmented, the Proposed Action is not expected to result in increased fragmentation and edge effects causing further fragmentation of the impacts to Tuart TEC.

6.2.2.3 Introduction and/or spread of weeds

The Proposed Action has the potential to introduce and/or spread weeds through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of weed infested topsoil. This may result in weeds establishing or spreading from the PAA into adjacent areas of Tuart TEC. Two WoNS were recorded in the PAA during the GHD (2025a, b) and Biota (2025) surveys. The presence of significant weeds could directly impact the integrity of intact Tuart TEC vegetation. Main Roads routinely manages weeds and has established mitigation and monitoring measures detailed in Section 8. Given the high weed load currently within the PAA and surrounds and proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of weeds that could result in significant indirect impacts to the Tuart TEC.

6.2.2.4 Introduction and/or spread of *Phytophthora cinnamomi* Dieback

The Proposed Action has the potential to introduce and/or spread dieback through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of dieback infested topsoil. The Proposed Action is not expected to spread *Phytophthora* dieback through sediment in stormwater runoff as the drainage strategy is to provide infiltration at the source, or as close to the source as possible, using permeable base pits via infiltration basins. Tuart is not considered to be susceptible to *P. cinnamomi* but is susceptible to other *Phytophthora* species (DEE, 2019). Main Roads routinely manages dieback and has established dieback hygiene controls detailed in Section 8. Given the disturbed nature of the overall PAA, previous and currently land uses, the proposed mitigation measures and the low susceptibility of the Tuart TEC to Dieback, the Proposed Action is not expected to result in the introduction and/or spread of dieback that could result in significant indirect impacts to the Tuart TEC.

6.2.2.5 Altered fire regimes

The Proposed Action has the potential to impact Tuart TEC through the accidental generation of fire during construction, however, this potential is considered low. The risk of fire during construction is temporary and no permanent changes to existing fire regimes are expected from the Proposed Action. Tuart is a relatively thick barked species and is able to resprout from epicormic buds following fire (Ruthrof et al, 2002). The species also predominantly relies on fire for recruitment of seedlings (Ruthrof et al, 2002).

Main Roads will implement construction and operational controls as detailed in Section 8 and Attachment 8 to appropriately control the risk of fire. This will include identifying potential ignition sources and/or activities with the potential to lead to fire, and preventable measures. Weed management will reduce the risk of fires caused by the Proposed Action spreading to nearby Tuart TEC. Given the existing infrastructure and industries currently present within and adjacent to the PAA, the overall degraded nature of the PAA and that fire is manageable, the implementation of the Proposed Action is not expected to impact existing fire regimes, nor increase the likelihood of fires.

6.2.2.6 Abiotic aspects

Acid Sulphate Soils and soil contamination

The Proposed Action has the potential to disturb ASS during excavation activities and/or dewatering, however the Tuart TEC patches intersecting with the PAA do not occur within areas of higher risk ASS.

Management measures as detailed in Section 8 and Attachment 8 will be implemented while undertaking excavation and piling to adequately manage potential ASS related impacts from occurring. Accordingly, ASS impacts are not expected to affect Tuart TEC.

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 management measures outlined in Section 8 and Attachment 8 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

Construction water will be sourced across the length of the project, with multiple water sources being required for the Proposed Action. Accordingly, the taking of water will not be limited to one or two locations.

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 indirect 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.

Modelling of groundwater drawdown associated with abstraction during construction indicates that any changes to groundwater levels are predicted to be restricted to within approximately 300 m of the production bore location. While Tuart TEC is not expected to be impacted by the temporary taking of water for construction water, monitoring of groundwater levels would be required during abstraction if any production bores are installed within 300 m of a Tuart TEC patch.

6.2.2.7 Dust generation

The Proposed Action will involve vegetation clearing and earthworks, which will potentially generate dust, however, given its temporary nature and the management measures proposed, potential dust impacts will not have significant impact on Tuart TEC. If there was an impact on the Tuart TEC from dust deposition, it would be negligible and temporary.

Vegetation impacts due to dust deposition has not been detected for any metropolitan road project.

Although the risk of dust impacts on the Tuart TEC is very low and, accordingly, doesn't trigger the need for additional management measures, dust suppress measures, such as water sprinkling on the exposed grounds and controlling speed will be implemented to manage safety, engineering and amenity risks. Implementing these management measures may also benefit the vegetation health of the Tuart TEC. Given the limited amount of dust from the Proposed Action, that dust has not been observed as having an impact on adjacent vegetation for any metropolitan road project and exposure of the ground being temporary, an impact on vegetation condition of the Tuart TEC is not expected.

6.2.3 Assessment of significance

Table 6-6 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.

Table 6-6: 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 13). 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 20,834.20 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. May 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 6-5, 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 Proposed Action 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 13). 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 one small Tuart within the Tuart TEC is likely to be impacted by the Proposed Action 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 13). 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 <i>Significant Impact Guidelines 1.1</i> (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 Banksia TEC

6.3.1 Direct impacts

Construction of the Proposed Action is likely to result in the direct loss of up to 10.58 ha of the Banksia TEC, of which 0.86 ha was mapped as being in Very Good to Excellent condition, 1.7 ha in Very Good condition and 2.19 ha was mapped as being in Good condition with 6.67 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.

6.3.1.1 Banksia TEC patch assessment

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. Results from the HQS assessment using the DCCEEW HQS tool for Banksia Woodlands of the Swan Coastal Plain threatened ecological community is presented in Attachment 9.

As shown in Table 6-7 and Figure 15, patches BT02, BT03, BT04, BT05, and BT06 will be reduced in size but remain greater than 2 ha with vegetation in Good or better condition to remain a Banksia TEC patch. While not all patch areas outside the PAA were surveyed as part of the biological surveys, based on field observations it is assumed patch condition is good or better in remaining patch areas (GHD, 2025a; b).

Table 6-7: 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)		Overall HQS of patch	Extent within PAA (ha)	Extent within PAA (%)	Comments
BT02	14.27	Very Good	0.86	5.38	1.88	13.15	Clearing on edge of patch. Patch will meet size threshold and condition thresholds (at least 6.53 ha in Very Good condition) post clearing. Remains Banksia TEC patch.
		Good	0.61				
		Degraded	0.41				
BT03	17.76	Very Good	0.35	4.13	3.41	19.20	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	1.16				
		Degraded	1.03				
		Completely Degraded	0.87				
BT04	62.59	Very Good to Excellent	0.86	5.03	2.65	4.24	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.
		Very Good	0.49				
		Degraded	1.30				
BT05	7.15	Good	0.08	2.90	1.11	15.44	Clearing of mostly degraded vegetation on edge of patch. Patch will meet size threshold and condition thresholds
		Degraded	1.03				

Patch ID	Size of patch overall (ha)	Condition rating within PAA (ha)		Overall HQS of patch	Extent within PAA (ha)	Extent within PAA (%)	Comments
							(>2 ha and Good condition or better condition) post clearing. Remains Banksia TEC patch.
BT06 and BT07	51.94	Good	0.33	5.50	1.54	2.96	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.
		Degraded	1.15				
		Completely Degraded	0.87				

6.3.2 Indirect impacts

6.3.2.1 Loss of patch viability (threshold no longer met)

All Banksia TEC patches impacted by the PAA will retain the 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 Banksia TEC patch to determine if the patch extent remaining still meets the thresholds (section 6.3.1.1).

6.3.2.2 Fragmentation and edge effects

Clearing for the Proposed Action is 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 further fragmentation of the impacts to Banksia TEC.

6.3.2.3 Introduction and/or spread of weeds

The Proposed Action has the potential to introduce and/or spread weeds through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of weed infested topsoil. This may result in weeds establishing or spreading from the PAA into adjacent areas of Banksia TEC. Two WoNS were recorded in the PAA during the GHD (2025a, b) and Biota (2025) surveys. The presence of significant weeds could directly impact the integrity of intact Banksia TEC vegetation. Main Roads routinely manages weeds and has established mitigation and monitoring measures detailed in Section 8 and Attachment 8. Given the high weed load currently within the PAA and surrounds and proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of weeds that could result in significant indirect impacts to the Banksia TEC.

6.3.2.4 Introduction and/or spread of *Phytophthora cinnamomi* Dieback

The Proposed Action has the potential to introduce and/or spread dieback through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of dieback infested topsoil. The Proposed Action is not expected to spread *Phytophthora* dieback through sediment in stormwater runoff as the drainage strategy is to provide infiltration at the source, or as close to the source as possible, using permeable base pits via infiltration basins.

Banksia is susceptible to *P. cinnamomi* and impacts to the Banksia TEC can be severe (DEE, 2016a). The two areas classed as dieback infested as identified by Glevan (2025) are in already disturbed areas, north of North Lake Road and approximately 3 km south of BT02 and south of Gibbs Road, approximately 700 m north-west of BT03.

Main Roads routinely manages dieback and has established dieback hygiene controls detailed in Section **Error! Reference source not found.** and Attachment 8. Given the disturbed nature of the overall PAA, previous and currently land uses and the proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of dieback that could result in significant indirect impacts to the Banksia TEC.

6.3.2.5 Altered fire regimes

The Proposed Action has the potential to impact Banksia TEC through the accidental generation of fire during construction, however, this potential is considered low. The risk of fire during construction is temporary and no permanent changes to existing fire regimes are expected from the Proposed Action. Key Banksia species of the TEC (i.e. diagnostic species) have particular responses to fire and require fire-free intervals to increase fire tolerance and/or to allow a build up of seed resources (DEE, 2016a). Increased fire frequency can also promote grassy weed invasion which in turn can increase fire risk (DEE, 2016a).

Main Roads will implement mitigation and monitoring measures detailed in Section 8 and Attachment 8 to appropriately control the risk of fire. This will include identifying potential ignition sources and/or activities with the potential to lead to fire, and preventable measures. Weed management will reduce the risk of fires caused by the Proposed Action spreading to nearby Banksia TEC. Given the existing infrastructure and industries currently present within and adjacent to the PAA, the overall degraded nature of the PAA and that fire is manageable, the implementation of the Proposed Action is not expected to impact existing fire regimes, nor increase the likelihood of fires.

6.3.2.6 Abiotic aspects

Acid Sulphate Soils and soil contamination

The Proposed Action has the potential to disturb ASS during excavation activities and/or dewatering, however the Banksia TEC patches intersecting with the PAA do not occur within areas of higher risk ASS.

The implementation of management measures detailed in Section 8 and Attachment 8 when undertaking excavation and piling will adequately manage potential ASS related impacts from occurring. Accordingly, ASS impacts are not expected to affect Banksia TEC.

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.

Existing drainage structures and devices will be used to maintain existing water quality. The Proposed Action will implement the standard management measures described in Table 8-4 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.

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 Banksia TEC at worst, which will be reversed once dewatering is concluded with no long term impact remaining from the Proposed Action.

Construction water

The Proposed Action will require construction water, with the source locations 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.

Banksia TEC is not expected to be impacted by the temporary taking of water for construction water.

6.3.2.7 Dust generation

The Proposed Action will involve vegetation clearing and earthworks, which will potentially generate dust, however, given its temporary nature and the management measures proposed, dust deposition will not have significant impact on Banksia TEC. If there was an impact on the Banksia TEC from dust deposition, it would be negligible and temporary.

Vegetation impacts due to dust deposition has not been detected for any metropolitan road project.

Although the risk of dust impacts on the Banksia TEC is very low and, accordingly, doesn't trigger the need for additional management measures, dust suppress measures, such as water sprinkling on the exposed grounds and controlling speed will be implemented to manage safety, engineering and amenity risks. Implementing these management measures may also benefit the vegetation health of the Banksia TEC. Given the limited amount of dust from the Proposed Action, that dust has not be observed as having an impact on adjacent vegetation for any metropolitan road project and exposure of the ground being temporary, an impact on vegetation condition of the Banksia TEC is not expected.

6.3.3 Assessment of significance

Table 6-6Table 6-8 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 may have a significant impact on the Banksia TEC.

Table 6-8: 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 10.58 ha of Banksia TEC (Figure 15), including 0.87 ha in 'Completely degraded' condition, 4.93 ha in 'Degraded' condition, 2.19 ha in 'Good' condition, 1.70 ha in 'Very Good' and 0.86 ha in "Very Good to Excellent" 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 211,239.24 ha of native vegetation strongly and moderately associated with the Banksia TEC across the SCP. Locally it is estimated there is 7,559.45 ha of Banksia TEC within 10 km of the PAA. Of this, 2,695.87 ha occurs in conservation reserves. The Proposed Action will impact up to 10.58 ha of Banksia TEC, which is approximately 0.003% and 0.005% 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 0.13% 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. Potentially significant.
Fragment or increase fragmentation of an ecological community,	The Proposed Action will involve clearing on the edges of multiple Banksia TEC patches. As shown in Table 6-7, Patches BT02, BT03, BT04, BT05, BT06, and BT07 will be

Criteria	Assessment
for example by clearing vegetation for roads or transmission lines	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 15. 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 Proposed Action. Although the Proposed Action may adversely affect habitat critical to the survival of the Banksia TEC, based on the Approved Conservation Advice (DEE, 2016b). Potentially significant.
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	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, 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.

Criteria	Assessment
	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 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	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 10.58 ha of Banksia TEC (Figure 15). Although the Proposed Action will reduce the extent of the five patches by up to 10.58 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 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:

Criteria	Assessment
	- 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 (see Section 8) - 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 <i>Significant Impact Guidelines 1.1</i> (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 Proposed Action may 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.

6.4 *Caladenia huegelii*, *Diuris micrantha* and *Drakaea elastica*

6.4.1 Direct impacts

Extensive targeted searches within areas of suitable habitat for *Caladenia huegelii*, *Diuris micrantha* and *Drakaea elastica* were undertaken by GHD (2025a, e) during surveys over two years for the Proposed Action. None of the species were recorded and it is considered unlikely they would be present in the PAA (refer to Section 5.4). The Proposed Action will not result in direct impacts to *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica* individuals.

There is 14.27 ha of potential habitat for *Caladenia huegelii*, *Diuris micrantha* and *Drakaea elastica* within the PAA. This potential habitat is aligned with areas of Banksia TEC and/or areas of Carnaby's Black Cockatoo foraging habitat. Clearing within the PAA will result in the direct loss of 14.27 ha of potential habitat for *Caladenia huegelii*, *Diuris micrantha* and *Drakaea elastica*.

6.4.2 Indirect impacts

The Proposed Action has the potential to indirectly impact on potential orchid habitat through increased fragmentation and edge effects, introduction and/or spread of weeds and dieback, altered fire regimes and changes to hydrology. Clearing required for the Proposed Action will result in increased fragmentation of the potential orchid habitat, however, it is unlikely to result in fragmentation that would significantly impact the function of the potential orchid habitat. Main Roads routinely manages weeds and dieback and has established hygiene protocols, mitigation and monitoring measures detailed in Section 8. Given the proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of weeds or dieback that could result in significant indirect impacts to the potential orchid habitat. Similarly, Main Roads will implement standard construction and operational controls to appropriately control the risk of fire. As outlined in Section 6.3.2.6, no water quality or contamination related impacts on

Banksia TEC (and aligned potential orchid habitat) are expected. The residual indirect impacts on potential orchid habitat associated with the Proposed Action are considered negligible.

6.4.3 Assessment of significance

No individuals of *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica* were recorded within the PAA and it is considered unlikely they would be present in the PAA. There is potential orchid habitat within the PAA, but this habitat is not considered critical habitat for any of these species. The Proposed Action will not lead to a long-term decrease in the size of a *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica* population, nor reduce the area of occupancy or fragment an existing population into two or more populations given none were recorded in the PAA. The Proposed Action will not adversely affect habitat critical to the survival of these species or affect habitat to the extent that the species are likely to decline. The Proposed Action is not expected to result in the introduction or spread of invasive species or diseases that would impact *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica* individuals or their potential habitat. The Proposed Action will not interfere with the recovery of *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica*. Overall, based on the above the Proposed Action is not expected to have significant impacts (direct or indirect) on *Caladenia huegelii*, *Diuris micrantha* or *Drakaea elastica*.

6.5 Black Cockatoos

6.5.1 Direct impacts

The Proposed Action will impacts two threatened Black Cockatoo species:

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

The impacts from the Proposed Action include:

- Clearing of up to 21.06 ha of Moderate and 0.15 ha of moderate to high quality foraging habitat for Carnaby's Cockatoo (Figure 17)
- Clearing of up to 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate, and 9.14 ha of Low quality foraging habitat for FRTBC (Figure 19)
- Loss of up to 16 Black Cockatoo suitable DBH trees, of which no trees contained hollows (Figure 22). Although 16 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, Biota 2025).

Table 6-9: Summary of DBH Trees within the PAA

Species	DBH (mm)	Hollows	Remnant Native
Marri	700	-	Remnant
Marri	500	-	Planted

Species	DBH (mm)	Hollows	Remnant Native
Marri	500	-	Planted
Marri	500	-	Planted
Marri	500	-	Planted
Marri	500	-	Planted
Marri	600	-	Remnant
Marri	600	-	Planted
Marri	800	-	Planted
Marri	800	-	Planted
Tuart	670	-	Remnant
River red gum	800	-	Planted
River red gum	800	-	Planted
Flooded Gum	650	-	Planted
Jarraah	540	-	Remnant
Jarraah	780	-	Remnant

6.5.1.1 Scale, duration and intensity of impacts

The anticipated impacts are expected to be limited to the permanent loss of foraging habitat during the construction period.

Given the length of the PAA, depending on funding availability, the construction of the proposed action is likely to take several years. It is anticipated the Proposed Action will be progressively built.

6.5.1.2 Short-term and long-term impacts to local flocks

Advice was recently sought from Australian Black Cockatoo Specialists regarding another major project and its potential impact on “local” or “resident” flocks. They advised:

*Rycken et al. (2018) studied Carnaby's, Baudin's and forest red-tail cockatoos using satellite transmitters and GPS units to determine at what point after release rehabilitated cockatoos demonstrated normal flocking behaviour. In their research they used behavioural change point analysis (BCPA; Rycken et al. 2018) to determine if they could identify three behavioural states commonly assigned to animal movement: foraging, commuting, and exploratory behaviour (Dingle and Drake 2007), and a fourth behavioural state they defined as 'resident behaviour' (i.e. where a bird is relatively stationary in a location but may make small outward movements to forage). They found that flocked birds of all three species displayed all activity states **except** [ABCS emphasis] resident behaviour. Only unflocked birds which had not yet integrated into wild flocks showed resident behaviour. Their GPS*

tracking data also showed that individual birds moved between flocks, and large roosting flocks often splintered into smaller foraging flocks.

Rycken et al. (2018) also stated that “resident behaviour is highly uncharacteristic for a flock of black cockatoos when it comes to their daily activity budgets because black cockatoos demonstrate a bimodal daily foraging pattern that spans at least several kilometres from the roost (Weerheim 2008, Groom et al., 2017)”.

More recently data was collected on the movements of two rehabilitated Carnaby’s cockatoos (Mawson and Dawson, unpublished data) released at Pinjar (in March 2025) and Bickley (in May 2025) into different wild flocks. Both birds were photographed in mid-September 2025 and identified from their leg band numbers feeding in a single flock foraging on Norfolk Island pine trees at Shoalwater Bay. This represents movements of 81 km and 49 km from the two release points, further demonstrating the fluid nature of flock membership and the distances that this species will travel across the metropolitan area to access different food sources.

The information provided above demonstrates that Carnaby’s and Forest red-tail cockatoos are fluid in their membership of flocks, and that flocks relocate to different roosts across the urban and peri-urban area to source available food sources. Carnaby’s cockatoo often moves distances greater than 50 km to access better foraging habitat, meaning that the Gabbadah, St Ronan and Lake Mealup offset sites would all be readily accessible by any cockatoos residing on the Swan Coastal Plain. The concept of ‘local flocks’ is a misnomer and has no support in the published literature. If the foraging habitat is of sufficient quality to support a flock of cockatoos, and it can be accessed via vegetated corridors or large blocks of remnant vegetation, then cockatoos are likely to do so, but only for as much time as the resource continues to meet the daily food requirements of a flock (whatever size it might be).”

The short-term loss of moderate value foraging habitat is being offset by the long-term benefits of protecting foraging habitat in more suitable locations as outlined in the Offset Strategy (Attachment 10).

6.5.2 Indirect impacts

6.5.2.1 Fragmentation and edge effects

Black cockatoo habitat is already fragmented by the existing Kwinana Freeway, associated road corridors and surrounding land uses. The PAA is approximately 200 m at its widest point. Clearing within the PAA is unlikely to fragment the surrounding foraging habitat to an extent that it represents a barrier to movement of black cockatoos through the local area. Furthermore, the removal of foraging habitat within the PAA will not create a gap of 1 km or more between patches of available habitat.

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.

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

6.5.2.2 Introduction and/or spread of weeds

The Proposed Action has the potential to introduce and/or spread weeds through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of weed infested topsoil. Main Roads routinely manages weeds and has established mitigation and monitoring measures detailed in Section 8. Given the existing high weed load within the PAA and surrounds and proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of weeds that would result in significant indirect impacts to black cockatoo habitat.

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

The Proposed Action has the potential to introduce and/or spread dieback through ground disturbing activities such as clearing, increased movement of vehicles or earth-moving machinery and import or reuse of dieback infested topsoil.

A dieback survey has been undertaken for the PAA to inform management and reduce the risk of indirect impacts. Additionally, Main Roads routinely manages dieback and has established dieback hygiene controls detailed in Section 8. Given the disturbed nature of the overall PAA, previous and current land uses and the proposed mitigation measures, the Proposed Action is not expected to result in the introduction and/or spread of dieback that could result in significant indirect impacts to black cockatoo habitat.

6.5.2.4 Increased risk of fire

The Proposed Action has the potential to impact black cockatoo habitat through the accidental generation of fire during construction. Main Roads will implement standard construction and operational controls to appropriately control the risk of fire. This will include identifying potential ignition sources and/or activities with the potential to lead to fire, and preventable measures. Weed management will reduce the risk of fires caused by the Proposed Action spreading to nearby black cockatoo habitat. Given the existing infrastructure and industries currently present within and adjacent to the PAA, the overall degraded nature of the PAA and that fire is manageable, the implementation of the Proposed Action is not expected to impact existing fire regimes, nor increase the likelihood of fires.

6.5.2.5 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 Proposed Action 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 Proposed Action 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.

6.5.2.6 Movement barriers

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 Proposed Action unlikely to increase or change this impact.

6.5.2.7 Abiotic aspects

Noise, light, vibration and dust emissions

Although the Proposed Action may increase noise, light and vibration emissions during construction, this increase is not expected to be significant given the existing PAA is located within an existing freeway reserve, which already holds heavy traffic and provides roadside lighting.

No breeding activity or definitive evidence of breeding was recorded within or adjacent to the PAA.

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. The Proposed Action involves the upgrade of the existing Kwinana Freeway and therefore is not expected to have substantially increased noise, light and vibration emissions during operation. Main Roads will ensure any new lighting within 50 m of known roost sites do not point directly at the roost. The potential impact to Black Cockatoos from noise, light and vibration associated with the Proposed Action is considered negligible.

The Proposed Action will involve vegetation clearing and earthworks, which will potentially generate dust, however it will not have a significant impact on the surrounding vegetation include black cockatoo foraging habitat. If there was an impact on black cockatoo foraging habitat from dust deposition, it would be negligible and temporary.

Vegetation impacts due to dust deposition has not been detected for any metropolitan road project. Although the risk of dust impacts on the black cockatoo foraging habitat is very low and, accordingly, doesn't trigger the need for additional management measures, dust suppress measures, such as water sprinkling on the exposed grounds and controlling speed will be implemented to manage safety, engineering and amenity risks. Implementing these management measures may also benefit the vegetation health of the black cockatoo foraging habitat. Given the limited amount of dust from the Proposed Action, that dust has not be observed as having an impact on adjacent vegetation for any metropolitan road project and exposure of the ground being temporary, an impact on vegetation condition of the black cockatoo foraging habitat is not expected.

6.5.3 Assessment of significance

Table 6-10 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 6-11.

As presented in Table 6-10 and Table 6-11, the Proposed Action is likely to trigger referral,. 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 6-10: 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 21.05 ha of Moderate and 0.15 ha Moderate – High, quality foraging habitat for Carnaby's Cockatoo and 1.51 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.13 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

Criteria	Assessment
	Proposed Action indicates the proposed clearing represents a 0.13% 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 0.004% 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 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. Construction management 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. 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. The loss of 21.05 ha of Moderate and 0.15 ha Moderate – High, quality foraging habitat for Carnaby's Cockatoo and 1.51 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.13 ha of Low quality foraging habitat for FRTBC is unlikely to lead to a long-term decrease in the size of a population given the location of the PAA and the nature of the habitat (freeway roadside vegetation). The offsets proposed will create and protect foraging habitat in locations that are best for species and may assist in increasing important populations. Unlikely to be significant.
Reduce the area of occupancy of the species	The Proposed Action requires the clearing of 21.065 ha of Moderate and 0.15 ha Moderate – High, quality foraging habitat for Carnaby's Cockatoo and 1.521 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC, which represents 0.13% of local habitat within 12 km of the PAA; and 0.004% 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 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 regional 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. Offsets proposed will create and protect foraging habitat in locations that are best for species, thus increasing the area of occupancy of the species.

Criteria	Assessment
	Unlikely to be significant.
Fragment an existing population (or important population, for FRTBC) into two or more populations	The Proposed Action will not 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 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 Proposed Action has resulted in all but sixteen large trees (trees with a DBH above 500 mm) being avoided within the 20 km corridor, of which only 10 are Marri. Of these, eight 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 DCCEE requirements to not have revegetated foraging habitat within 10 m of the traffic lane. Accordingly, the Proposed Action 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 removal of up to 0.15 ha of Moderate-High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo. The Proposed Action will remove up to 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.13 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, albeit not High quality foraging habitat. 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. Offsets proposed will create and protect foraging habitat in locations that are best for species, thus creating habitat critical to the survival of a species. 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).

Criteria	Assessment
	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 21.06 ha of Moderate and 0.15 ha of Moderate-High quality foraging habitat for Carnaby's Cockatoo, which represents approximately 0.13% 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 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC, which represents approximately 0.13% 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. Furthermore, offsets proposed will create and protect foraging habitat in locations that are best for species, thus ensuring the species won't decline due to the proposed action's impact on availability or quality of habitat. Unlikely to be significant.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	The 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 verges and in road drainage basins/swales to prevent the spread of weeds into adjacent habitat. The Proposed Action will not introduce or facilitate the movement of any predator species (e.g., foxes, feral cats or rabbits) as it primarily relates to the construction of additional lanes to an existing freeway. 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.

Criteria	Assessment
Introduce disease that may cause the species to decline	The proposed action to construct additional lanes on an existing freeway will not 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 to construct additional lanes on an existing freeway 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. Furthermore, offsets proposed will create, protect and enhance habitat critical for survival throughout their breeding and non-breeding range, assisting in the recovery of the species. Unlikely to be significant.
Conclusion	Based on the above assessment against the <i>Significant Impact Guidelines 1.1</i> (DoE 2013), the Proposed Action to construct additional lanes on an existing freeway 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 most 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. Furthermore, offsets proposed will create, protect and enhance habitat critical for survival throughout their breeding and non-breeding range, assisting in the recovery of the species.

Table 6-11: 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 0.15 ha of Moderate – High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo and 1.52 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 Proposed Action has resulted in all but sixteen large trees (trees with a DBH above 500 mm) being avoided within the 20 km corridor, of which only 10 are Marri. Of these, eight 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 21.21 ha of Moderate quality foraging habitat for Carnaby's Cockatoo. Although the Proposed Action 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 9.52 ha of Low – Moderate and 9.14 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. May 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: • 0.15 ha of Moderate – High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo • 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 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 phase. 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 • 10.58 ha of Banksia TEC • 0.15 ha of Moderate – High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo • 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC. • 16 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 DCCEE 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 Proposed Action 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 Proposed Action 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 174 ha and covers approximately 20 km, the Proposed Action has been designed in such a way as to only impact 5.51 ha of vegetation that is in Good or better condition. Furthermore, significant effort has been undertaken to avoid all large trees with only sixteen 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.
- The detailed design of Noise walls will seek to reduce impacts to Black Cockatoo by incorporating elements to reduce bird strike such as visual markers.

As outlined in section 1.3 the amendment to the PAA resulted in an increase in the impact to Banksia TEC, particularly Patch BT03. In addition to the above, the following measures have been

implemented to reduce the extent of clearing required for Banksia Woodlands TEC patch BT03, along the western side of the Rowley Road on-ramp to Kwinana Freeway northbound:

- Staying within the existing road reservation to limit impact on adjacent vegetation, limit land acquisition, and minimise impacts on existing Western Power infrastructure.
- Adopted maximum longitudinal ramp grades at the southern end of the Rowley Road on-ramp to align with natural surface grades and reduce the extent of disturbance
- Inclusion of a retaining wall on the west side of the Rowley Road on-ramp in lieu of a typical 1:3 batter
- Relocation of the principal shared path (PSP) to the top and adjacent to the retaining wall for the Rowley Road on-ramp to minimise the width of infrastructure footprint and utilising the excavation area required for the construction of the ramp.
- Main Roads and the Public Transport Authority worked together to minimise the width of the rail corridor where possible to reduce verge-side impacts due to the inability to widen the freeway into the median due to the Perth–Mandurah passenger rail line.

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

Mitigation measure	Tuart TEC and Banksia TEC	Black Cockatoos
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 8-3 and have been incorporated into the Construction Environmental Management Plan (CEMP) (Attachment 8) 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 captured 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 processes, 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 10.58 ha of Banksia TEC	Area (ha) of Banksia TEC cleared			No more than 10.58 ha of Banksia TEC cleared
Clearing of 0.15 ha of Moderate – High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo	Area (ha) of Carnaby's foraging habitat cleared			No more than 0.15 ha of Moderate – High and 21.06 ha of Moderate quality Carnaby's Cockatoo foraging habitat cleared
Clearing of 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC	Area (ha) of FRTBC foraging habitat cleared			No more than 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC cleared
Clearing of 16 potential Black Cockatoo breeding trees, without hollows	Number of trees with a suitable DBH cleared			No more than 16 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.

Preconstruction 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 10.58 ha of Banksia TEC 0.15 ha of Moderate – High and 21.06 ha of Moderate quality foraging habitat for Carnaby's Cockatoo 1.52 ha of Moderate – High, 9.52 ha of Low – Moderate and 9.14 ha of Low quality foraging habitat for FRTBC 16 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 will be carried out in accordance with DBCA's Phytophthora Dieback Management Manual 2020 including; - Minimise and manage access to protectable areas - Heavy plant and machinery entering the work site will be inspected and confirmed to be clean (free of vegetation and soil material) - Ensure drainage from infested areas is directed away from uninfested areas - Topsoil from infected or potentially infected dieback areas will be segregated and not used in uninfested areas Fire Management - 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 - 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	Preconstruction - 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 Light - Ensure construction lighting within 50m of any recorded roosts is pointed away from roost. Dust - Use of water carts as required to wet down dust generation surfaces such as earthwork areas. - Progressive construction and clearing, limiting the amount of exposed areas for extended periods of time			
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 - Fuel and chemicals in bunded areas located away from drainage lines - 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	Recording of spills/leaks	Decline in the extent or condition of nearby Banksia and Tuart 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 - Major maintenance of vehicles and plant to be undertaken offsite - Provision of spill response kits at refuelling locations and any locations where hydrocarbons or chemicals are stored	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
Avoid injury or mortality to Black Cockatoos	- Fauna observers will be present during the clearing of Black Cockatoo habitat - Landscaping shall not include Black Cockatoo foraging habitat within 10m of the road	- 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	- 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)

Management Objective/Desired Outcomes	Management Measures	Performance Target/Completion Criteria	Monitoring/Reporting Activity	Potential Risk/Threat
	- 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	- Landscaping designs exclude foraging or breeding plant species within 10m of the road - No incidents of speeding within the construction site boundary		

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.

The tailored avoidance and mitigation measures outlined in section 8.4 are demonstrably effective to address key risks to Black Cockatoos, Banksia TEC, and Tuart TEC. For Black Cockatoos, the strategies incorporate qualified fauna observers during clearing, exclusion zones for foraging habitat near roads, readily available wildlife rescue contacts, and stringent speed limits for construction vehicles. These approaches directly mitigate risks by facilitating early fauna detection, minimising disturbance, enabling rapid response, and reducing vehicle strike incidents, as supported by adaptive management and compliance outcomes from previous projects. Management measures for Banksia TEC and Tuart TEC focus on minimising both direct and indirect impacts. This is accomplished through spatial avoidance, defined clearing boundaries, and stringent hygiene protocols to prevent the spread of plant pathogens such as *Phytophthora* dieback. Access and construction activities are tightly controlled to restrict disturbance to approved areas, and progressive rehabilitation is undertaken for temporarily impacted sites. Monitoring programs assess remnant vegetation health, and adaptive management is applied to address emerging risks or effectiveness concerns. These comprehensive measures, reinforced through ongoing compliance reporting, support the protection and long-term resilience of Banksia and Tuart TEC within and adjacent to the PAA.

9 RESIDUAL IMPACTS AND OFFSETS

9.1 Residual impacts

Table 9-1 provides a summary of the residual impacts on MNES from the Proposed Action following the application of proposed mitigation and management measures.

Table 9-1 Summary of residual impacts

MNES	Direct impacts	Indirect impacts
Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC)	Loss of up to 10.58 ha	Not expected
Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plan Threatened Ecological Community (Tuart TEC)	Loss of up to 3.04 ha	Not expected
Carnaby's Cockatoo foraging habitat	Loss of up to 21.21 ha	Not expected
FRTBC foraging habitat	Loss of up to 20.17 ha	Not expected

9.2 Acceptability of residual impacts

Following the avoidance and minimisation measures outlined in Section 8.2, the Proposed Action will result in the residual impacts summarised in Table 9-1. The direct impacts will be further minimised, where practicable during detailed design and construction planning. Avoidance and minimisation have limitations as the Proposed Action is required to meet road safety standards. Road vertical and horizontal geometry, land widths, steepness of roadside batters and road pavements construction are dictated by a series of Australian Standards and Austroads guidelines. This therefore may only allow a further small reduction in residual impacts.

9.3 Proposed offset strategy

Main Roads has developed an offset package to counterbalance the significant residual impacts of the Proposed Action to MNES. Table 9-2 provides a summary of the significant residual impacts on MNES for the Proposed Action. The Offset Strategy is provided in Attachment 10.

Table 9-2 Summary of significant residual impacts

MNES	Conservation Significance of Environmental Value	Significant Impact
Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia TEC)	Critically Endangered	10.58 ha
Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plan Threatened Ecological Community (Tuart TEC)	Endangered	3.04 ha
Carnaby's Cockatoo foraging habitat	Endangered	21.21 ha
Forest Red-tailed Black-Cockatoo (FRTBC) foraging habitat	Vulnerable	20.17 ha

10 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Section 3A of the EPBC Act defines the principles of ecologically sustainable development. Table 10-1 outlines how each of the five principles has been applied to the Proposed Action.

Table 10-1: EPBC Act Principles of Ecologically Sustainable Development

No.	Principle	Consideration of Principle in the Proposed Action
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 Proposed Action
		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.

11 ECONOMIC AND SOCIAL MATTERS

11.1 Projected Economic Costs and Benefits and Basis for Estimation

11.1.1 Costs and Benefits

11.1.1.1 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.

11.1.1.2 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

11.2 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 preconstruction and construction phases, and the requirement for ongoing maintenance.

11.3 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.

11.4 Details of Public and Stakeholder Consultation Activities

11.4.1 Stakeholders

Stakeholders that have an interest in the planning and development phase of the Proposed Action are listed in Table 11-1. 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 11-1: 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

11.4.2 Stakeholder engagement process

An engagement strategy to facilitate input from the community and stakeholders for the Proposed Action has been prepared. A summary of community consultation undertaken to inform the Proposed Action planning and development to date is provided in Table 11-2.

Table 11-2: 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	July 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
Westport Road and Rail Project Control Group	Out of session workshop to discuss northbound widening – median barrier relocation and rail maintenance access arrangements	July 2025
Cities of Kwinana, Cockburn and Rockingham	Meetings to present proposed Urban and Landscape Design and invite feedback	August 2025
Roger Cook MLA Electorate Office	Briefing with Electorate Office to provide overview of project scope, environmental approvals, sustainability focus areas and upcoming communications and stakeholder engagement activities.	August 2025
Project email subscribers	E-newsletter providing project updates	August 2025
Cities of Kwinana, Cockburn and Rockingham	Technical Working Group to discuss issues for the scope, design and mitigation of the project	September 2025
All community and stakeholders	Webpage update advising expressions of interest open to industry and contractors for the project's construction.	October 2025

Cities of Kwinana, Cockburn and Rockingham	Technical Working Group to discuss issues for the scope, design and mitigation of the project	October 2025
Member for Bibra Lake - Ms. Sook Yee MLA	Briefing to member of parliament to provide information on project scope and funding, environmental approvals, sustainability focus areas and communications and stakeholder engagement activities.	October 2025
Project email subscribers	E-newsletter providing project updates	December 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.

12 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

13 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.

14 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 Proposed Action specific native vegetation clearing permit application.

14.1 *Environmental Protection Act 1986, Part IV*

14.1.1 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 Proposed Action 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.

14.1.2 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 Proposed Action 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.

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

Main Roads has applied for 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.

14.3 Other approvals and regulation

Limited additional regulatory approvals will be required to develop and operate the Proposed Action (Table 14-1), 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 14-1: 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

14.4 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) approvals are required for the construction works within these land zones.

15 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 15-1.

Table 15-1: 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 <i>P. cinnamomi</i> 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) • Clearing of vegetation along a linear corridor next to an existing freeway will not compromise the integrity of the existing patch as only edges are being cleared • 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

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.	• 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. • Offsets proposed will create, protect and/or enhance TEC to ensure compliance with offset guidelines. Offset presented shall provide an overall environmental net benefit. Accordingly, the Proposed Action is not inconsistent with the priority protection and restoration actions of the Approved Conservation Advice for Banksia TEC (2016).
Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the SCP TEC Threatened Species Scientific Committee 2019, Approved Conservation Advice (incorporating listing advice) for the Tuart (<i>Eucalyptus gomphocephala</i>) 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. - Proposed widening of the existing freeway will not fragment or detrimentally modification remnants of the ecological community, noting proposed action will not impact any tuart trees greater than 500mm DBH, with large portions of the Tuart TEC being rehabilitation. - Offsets proposed will create, protect and/or enhance TEC to ensure compliance with offset guidelines. Offset presented shall provide an overall environmental net benefit. Revegetation and regeneration undertaken on offset properties will be done in accordance with relevant conservation advice. Accordingly, the Proposed Action is not inconsistent with the priority protection and restoration actions of the Approved Conservation Advice for Tuart TEC

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	(2019).

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 (<i>Calyptorhynchus latirostris</i>) 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 • Offset properties will protect and enhance non-breeding habitat • 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 <i>Calyptrorhynchus baudinii</i> and Forest Red-tailed Black Cockatoo <i>Calyptrorhynchus banksii naso</i>) 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	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 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

Recovery / Abatement plan	Priority Actions	Assessment against plan
	• Determine and implement ways to remove feral Honeybees from nesting hollows • 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.	identify Black Cockatoo habitat (including consideration of Black Cockatoo habitat mapping by DBCA and breeding records from WA museum) • Proposed Action area is not an important area for FRTBCs • 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	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	The Proposed Action is not inconsistent with the recommendations of the Recovery Plan, through the following:

Recovery / Abatement plan	Priority Actions	Assessment against plan
<i>Calyptrorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo), Department of the Environment, Water, Heritage and the Arts	• Determine and implement ways to minimise the effects of mining on habitat loss • 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.	• Monitoring of the effectiveness of management actions and whether there is a need to adapt them • 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 <i>Calyptrorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo) (DEWHA 2009).
Dieback Threat Abatement Plan for Disease in Natural Ecosystems Caused by <i>Phytophthora</i>	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.	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

Recovery / Abatement plan	Priority Actions	Assessment against plan
<i>cinnamomic</i> (Department of the Environment 2014).	• Protect priority biodiversity assets through reducing the spread and mitigating the impacts of dieback. • Communication and training.	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. 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	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	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.

Recovery / Abatement plan	Priority Actions	Assessment against plan
Environment, 2015).	• Increase public support for feral cat management and promote responsible cat ownership	The PAA is not considered to be existing breeding 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.
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. The PAA is not considered to be existing breeding habitat for Black Cockatoos, therefore predation of chicks from nesting hollows is unlikely to occur.

16 INFORMATION SOURCES

The reliability and uncertainties in the technical studies undertaken in preparation of the Proposed Action have been outlined in Table 16-1.

Table 16-1: 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.
GHD (2025e) Targeted Orchid Survey – Kwinana Freeway Upgrades	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.
Biota (2025) Anketell Rd Upgrade – Consolidated Biological Report. Unpublished report prepared for Main Roads, Western Australia.	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.
Glevan Consulting (2025) Phytophthora Dieback Occurrence Report for Kwinana Freeway Upgrade Assessment	Information is reliable. The assessment was carried out in accordance with the Phytophthora Dieback Interpreter's Manual for lands managed by the DBCA	There are no uncertainties that impact the assessment determination in this referral supporting document.

17 REFERENCES

Australian Weeds Committee (2012). Weeds of National Significance. Department of Agriculture, Fisheries and Forestry.

Biota (2024). Anketell Road Upgrade Targeted Chuditch Survey. Prepared for Main Roads Western Australia.

Chapman, T. (2008). Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan. Retrieved from <https://www.dcceew.gov.au/sites/default/files/documents/wa-forest-black-cockatoos-recovery-plan.pdf>

Conservation and Land Management (CALM). (2002). *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*.

Coyle, M (2021). Characterizing the habitat of road trauma hotspots for threatened black cockatoos in Metropolitan Perth. Murdoch University. Unpublished Masters Research Thesis.

Curtin University 2022, Referral of a proposal under s.38 of the EP Act Gngangara-Moore River State Forest, State Forest 65). Accessed April 2023 from 1. 2022-06-01 - Referral of a proposal under s38_Gngangara-Pinjar-Yanchep Change of Land Use_FINAL.pdf (epa.wa.gov.au)

DAWE (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*). Commonwealth of Australia, Canberra.

Department of Biodiversity Conservation and Attractions (DBCA) (2017a). EPA Redbook Recommended Conservation Reserves 1976-1991 (DBCA-029). Retrieved from <https://catalogue.data.wa.gov.au/dataset/epa-redbook-recommended-conservation-reserves-1976-1991>

DBCA (2017b). *A methodology for the evaluation of wetlands on the Swan Coastal Plain*, Western Australia: draft prepared by the Wetlands Section of the Department of Biodiversity, Conservation and Attractions and the Urban Water Branch of the Department of Water and Environmental Regulation, Perth.

DBCA (2018). *Directory of Important Wetlands in Australia – Western Australia (DBCA-045)*. Government of Western Australia. Retrieved from <https://catalogue.data.wa.gov.au/dataset/directory-of-important-wetlands-in-western-australia>

DBCA (2023a). Threatened and priority flora. Database.

DBCA (2023b). Threatened Ecological Community Fact Sheet - Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain). September 2023.

DBCA (2024a). Threatened and priority ecological communities. Database.

DBCA (2024b). Geomorphic Wetlands, Swan Coastal Plain (DBCA-019). Retrieved from <https://catalogue.data.wa.gov.au/dataset/geomorphic-wetlands-swan-coastal-plain>.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023). *Approved Conservation Advice for the Assemblages of plants and invertebrate animals of tumulus (organic*

mound) springs of the Swan Coastal Plain . Retrieved from

<https://www.environment.gov.au/biodiversity/threatened/communities/pubs/16-conservation-advice.pdf>

DCCEEW (2025). Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool. Retrieved from <http://www.environment.gov.au/epbc/pmst/index.html>.

Department of Environment and Conservation (DEC) (2006). Community of Tumulus (organic mound) springs of the Swan Coastal Plain Interim Recovery Plan No. 198. Perth, Western Australia.

DEC (2008). Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan, Department of Environment and Conservation. Retrieved from <https://www.dcceew.gov.au/sites/default/files/documents/wa-forest-black-cockatoos-recovery-plan.pdf>

DEC (2009a). Grand Spider Orchid (*Caladenia huegelii*) Recovery Plan. <https://www.dcceew.gov.au/sites/default/files/documents/caladenia-huegelii.pdf>

DEC (2009b). Glossy-leafed Hammer Orchid (*Drakaea elastica*) Recovery Plan. <https://www.dcceew.gov.au/sites/default/files/documents/drakaea-elastica.pdf>

DEC (2012). Chuditch (*Dasyurus geoffroii*) National Recovery Plan. Wildlife Management Program No. 54, Department of Environment and Conservation. Retrieved from <http://www.environment.gov.au/biodiversity/threatened/publications/recovery/chuditch/index.html>

DEE (2016a). Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain Ecological Community, Draft Conservation Advice Including Draft Listing Advice. October 2017.

DEE (2016b). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Canberra: TSSC, Threatened Species Scientific Committee. July 2023.

DEE (2019). Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community. Australian Government, Canberra, ACT. July 2022.

Department of Energy, Mines, Industry Regulation and Safety (DEMIRS). (2018). 1:500 000 State interpreted bedrock geology (DMIRS-016). Retrieved from <https://catalogue.data.wa.gov.au/dataset/1-500-000-state-interpreted-bedrock-geology-dmirs-016>

Department of Planning, Lands and Heritage (DPLH). (2019a). Region Scheme – Zones and Reserves (DPLH-023). Retrieved from <https://catalogue.data.wa.gov.au/dataset/region-scheme-zones-and-reserves-dop-072>

Department of Primary Industries and Regional Development (DPIRD). (2022). Soil Landscape Mapping—Systems (DPIRD-064). Retrieved from <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems>

DPIRD (2023). Native Vegetation Extent (DPIRD-005). Retrieved from <https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent>

DPIRD (2025). Soil landscape mapping—Zones (DPIRD-017). Retrieved from <https://catalogue.data.wa.gov.au/dataset/soil-landscape-land-quality-zones>

Department of the Environment and Energy (DotEE) (2019). *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community*. Canberra. Retrieved from <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf>.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Approved Conservation Advice for *Diuris purdiei* (Purdie's Donkey-orchid). <https://www.environment.gov.au/biodiversity/threatened/species/pubs/12950-conservation-advice.pdf>

DEWHA (2008a). *Approved Conservation Advice for Diuris micrantha (Dwarf Bee-orchid)*. Canberra: Department of the Environment, Water, Heritage and the Arts. Retrieved from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/55082-conservation-advice.pdf>

DEWHA (2008b). *Threat Abatement Plan for Predation by the European Red Fox*, Department of the Environment, Water, Heritage and the Arts.

DEWHA (2009). Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo). Retrieved from <https://www.environment.gov.au/biodiversity/threatened/species/pubs/67034-conservation-advice.pdf>

Department of the Premier and Cabinet (DPC). (2015). Review of the Strategic Assessment of the Perth and Peel Regions - 2015 draft documents and mapping (Draft Action Plan A to I). <https://www.wa.gov.au/government/publications/review-of-the-strategic-assessment-of-the-perth-and-peel-regions-2015-draft-documents-and-mapping-draft-action-plan-i>

DoE. (2013). Matters of National Environmental Significance - Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Department of the Environment. Australian Government. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf.

DoW (2009). Operational policy no. 5.12 – hydrogeological reporting associated with a groundwater well licence. Department of Water. Perth, Western Australia.

DPaW (2013). Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Western Australian Wildlife Management Program No. 52. Retrieved from <https://www.dcceew.gov.au/sites/default/files/documents/carnabys-cockatoo-recovery-plan.pdf>

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

<https://www.agriculture.gov.au/sites/default/files/documents/referral-guidelines-wablack-cockatoo.pdf>.

Department of Water and Environmental Regulation (DWER). (2018a). Clearing Regulations—Environmentally Sensitive Areas (DWER-046). Retrieved from <https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>.

DWER (2018b). Public Drinking Water Source Areas (DWER-033). Retrieved from <https://catalogue.data.wa.gov.au/dataset/public-drinking-water-source-areas>

DWER (2023). Perth Groundwater Map. Retrieved from <https://maps.water.wa.gov.au/Groundwater/>. Accessed September 2023.

DWER (2026a). EPA Referred Significant Proposals (DWER-120). Department of Water and Environmental Regulation. Government of Western Australia. <https://catalogue.data.wa.gov.au/dataset/epa-referred-significant-proposals>

DWER (2026b). EPA Referred Schemes (DWER-119). Department of Water and Environmental Regulation. Government of Western Australia. <https://catalogue.data.wa.gov.au/dataset/epa-referred-schemes>

DWER (2026c). Clearing Instruments Activities (Areas Approved to Clear) (DWER-076). Department of Water and Environmental Regulation. Government of Western Australia. <https://catalogue.data.wa.gov.au/dataset/clearing-instruments-activities>

EPA (2021). Referral of a proposal under section 38 of the Environmental Protection Act 1986 Instructions, October 2021. Environmental Protection Authority. Perth, Western Australia.

GHD Pty Ltd (2025a). Kwinana Freeway widening - Biological Survey. Unpublished report for Main Roads Western Australia

GHD Pty Ltd (2025b). Roe Highway widening – Targeted Flora, Vegetation and Wetland Assessment. Unpublished draft report for Main Roads Western Australia

GHD Pty Ltd (2025c). Roe Highway widening – Basic Fauna and SRE Survey. Unpublished draft report for Main Roads Western Australia

GHD Pty Ltd (2025d). Roe Highway widening – Targeted Black Cockatoo Survey. Unpublished draft report for Main Roads Western Australia

GHD Pty Ltd (2025e). Targeted Orchid Survey – Kwinana Freeway Upgrades. Unpublished report for Main Roads Western Australia.

Glevan Consulting (2025). Phytophthora Dieback Occurrence Report for Kwinana Freeway Upgrade Assessment. Unpublished report for Main Roads Western Australia.

Gibson, N., Keighery, B., Keighery, G., Burbidge, A., & Lyons, M. (1994). *A floristic survey of the southern Swan Coastal Plain*. Department of Conservation and Land Management.

Government of Western Australia, GoWA (2018). Vegetation Complexes - Swan Coastal Plain (DBCA-046). Retrieved from <https://catalogue.data.wa.gov.au/dataset/vegetation-complexes-swan-coastal-plain>

Government of Western Australia, GoWA (2019). 2018 South West Vegetation Complex Statistics, Current as of March 2019, Perth, Australia, Department of Biodiversity, Conservation and Attractions. Retrieved from <https://catalogue.data.wa.gov.au/dataset/dbca>.

Hedde, E., Loneragan, O., & Havel, J. (1980). *Vegetation Complexes of the Darling System, Western Australia, in Atlas of Natural Resources, Darling System Western Australia*. Department of Conservation and Environment.

Higgins, P.J. & S.J.J.F. Davies, eds, (1996). Handbook of Australian, New Zealand and Antarctic Birds. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press.

Infrastructure Australia (2019). Urban transport crowding and congestion, the Australian infrastructure audit 2019 supplementary report. Australia. Infrastructure Australia.

Johnstone, R. E. (2011). Black Cockatoos on the Swan Coastal Plain. Western Australia: Department of Planning.

Johnstone, RE & Storr, GM (1998), Handbook of Western Australian Birds. Volume 1: Non-passerines (Emu to Dollarbird), Western Australian Museum, Perth.

Lane, B.A. (1987). Shorebirds in Australia. Sydney, NSW: Reed.

Main Roads. (2013). Vegetation Placement within the Road Reserve Doc. No. 6707/022.

Mawson, P. R. (1995). The Red-capped Parrot *Purpureicephalus spurius* (Kuhl, 1820): A Pest by Nature or Necessity? PhD thesis, University of Western Australia.

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

Ruthrof, K. X., Yates, C. J., and Loneragan, W. A. (2002). The biology of Tuart (, Ill.). In B. J. Keighery & V. M. Longman (Editors), Tuart (*Eucalyptus gomphocephala*) and Tuart Communities (pp. 108–122). Wildflower Society of Western Australia Inc. Available from: <https://researchportal.murdoch.edu.au/esploro/outputs/bookChapter/The-biology-of-Tuart/991005543429707891>.

Saunders, D. A. (2014). Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia. Biological Conservation 177, 185 - 193.

Shepherd, DP, Beeston, GR, and Hopkins, AJM (2002), Native Vegetation in Western Australia – Extent, Type and Status, Resource Management Technical Report 249, Department of Agriculture, Western Australia.

Stream Environment and Water Pty Ltd (2025). Anketell Road Upgrade Wetland Assessment
Threatened Species Scientific Committee (TSSC). (2016). Approved Conservation Advice for the Banksia Woodlands of the Swan Coastal Plain Ecological Community.
<http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf>

WA Herbarium (2025). Florabase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. Retrieved from <http://florabase.dbca.wa.gov.au/> .

WA Herbarium. (2023). Threatened and priority flora. Database.

Webb, A., Kinloch, J., Keighery, G., & Pitt, G. (2016). *The extension of vegetation complex mapping to landform boundaries within the Swan Coastal Plain landform and forested region of south-west Western Australia*.

18 APPENDICIES

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

Appendix 1: Figures

Figure 1: PAA

Figure 2: Land Use

Figure 3: Reserves and Conservation Areas

Figure 4: Hydrology

Figure 5: Wetlands

Figure 6: Vegetation complexes within the PAA

Figure 7: Vegetation types within the PAA

Figure 8a: Vegetation condition within the PAA

Figure 9b: Dieback presence within the PAA

Figure 10: Historic MNES flora records within 5 km of the PAA

Figure 11: Fauna habitat within the PAA

Figure 12: Historic MNES fauna records within 5 km of the PAA

Figure 13: Tuart TEC within the PAA.

Figure 14: Tuart TEC within 10 km of the PAA.

Figure 15: Banksia TEC within the PAA.

Figure 16: Banksia TEC within 10 km of the PAA.

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

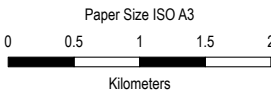
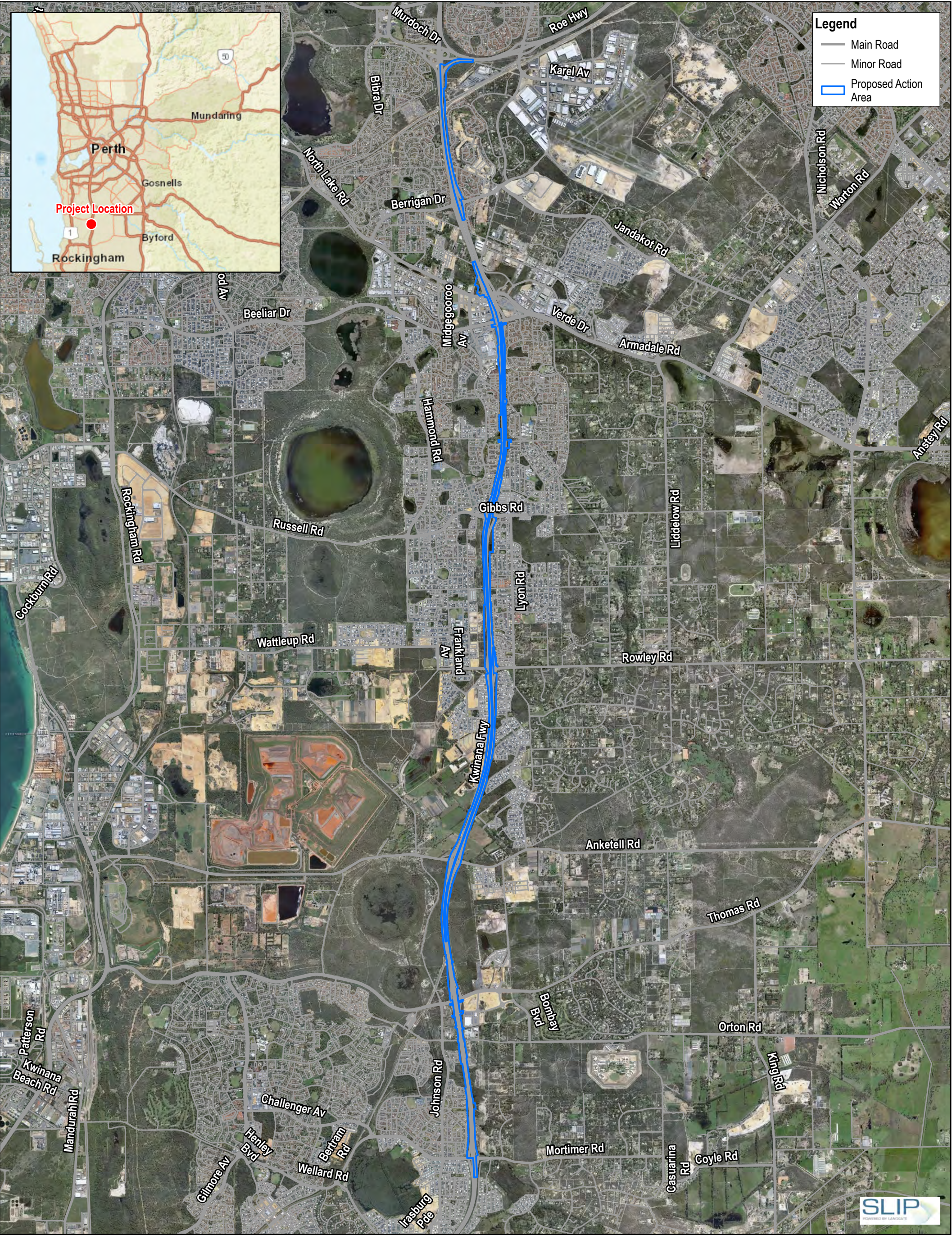
Figure 18: Carnaby's Cockatoo foraging habitat within 12 km of the PAA

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

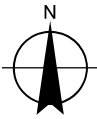
Figure 20: Forest Red-tailed Black Cockatoo foraging habitat within 12km of the PAA

Figure 21: Suitable DBH Trees within PAA

Figure 22: Black Cockatoo breeding and roosting habitat within 12km of the PAA



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

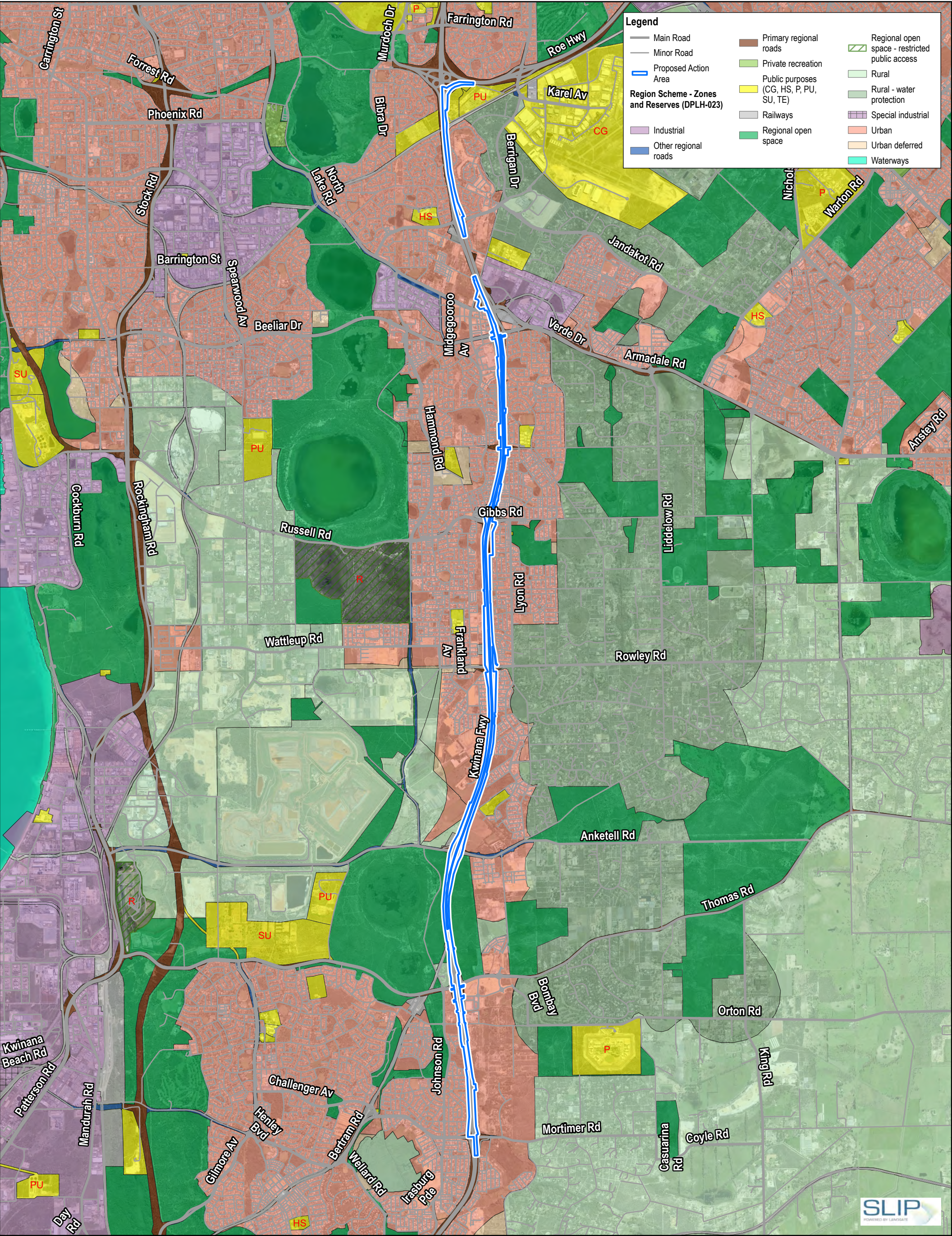


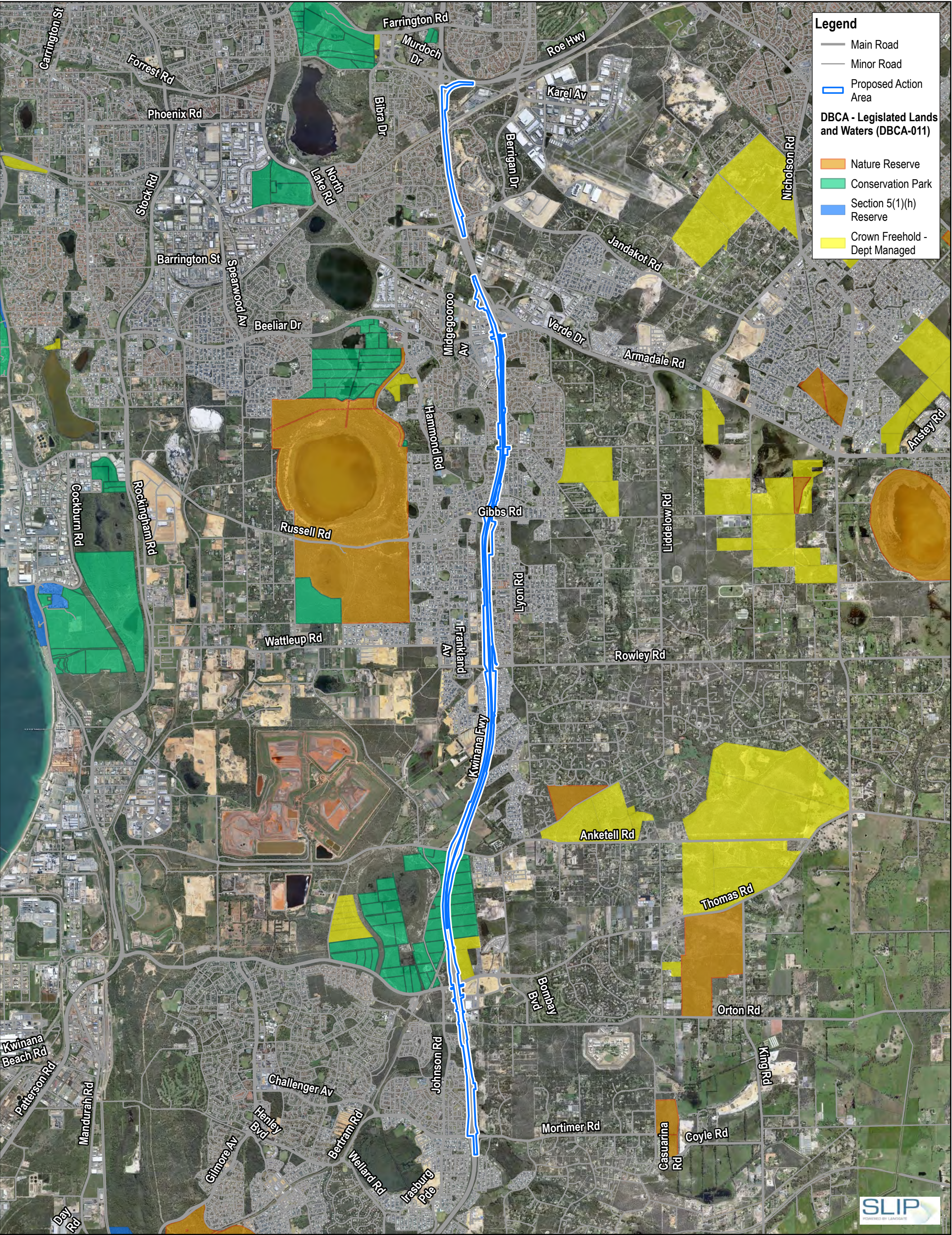
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

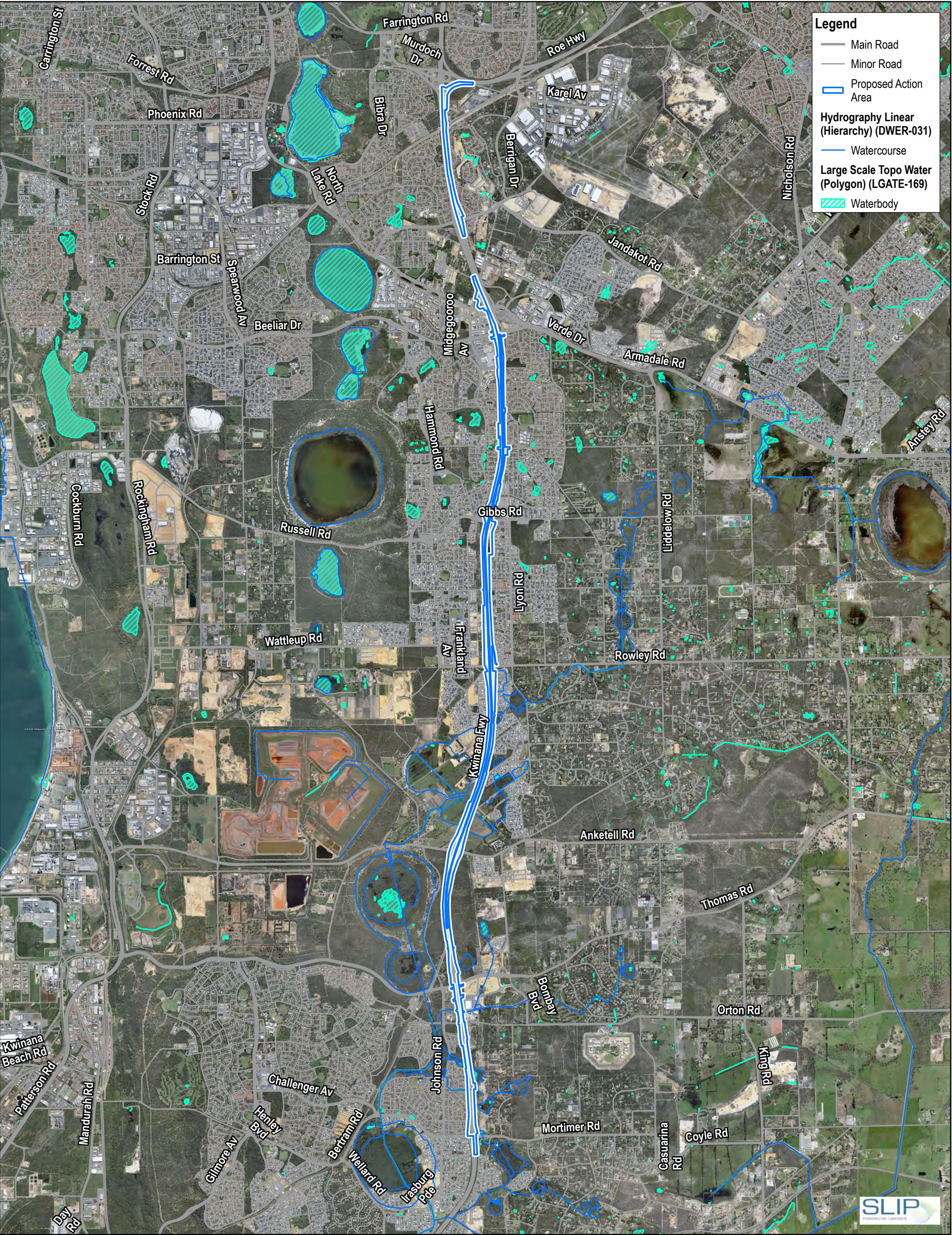
Project No. 12657323
Revision No. 2
Date 12/01/2026

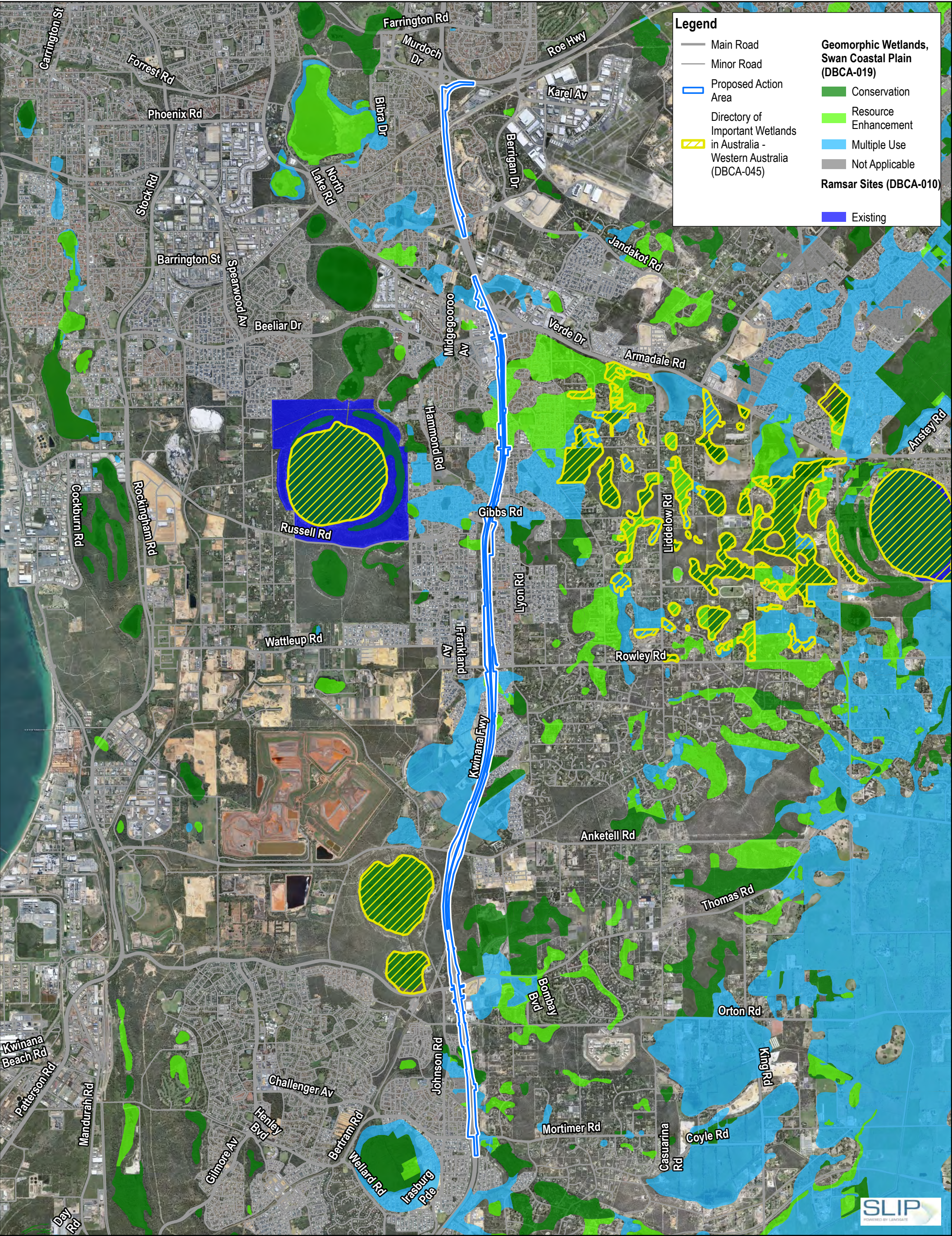
Proposed Action Area (PAA)

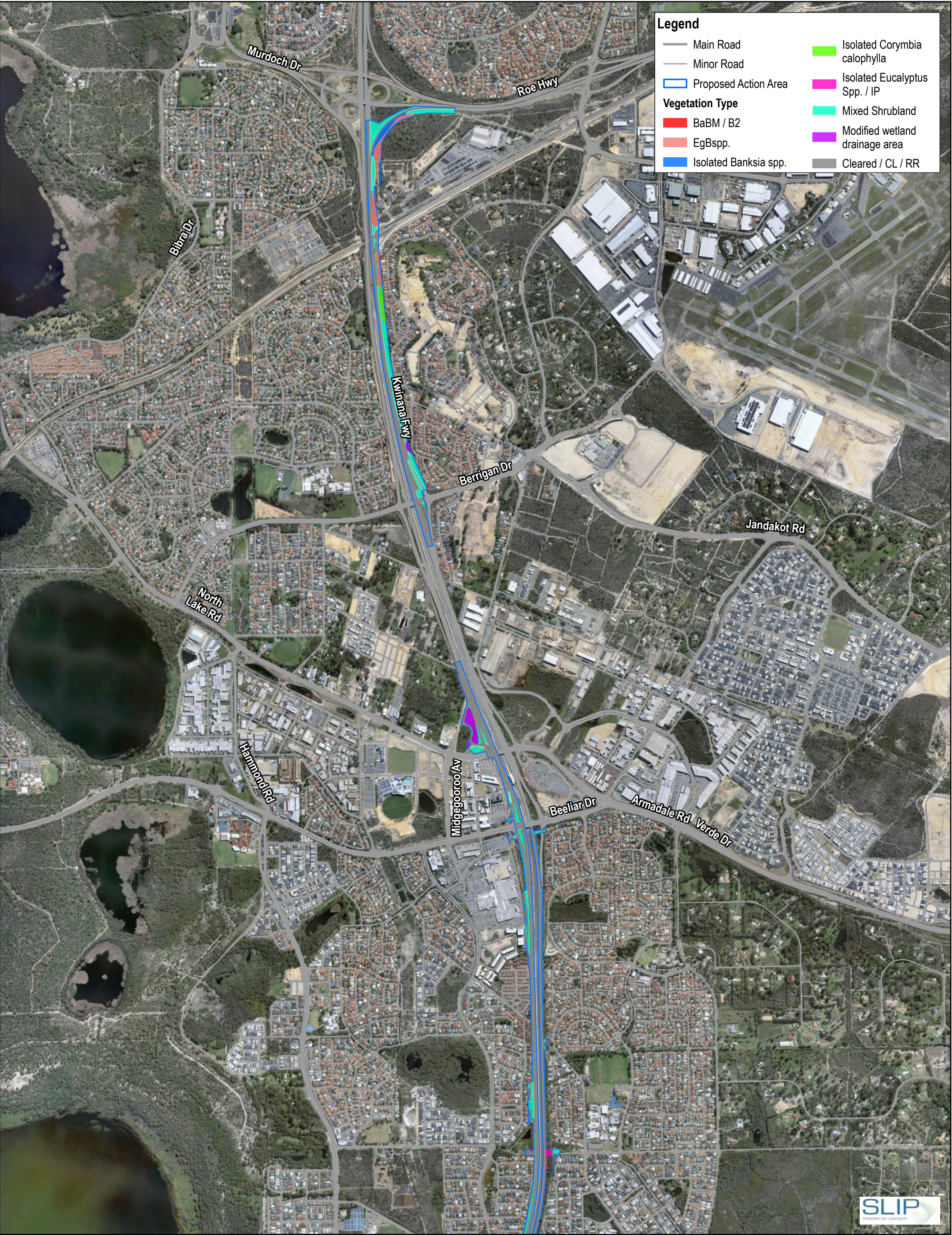
FIGURE 1

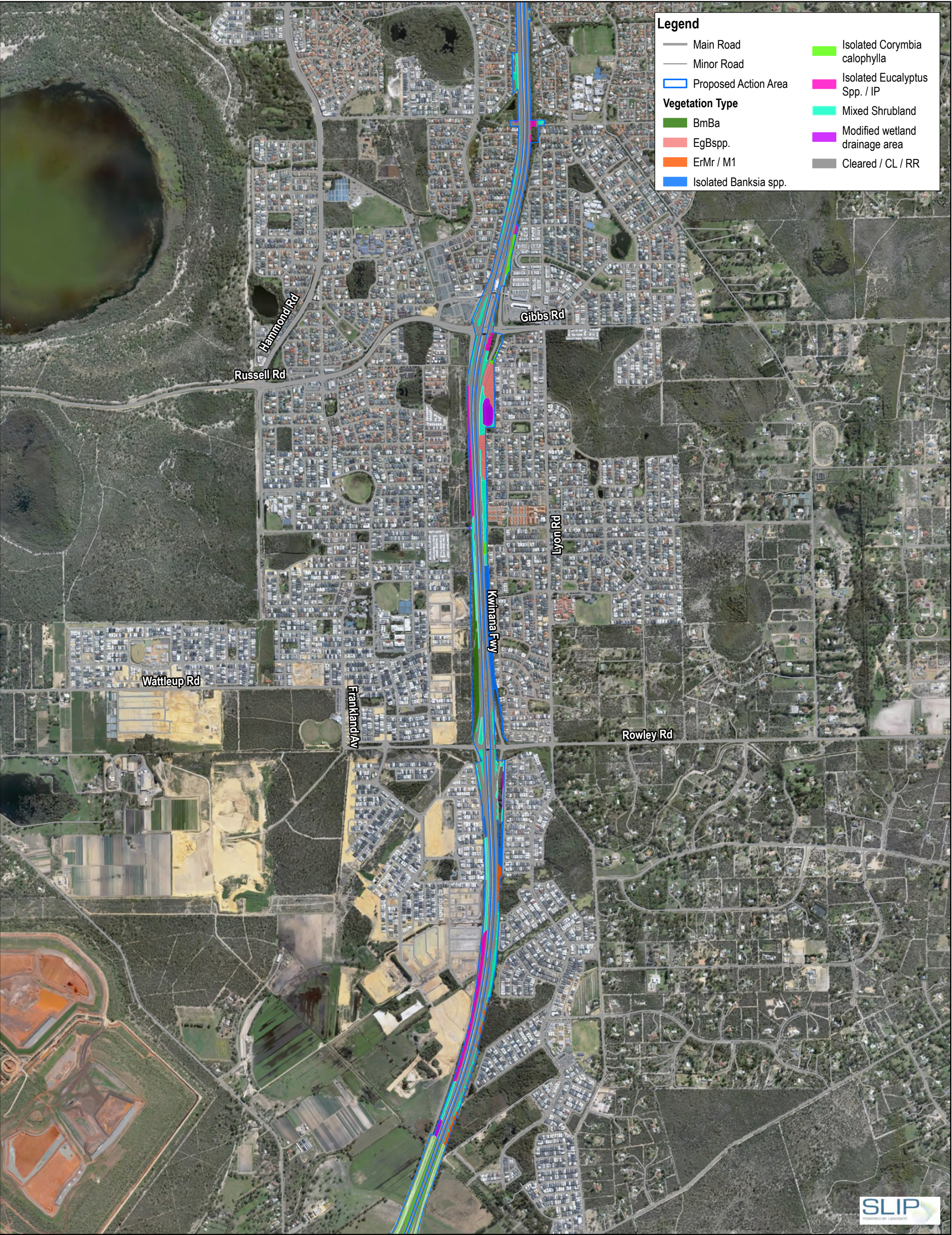


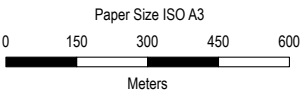
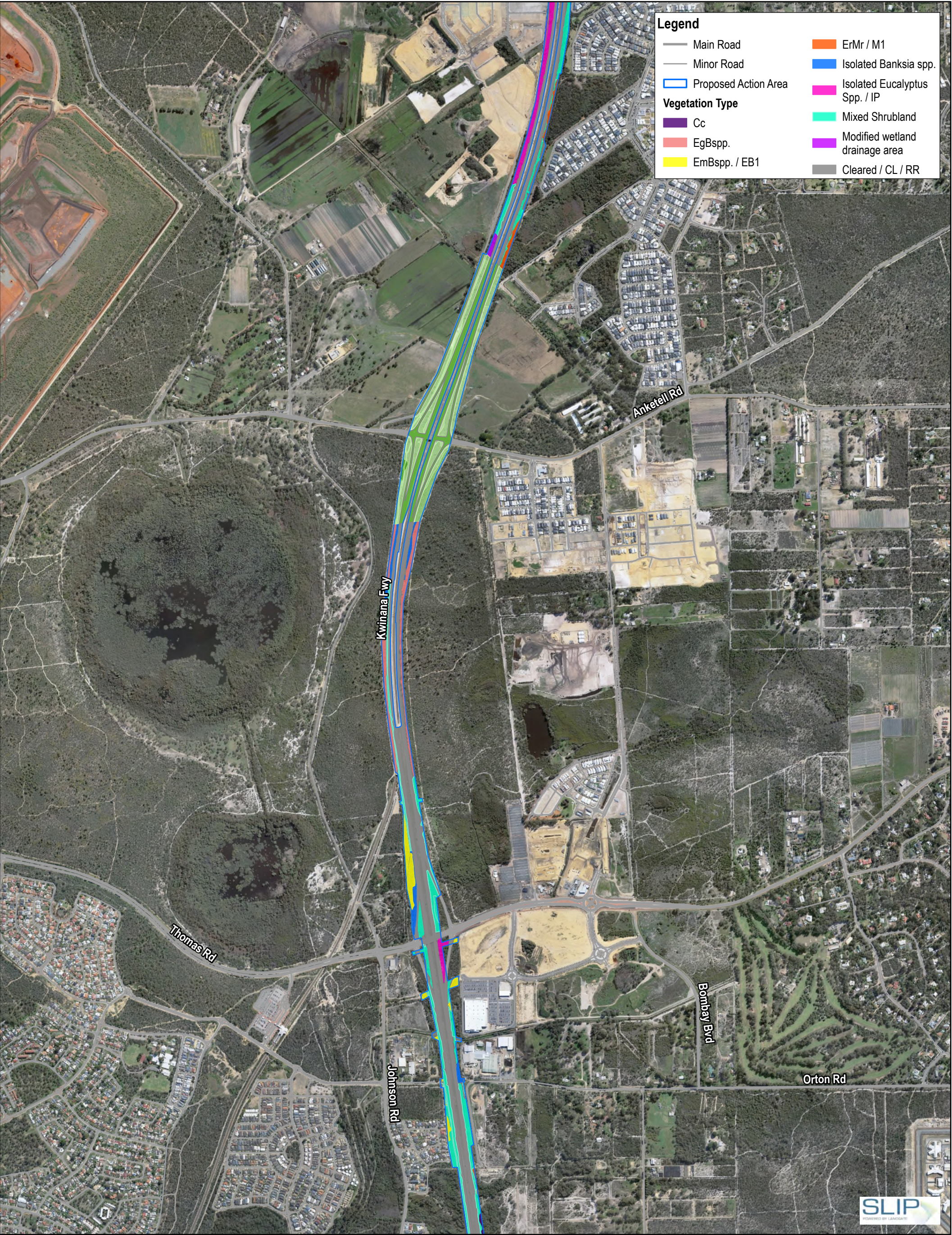




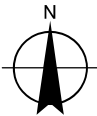








Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

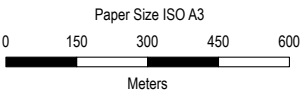
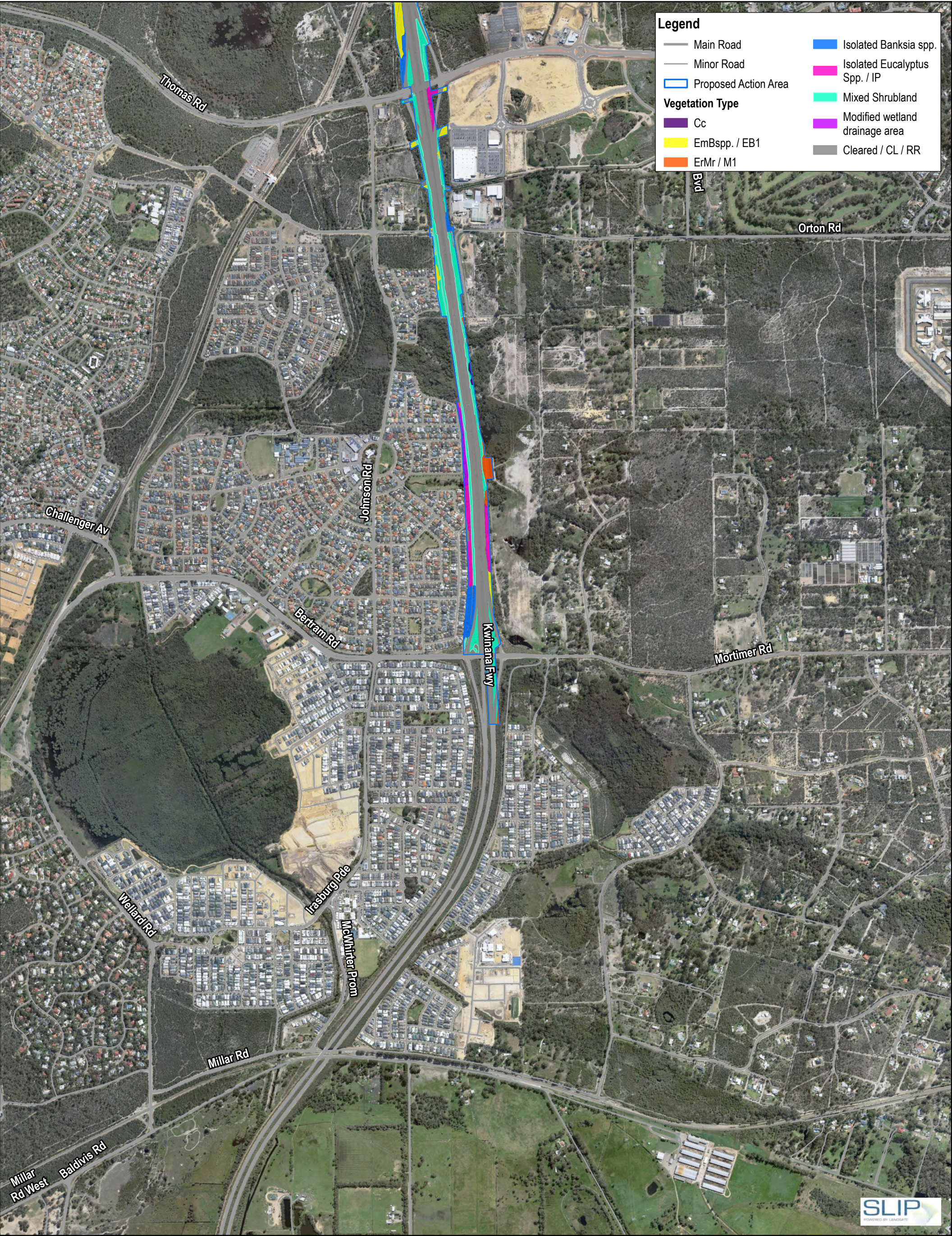


Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

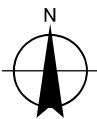
Project No. 12657323
Revision No. 3
Date 20/03/2026

Vegetation Type within the PAA

Page 3 of 4
FIGURE 7



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



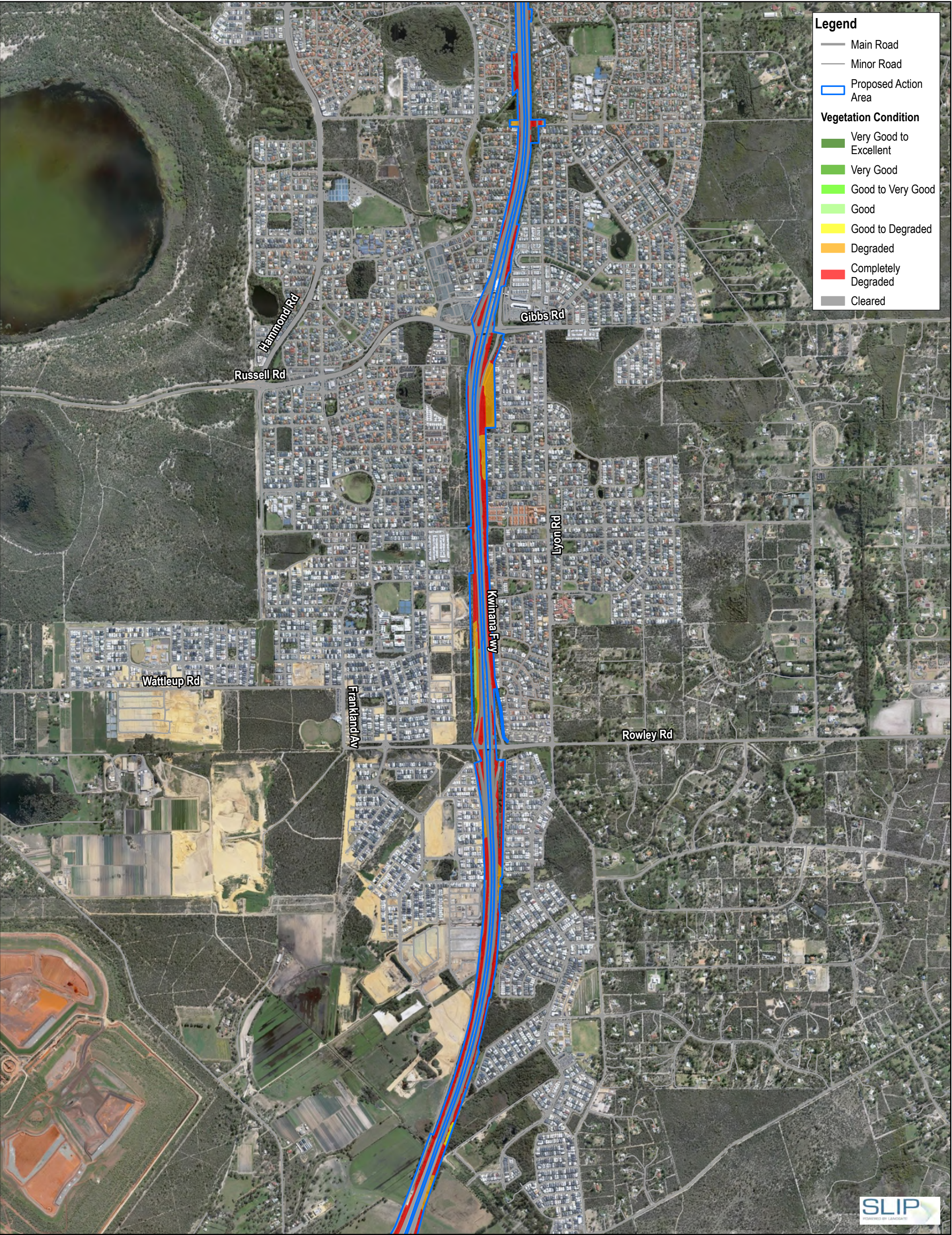
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

Project No. 12657323
Revision No. 3
Date 20/03/2026

Vegetation Type within the PAA

Page 4 of 4
FIGURE 7





Legend

Main Road

Minor Road

Proposed Action Area

Vegetation Condition

Very Good to Excellent

Very Good

Good to Very Good

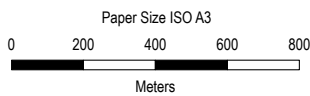
Good

Good to Degraded

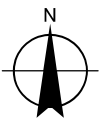
Degraded

Completely Degraded

Cleared



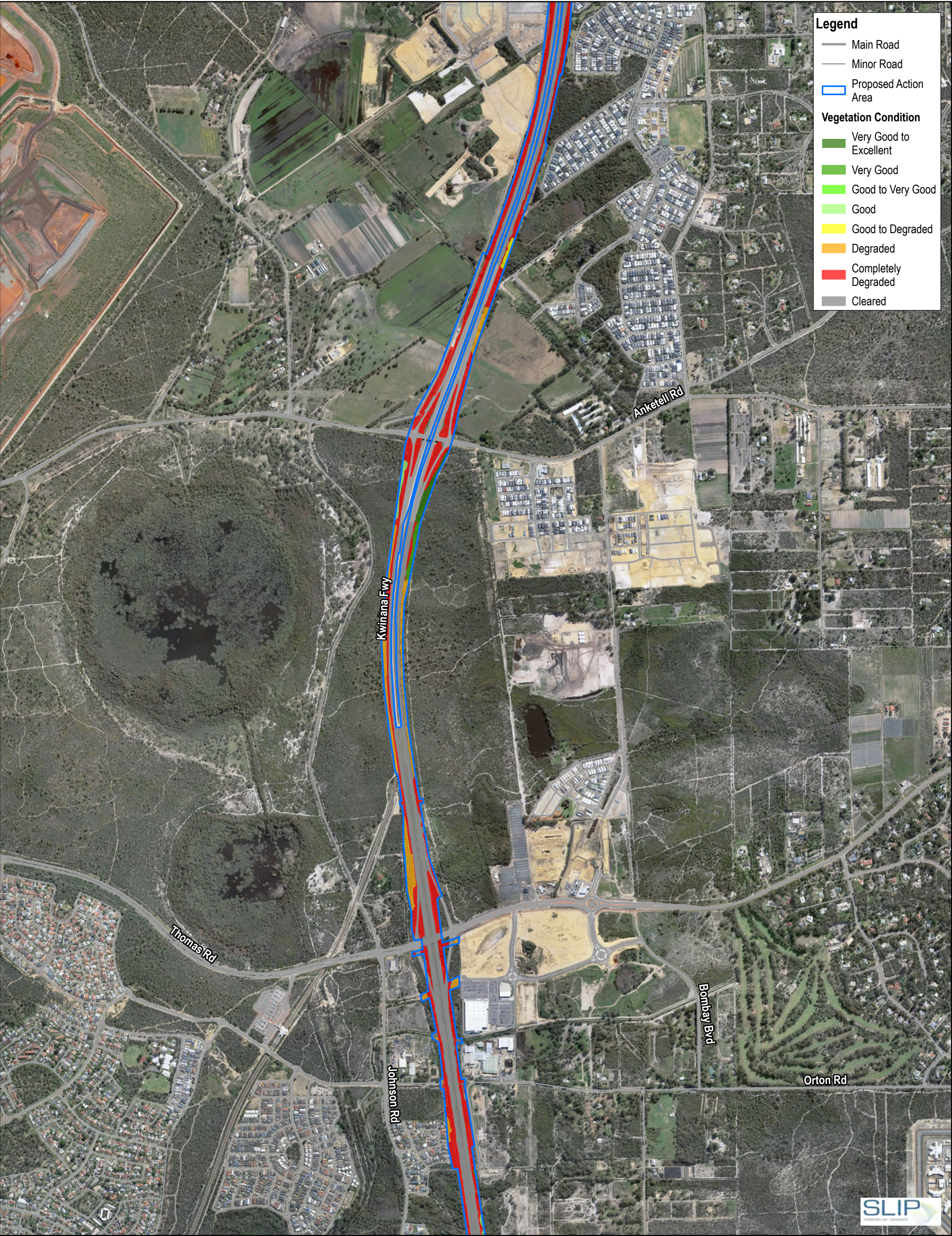
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50



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

Project No. 12657323
Revision No. 2
Date 9/04/2026

Vegetation Condition within the PAA

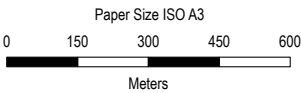


Legend

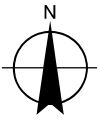
- Main Road
- Minor Road
- Proposed Action Area

Vegetation Condition

- Very Good to Excellent
- Very Good
- Good to Very Good
- Good
- Good to Degraded
- Degraded
- Completely Degraded
- Cleared



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

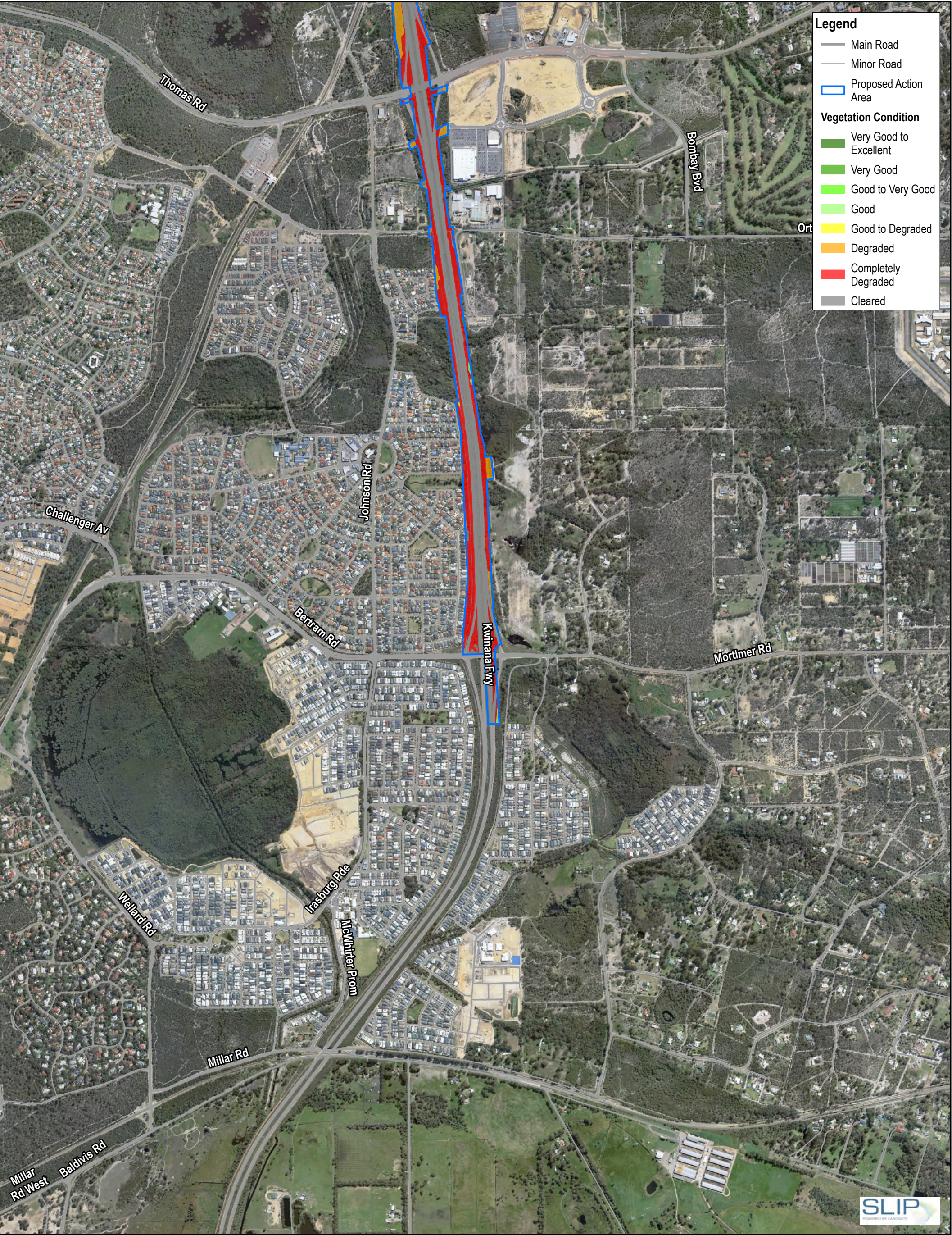


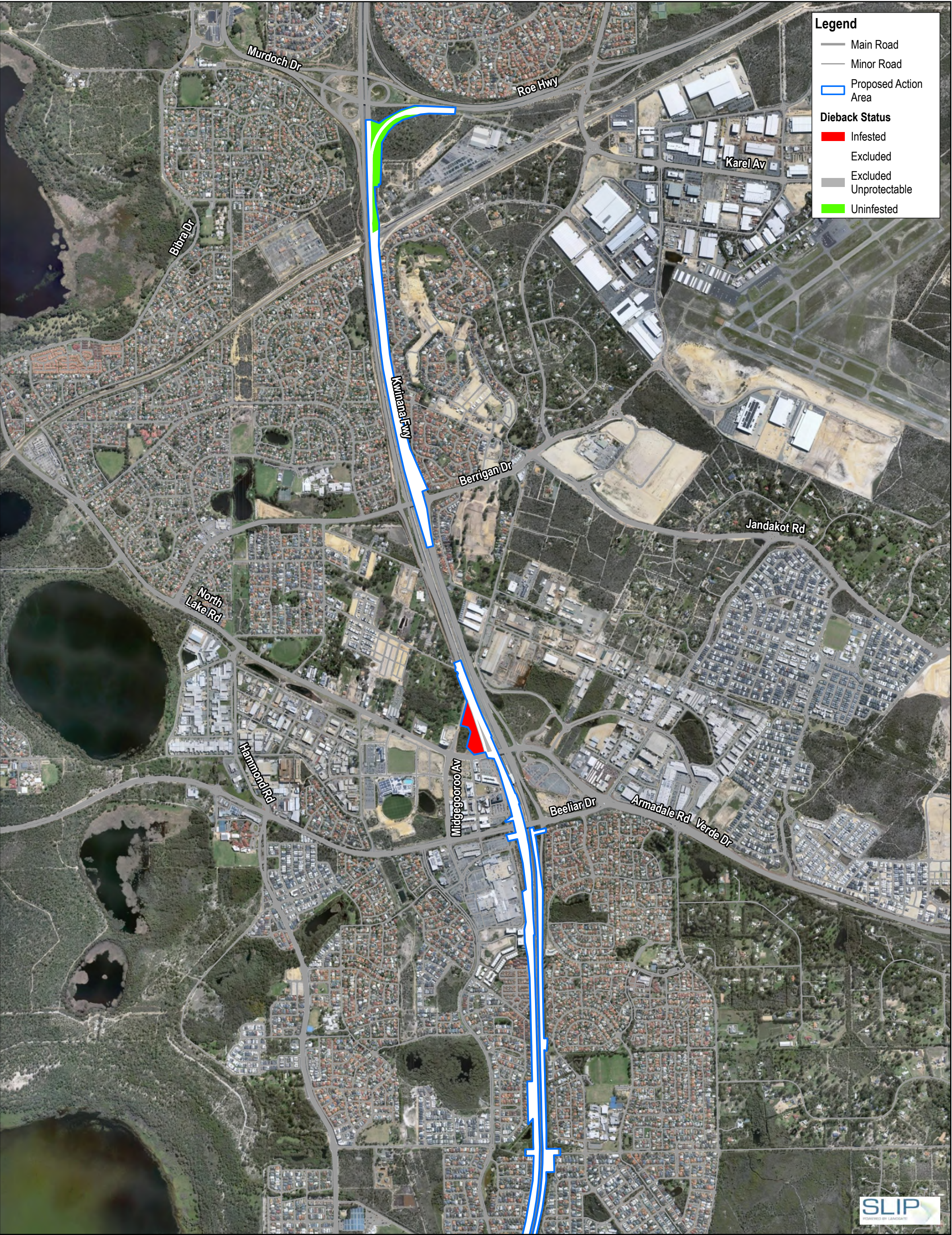
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

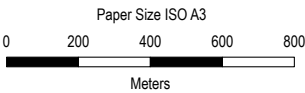
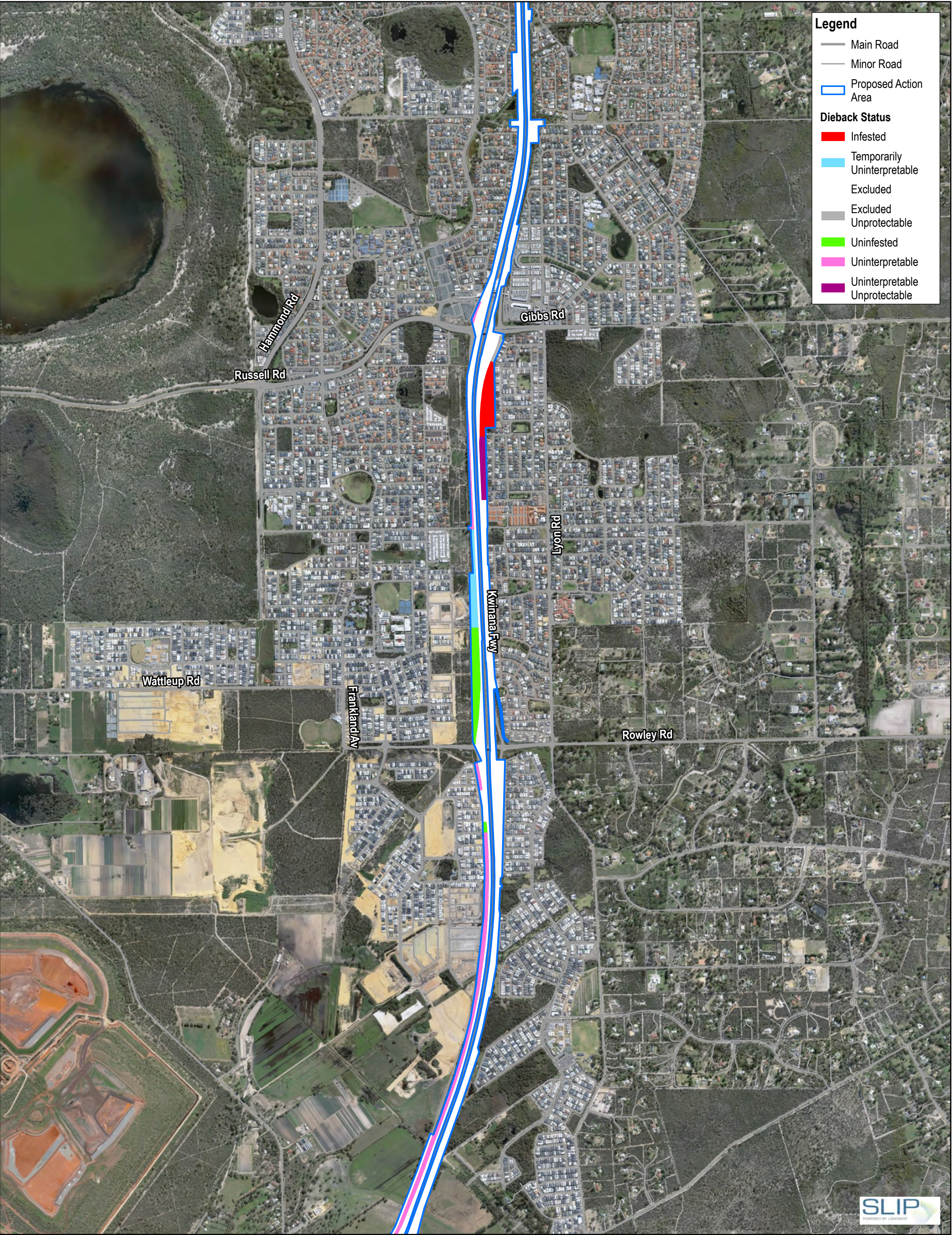
Project No. 12657323
Revision No. 2
Date 9/04/2026

Vegetation Condition within the PAA

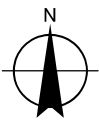
Page 3 of 4
FIGURE 8a







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

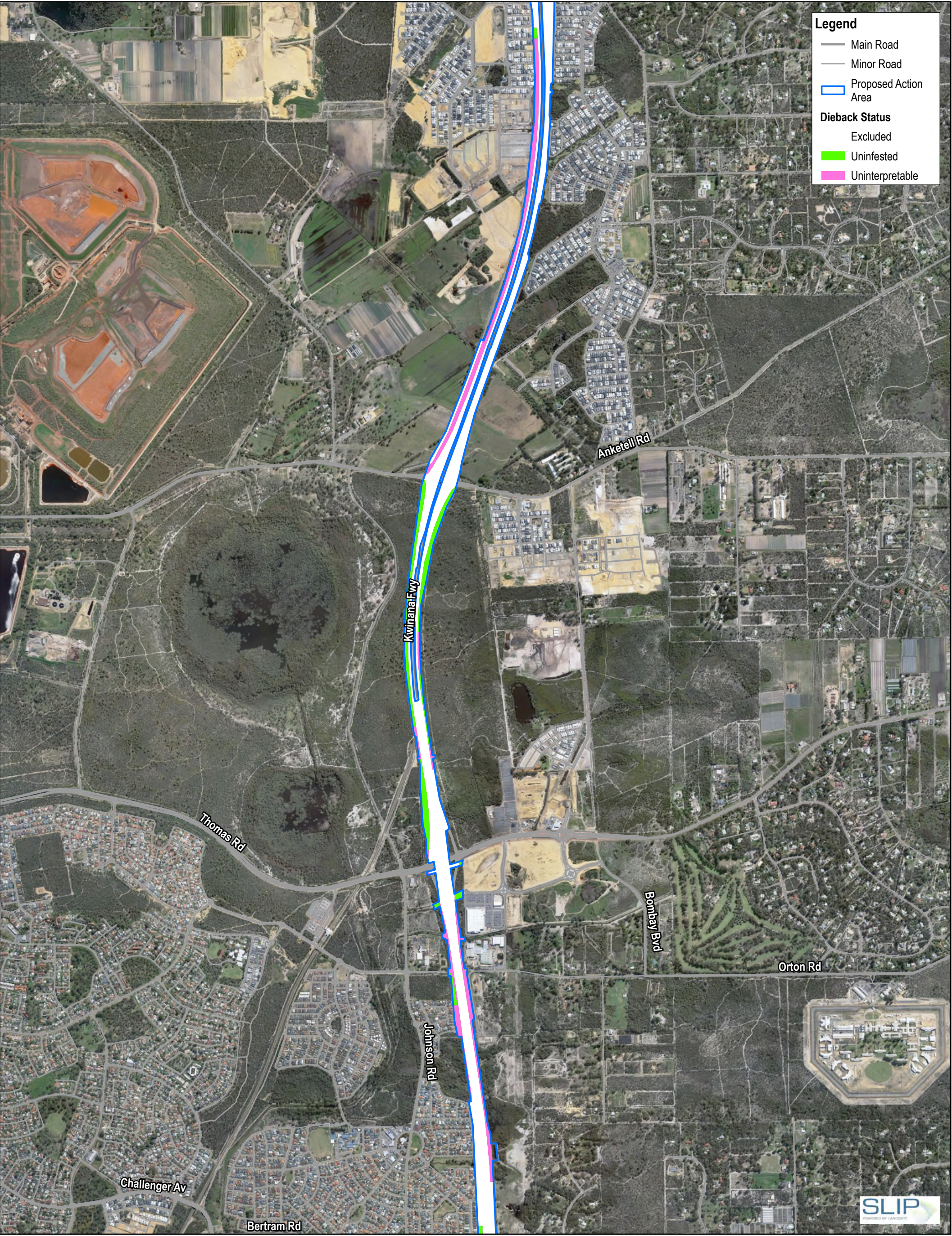


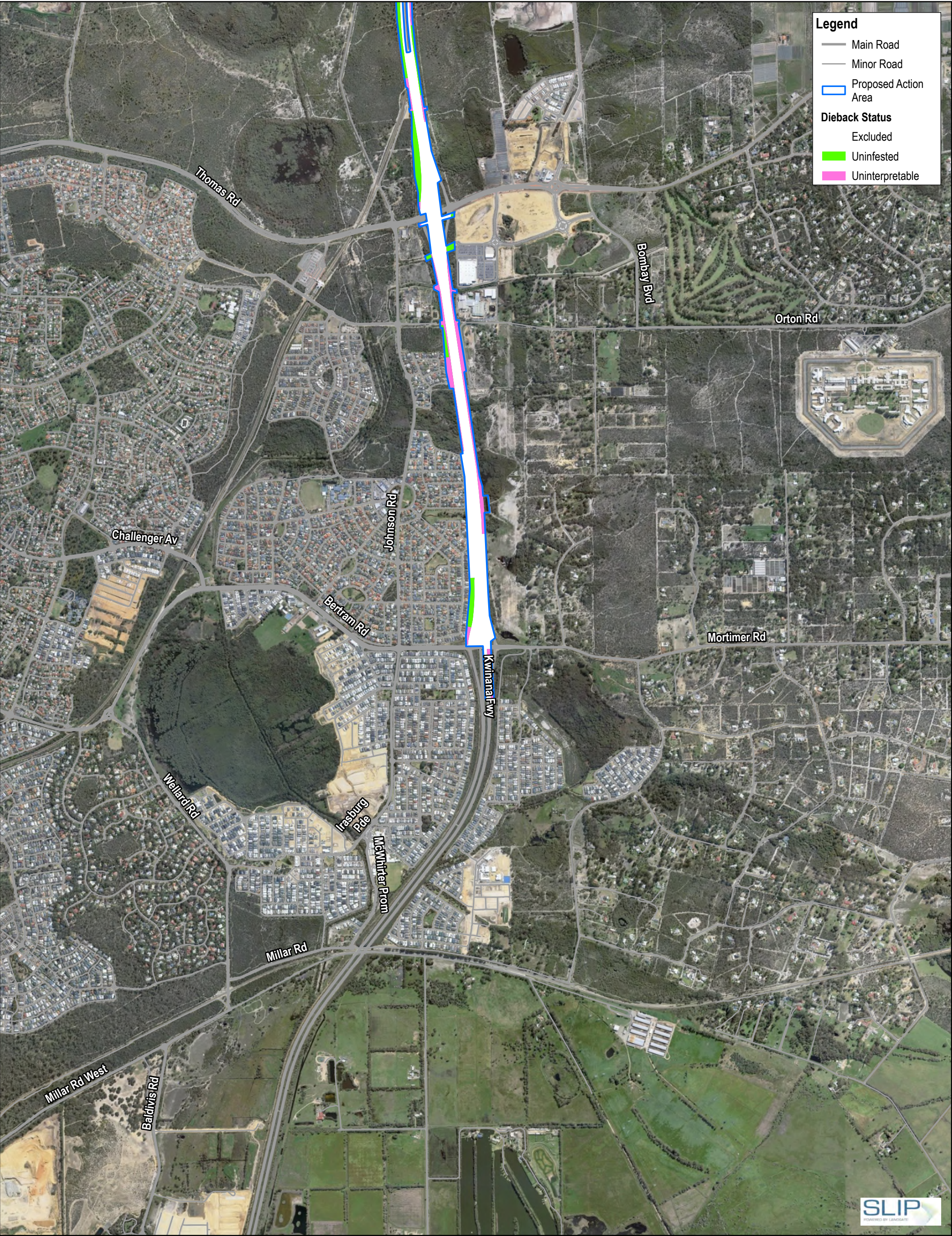
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

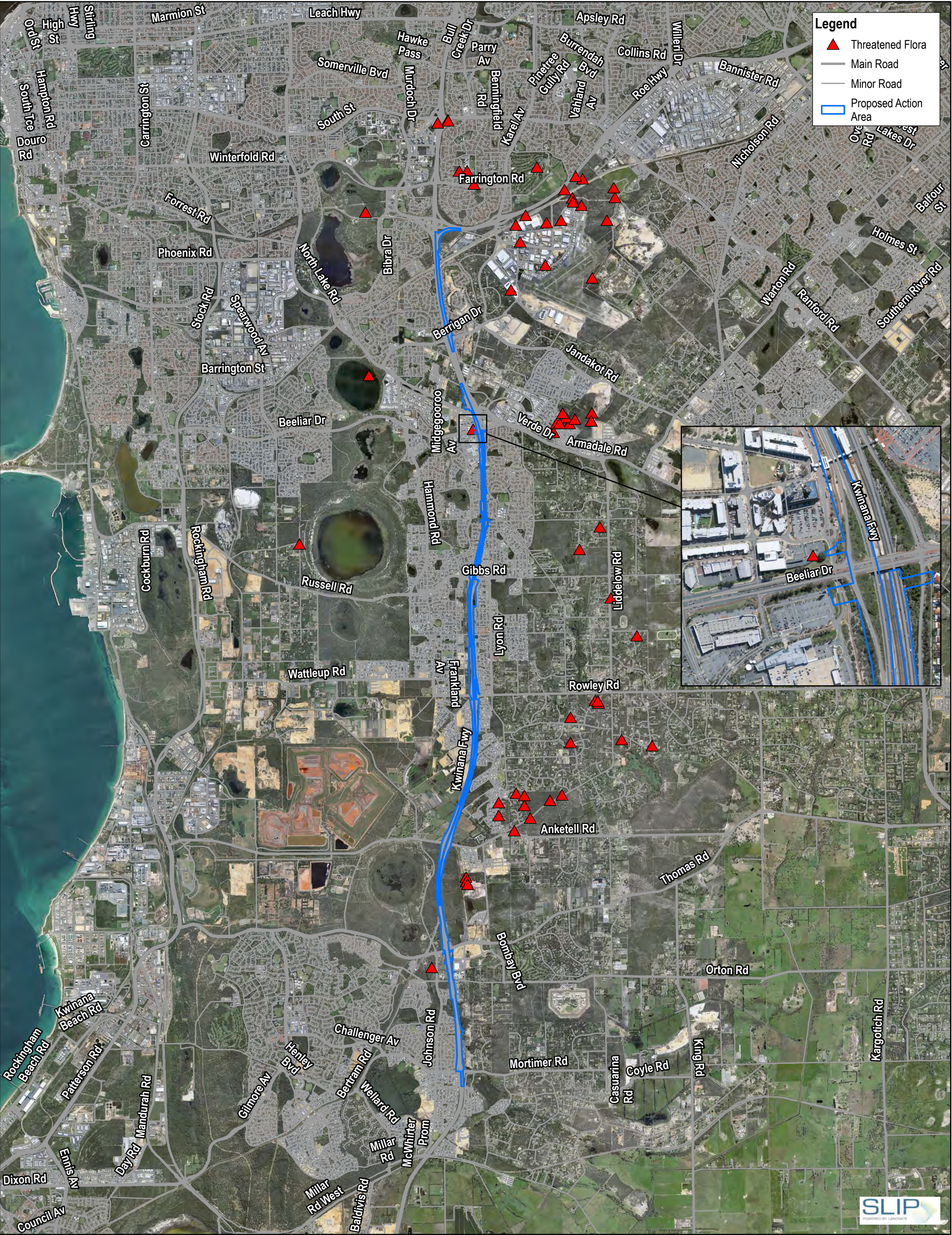
Preliminary Documentation
Dieback occurrence within the PAA

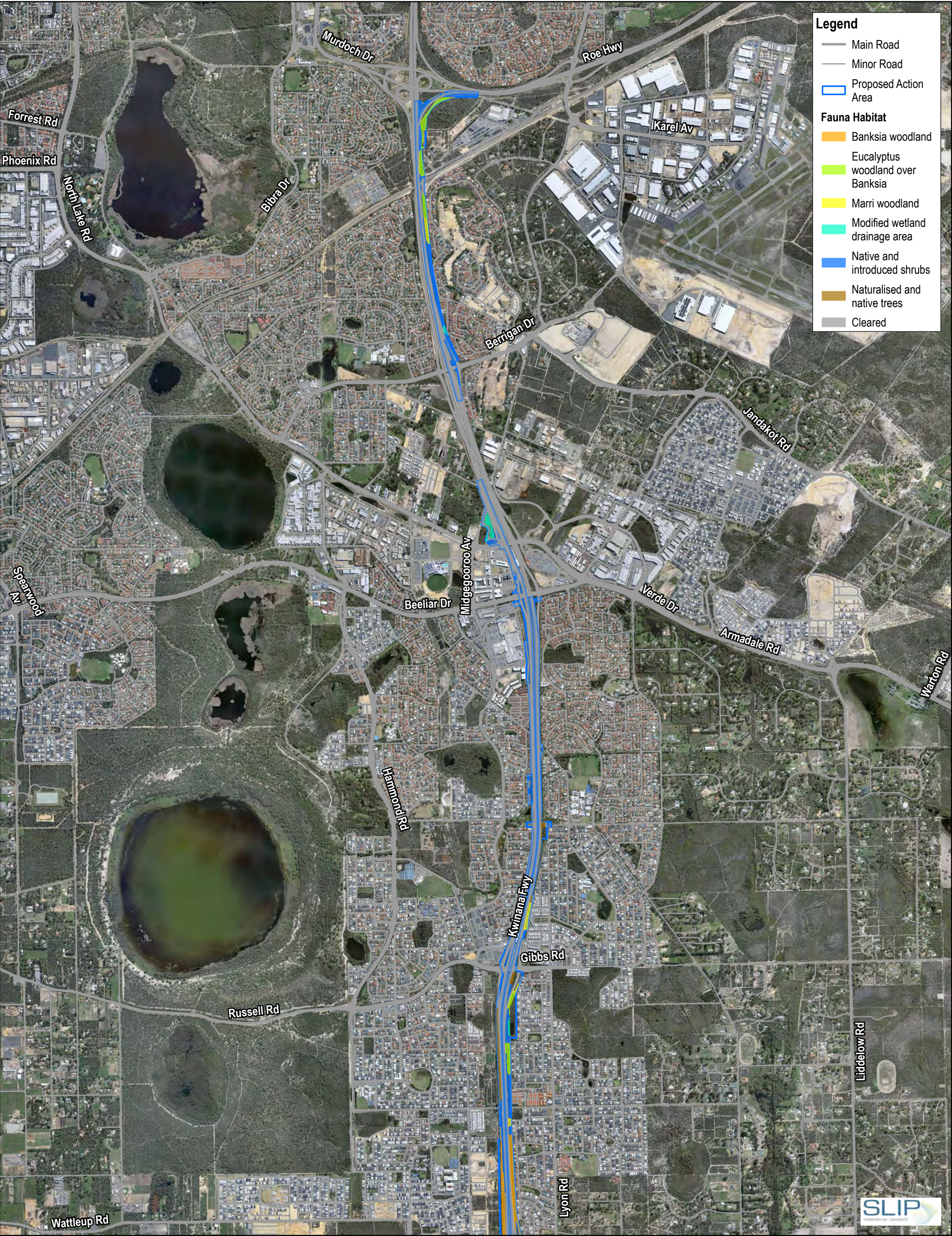
Project No. 12657323
Revision No. 2
Date 9/04/2026

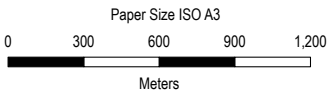
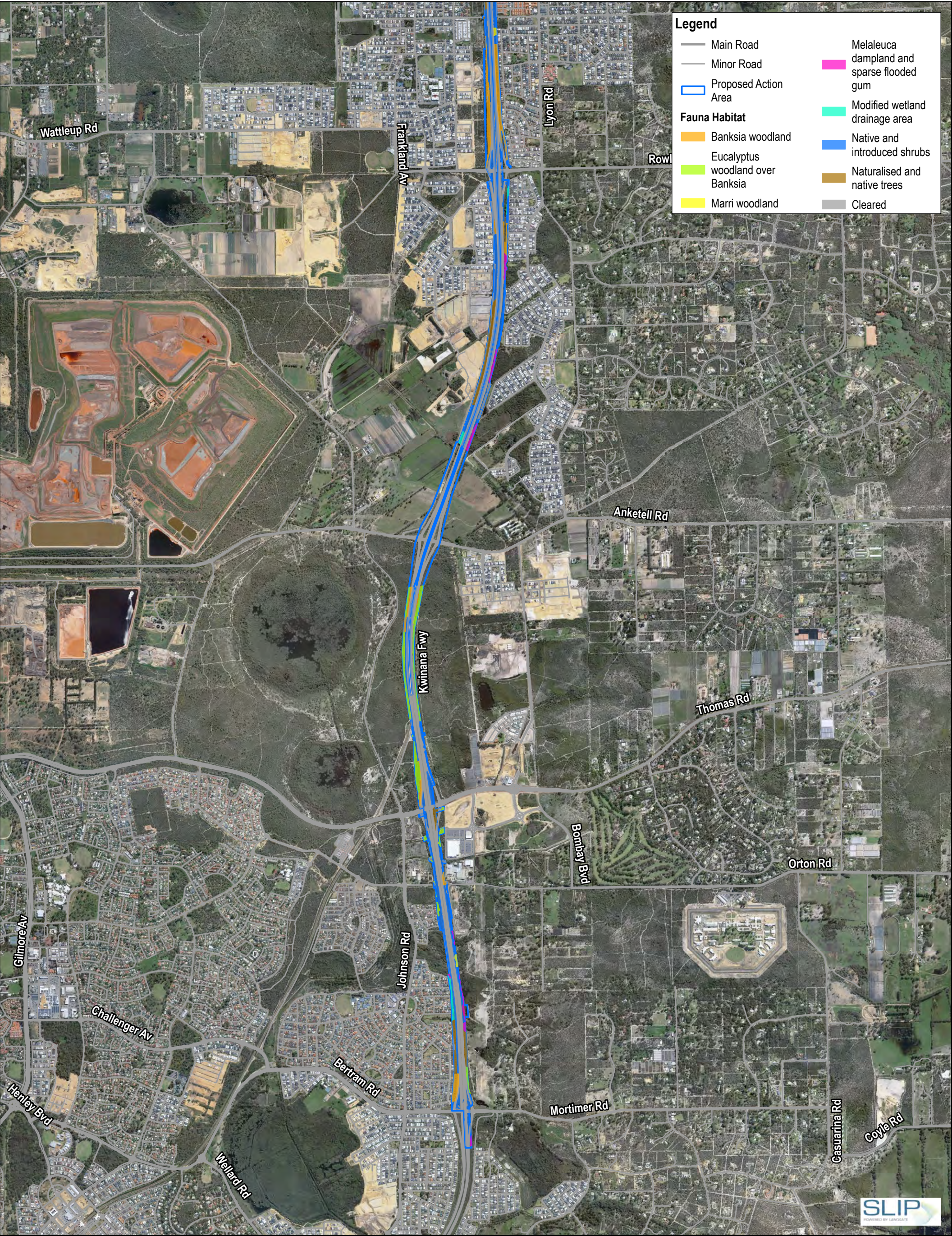
Page 2 of 4
FIGURE 8b



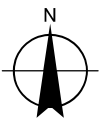








Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

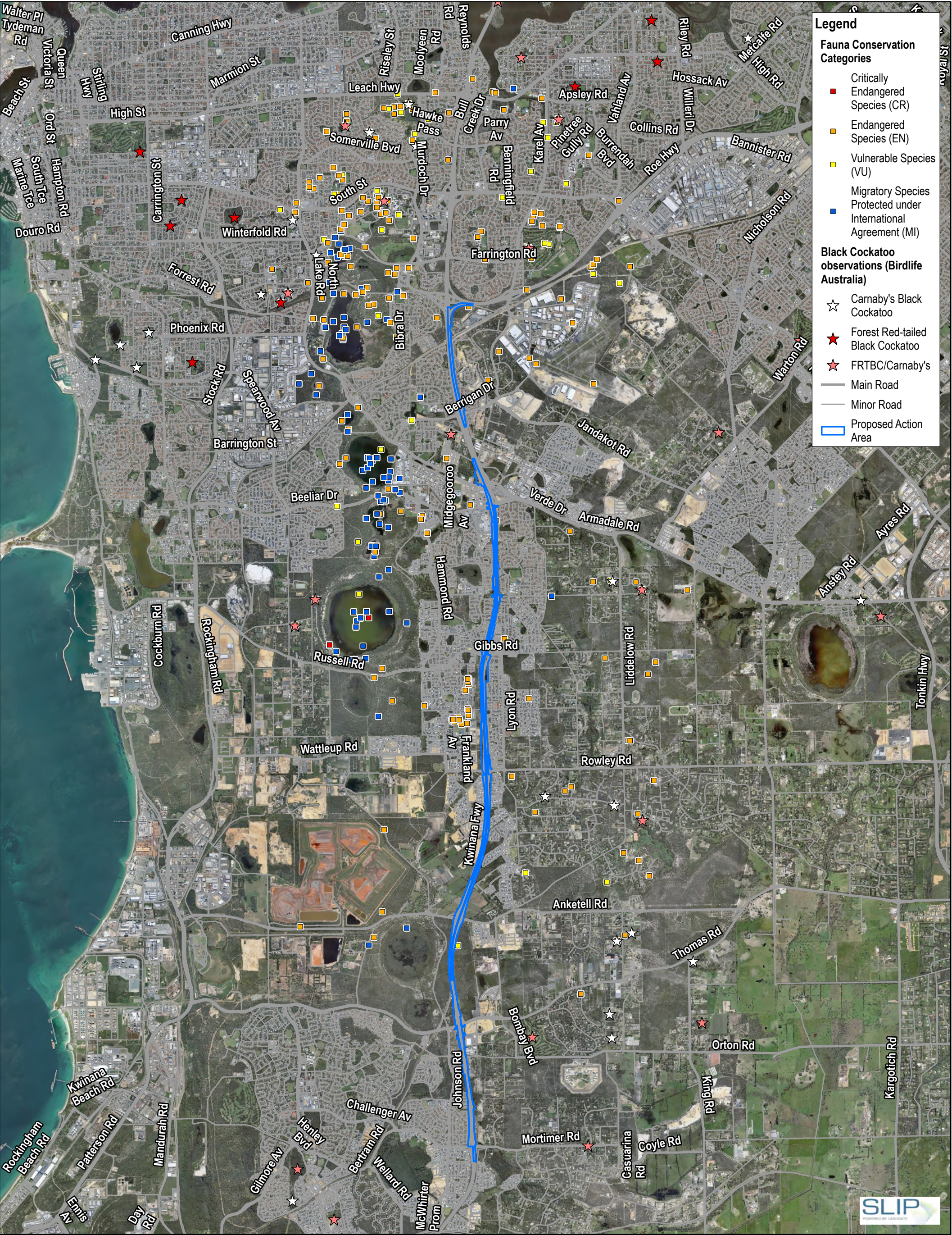


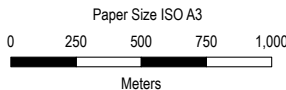
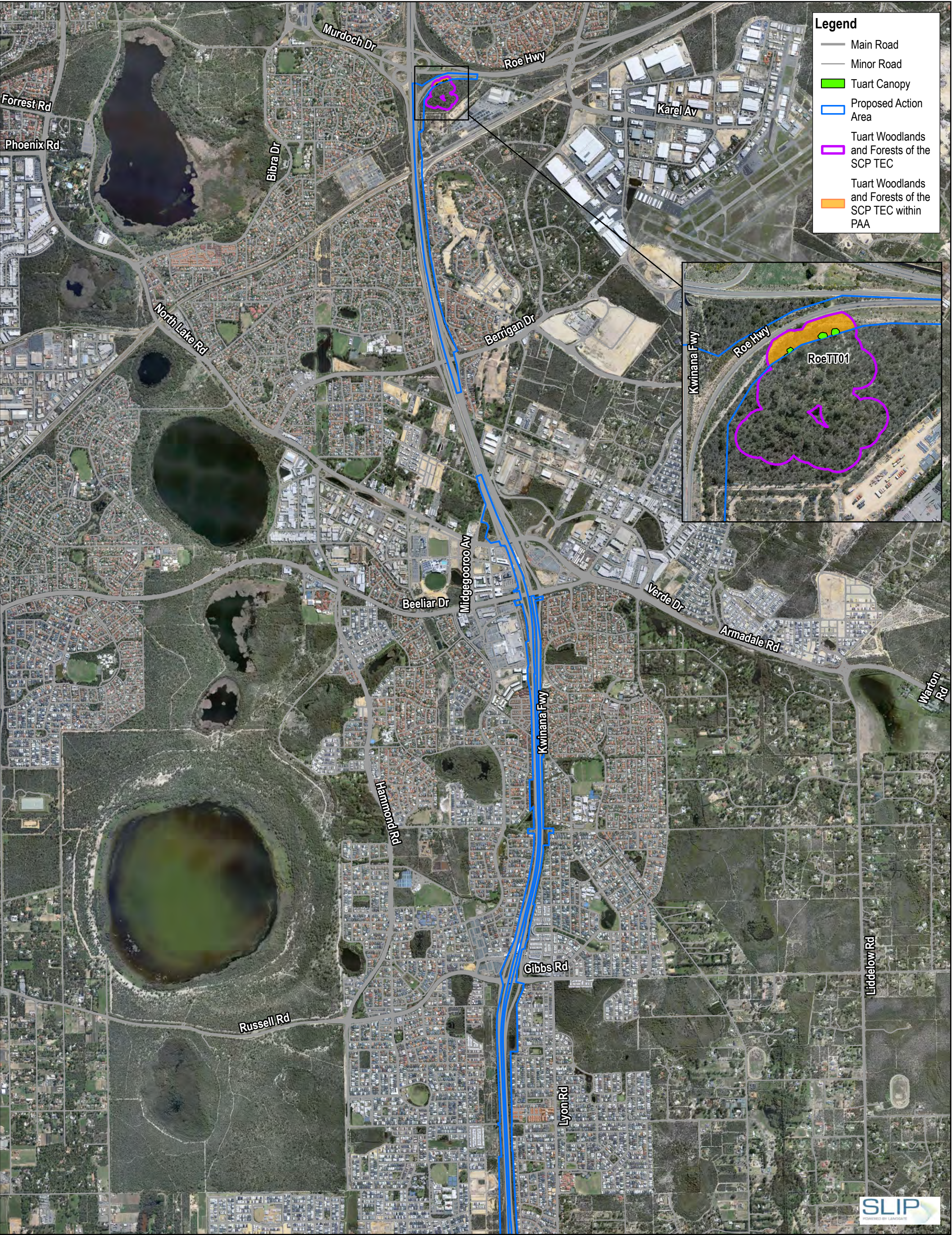
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

Project No. 12657323
Revision No. 2
Date 13/01/2026

Fauna Habitat Within the PAA

Page 2 of 2
FIGURE 10





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

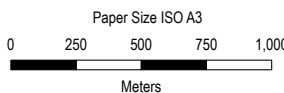
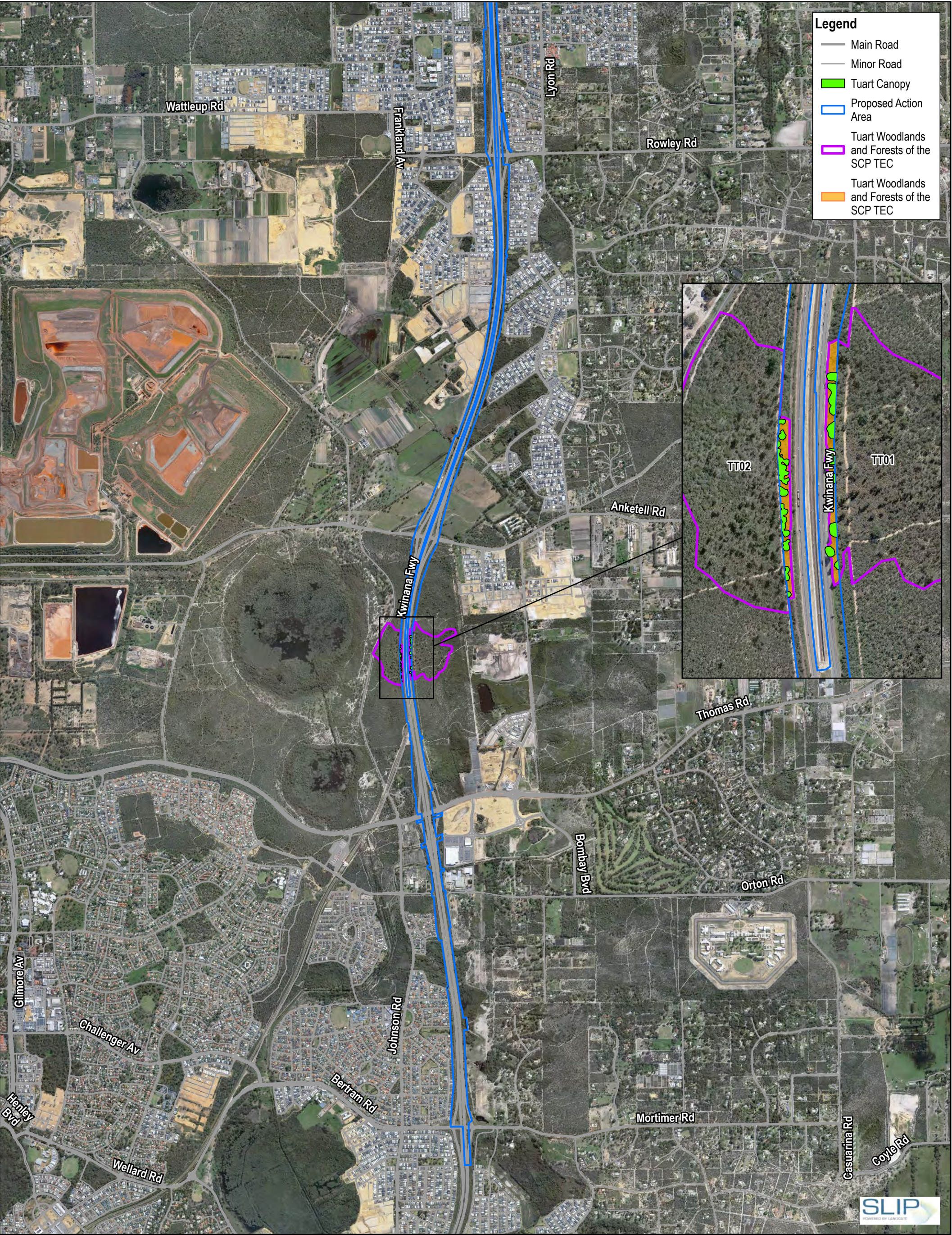


Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

Project No. 12657323
Revision No. 2
Date 13/01/2026

Tuart TEC Patches That
Overlap With the PAA

Page 1 of 2
FIGURE 12



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

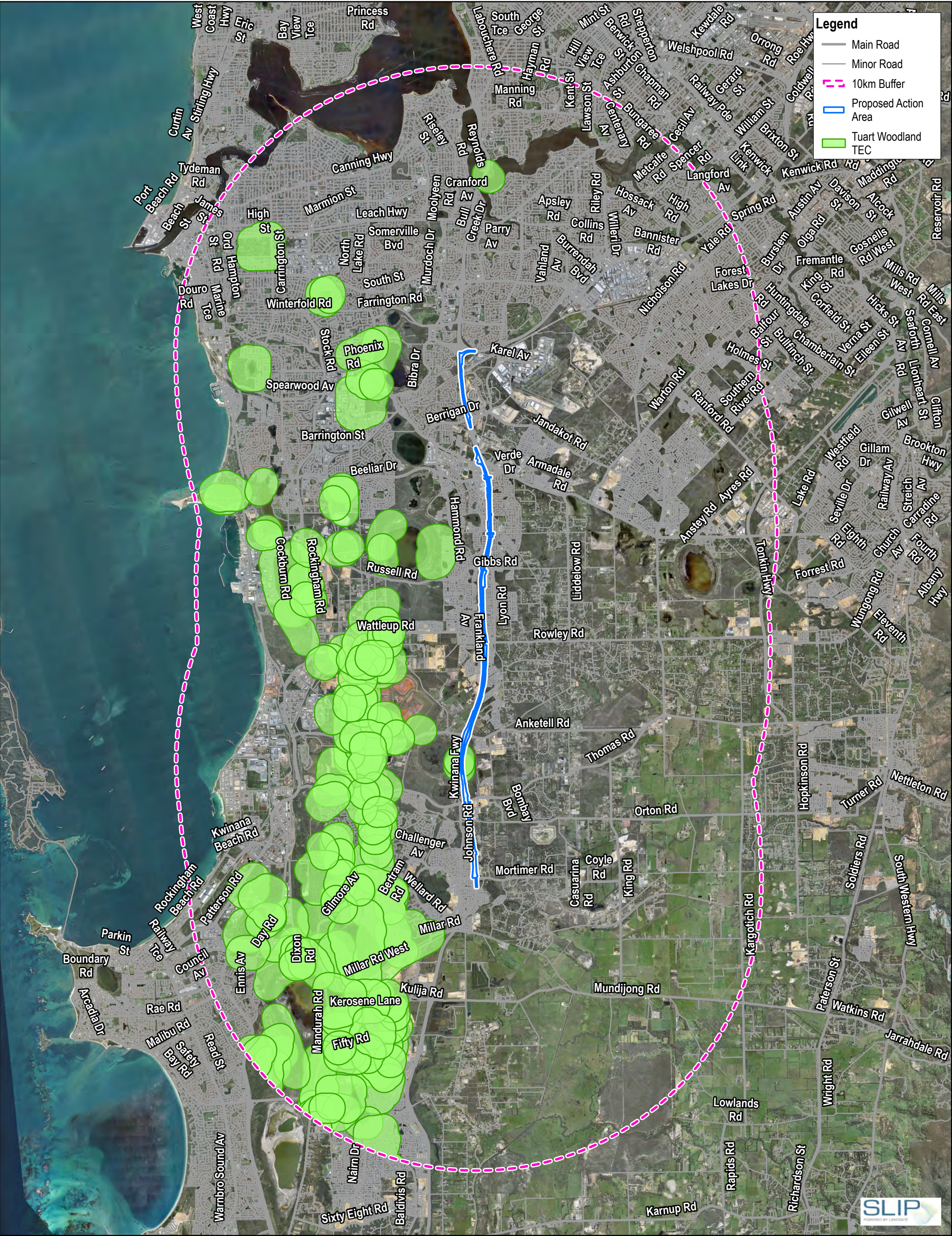


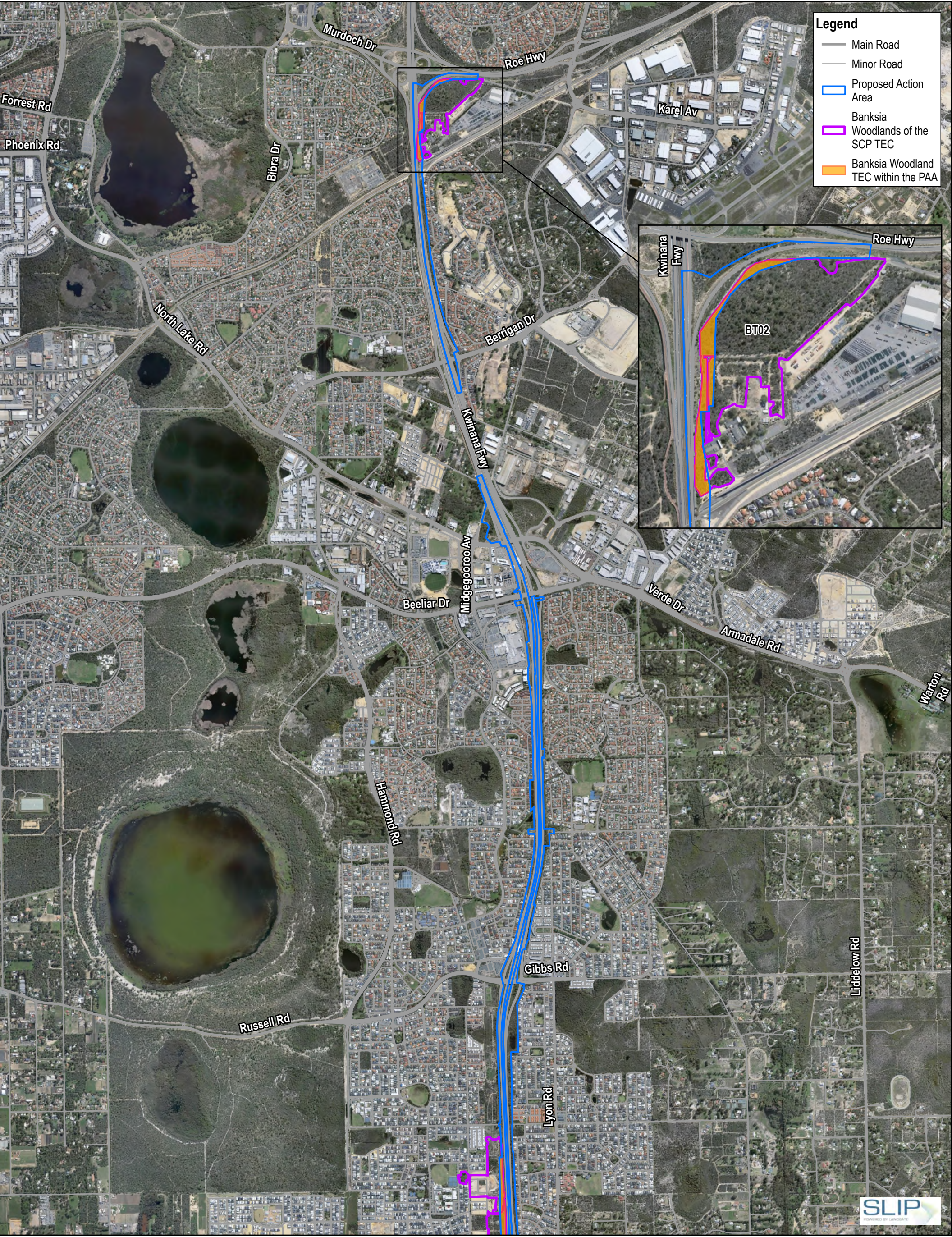
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Referral

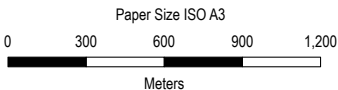
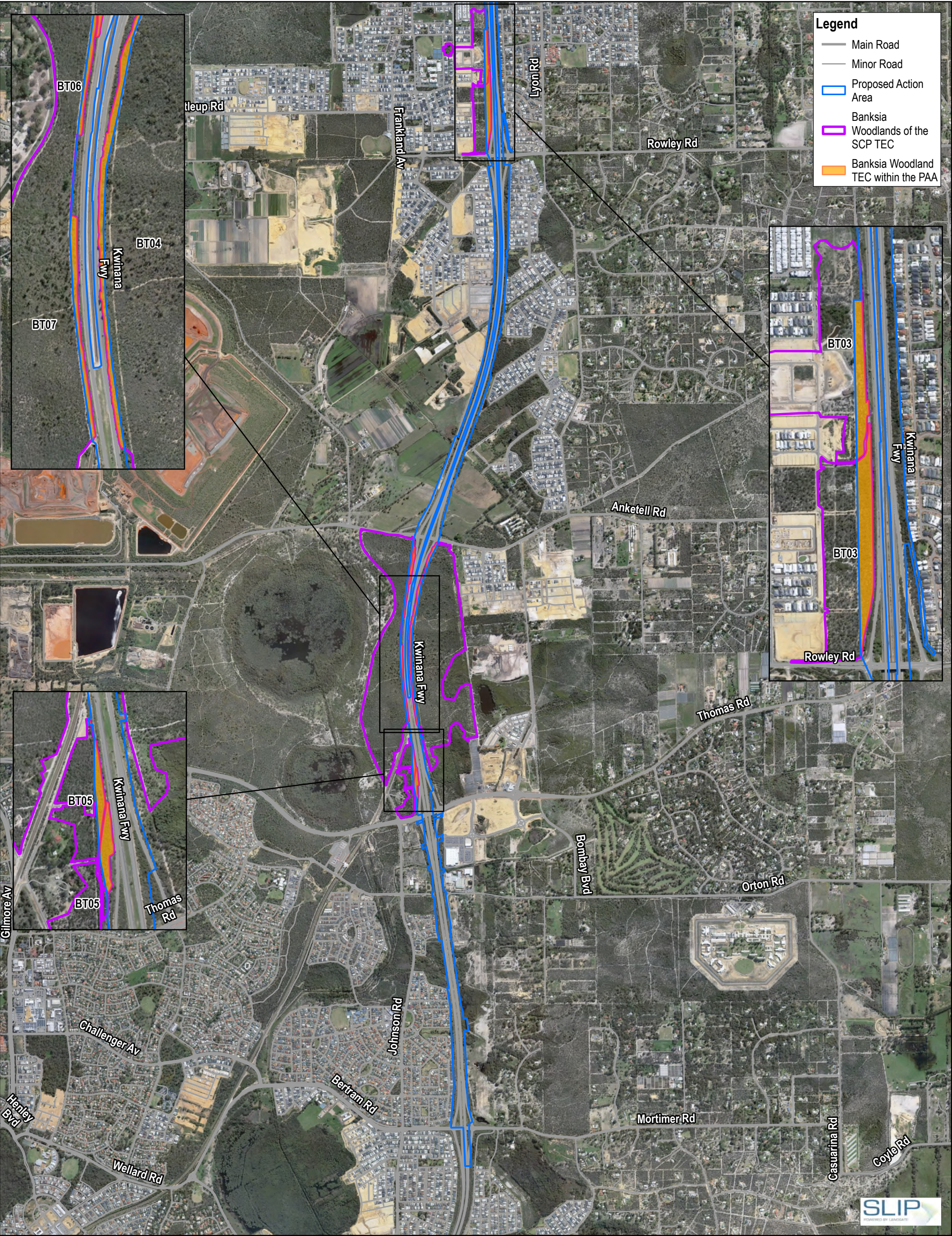
Project No. 12657323
Revision No. 1
Date 08/07/2025

Tuart TEC Patches That
Overlap With the PAA

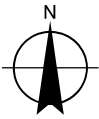
Page 2 of 2
FIGURE 12







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

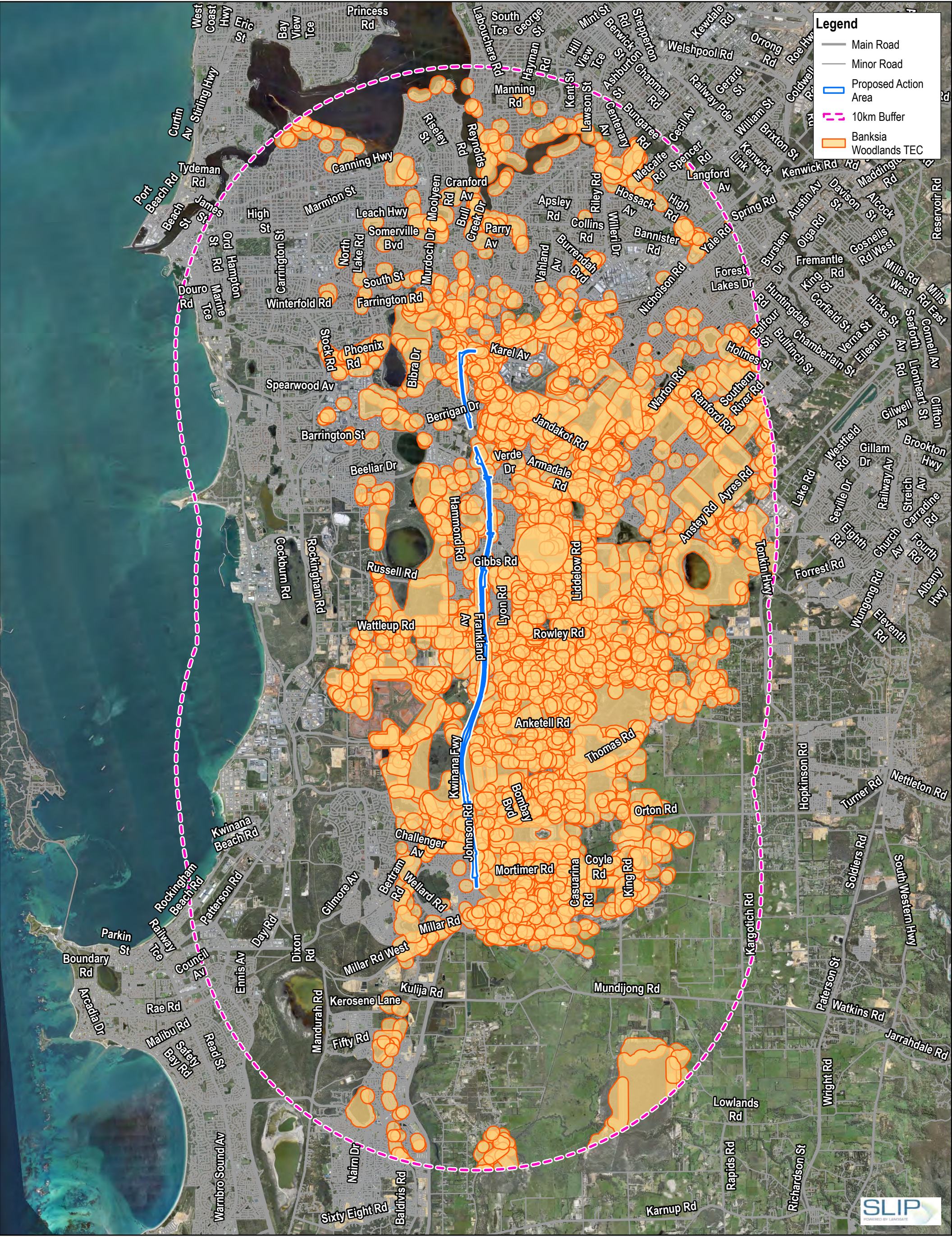


Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

**Banksia TEC Patches That
Overlap With the PAA**

Project No. 12657323
Revision No. 3
Date 16/06/2026

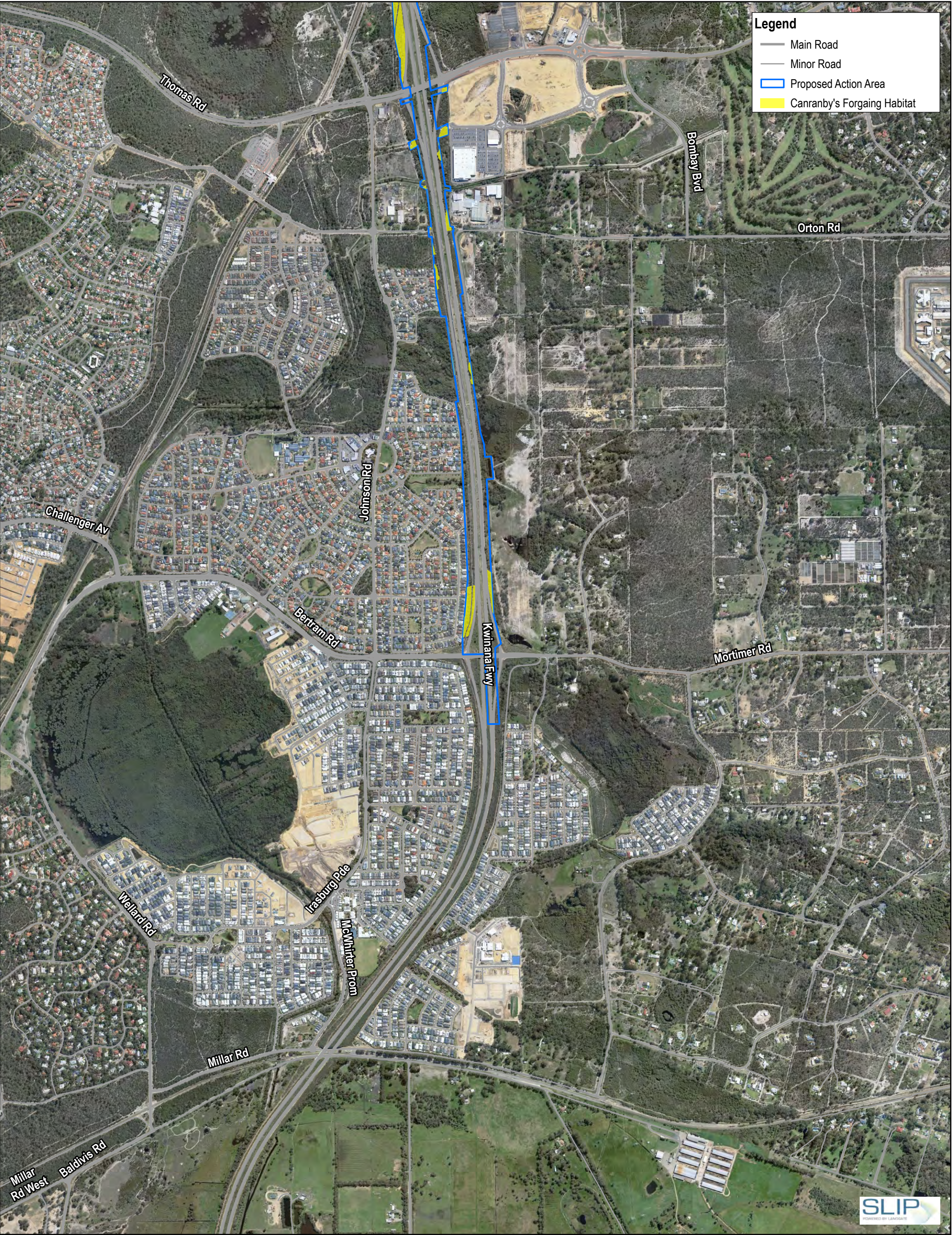
Page 2 of 2
FIGURE 14

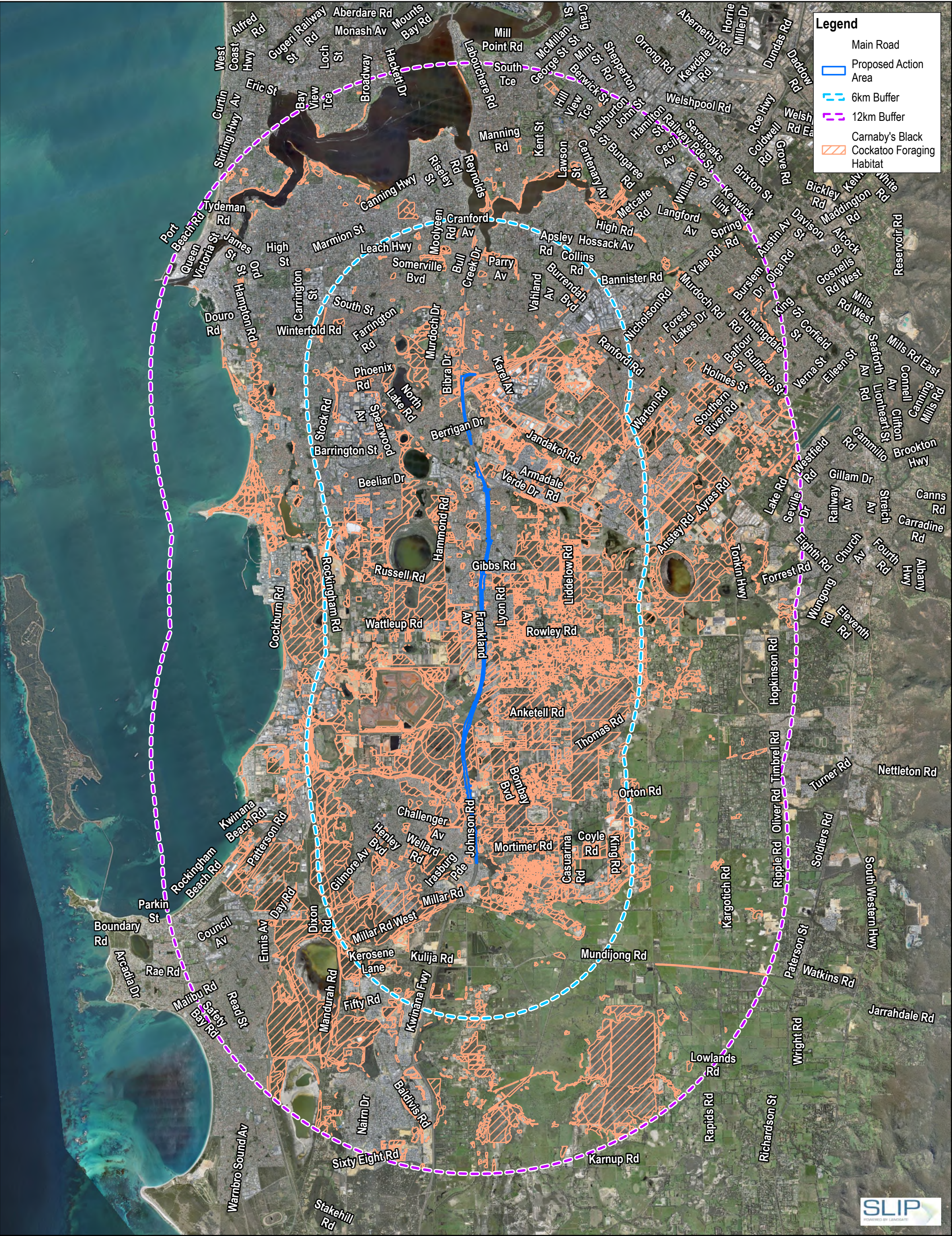






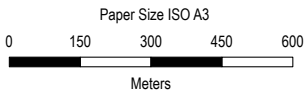




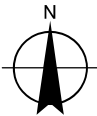








Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

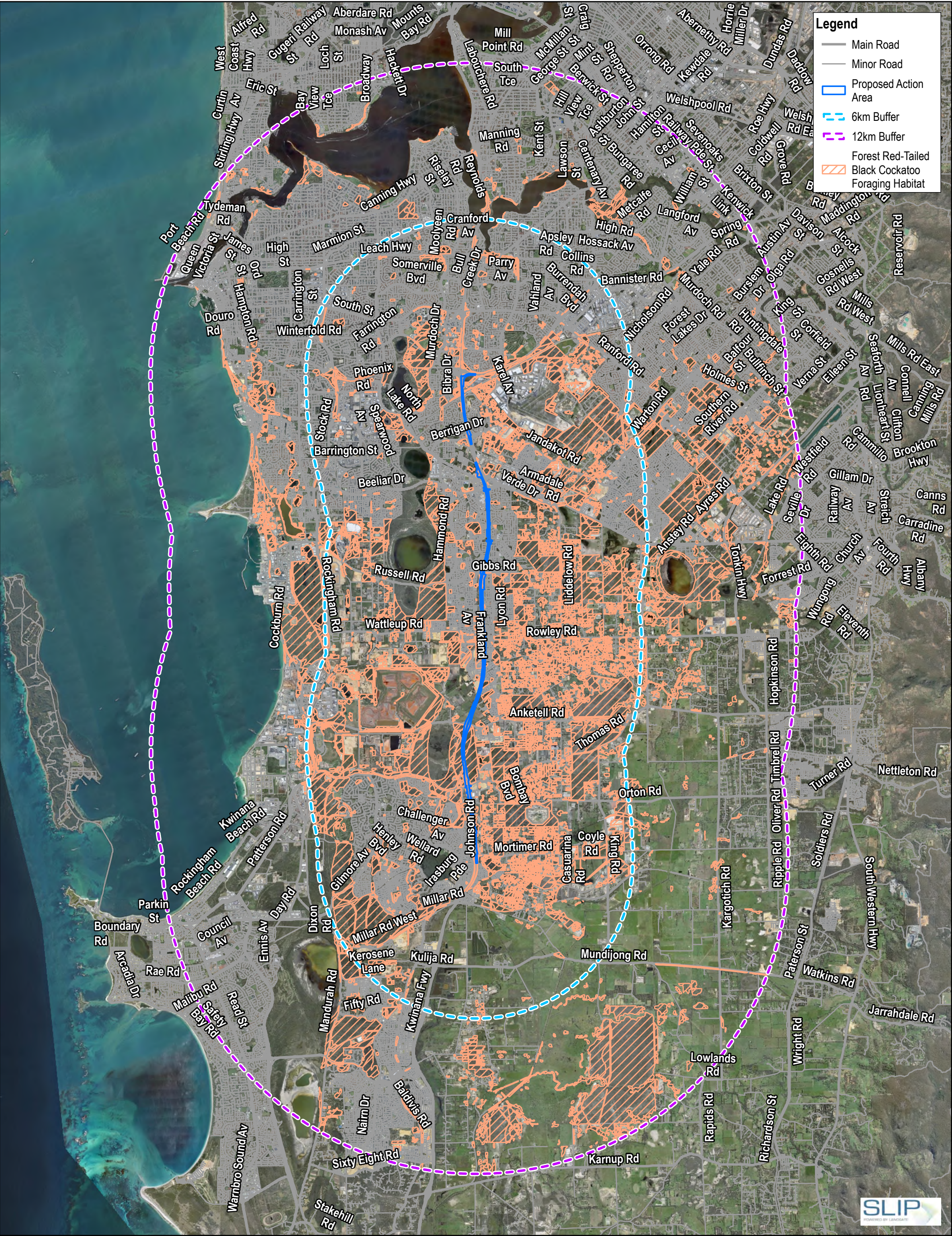


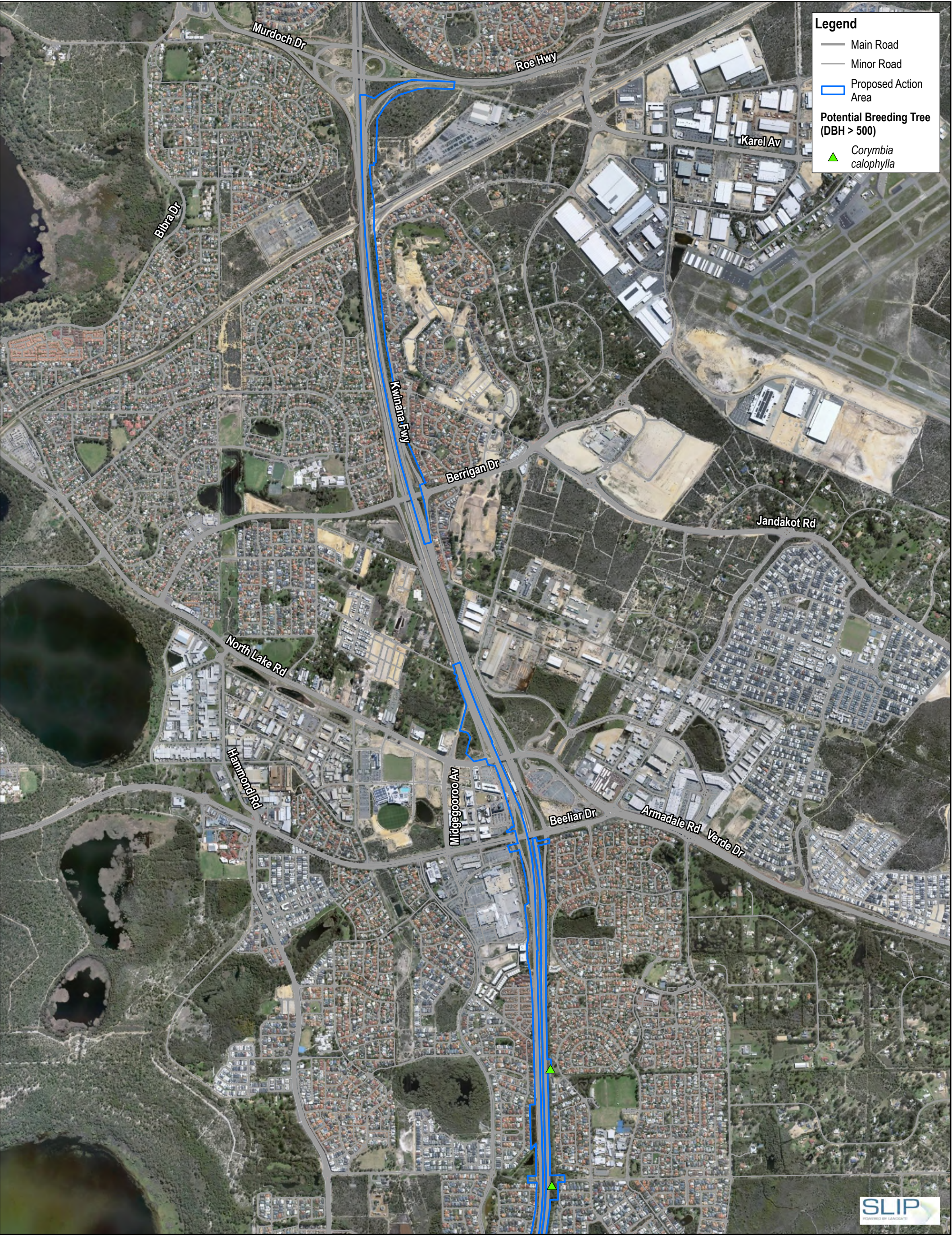
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

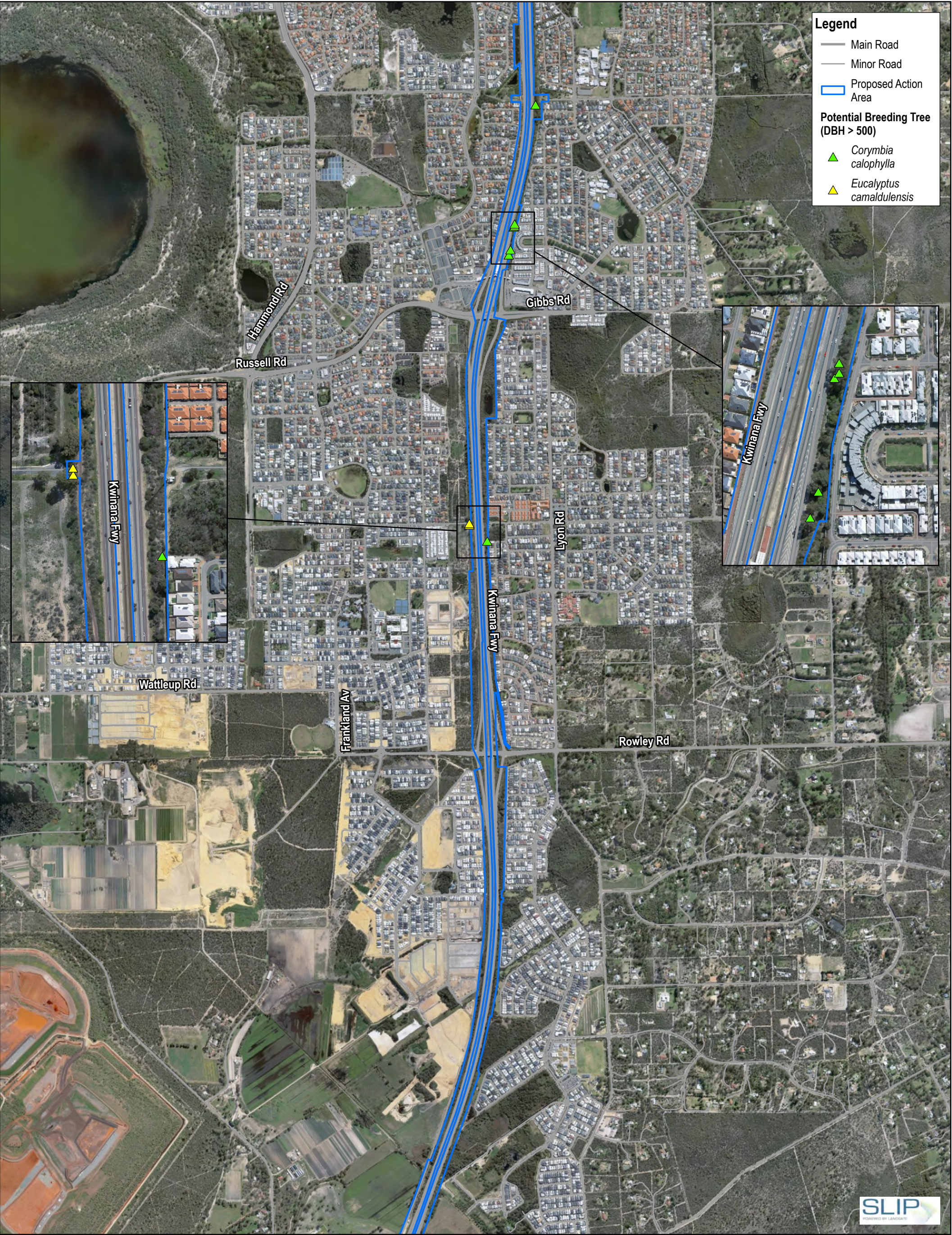
**Forest Red-tailed Black Cockatoo
Foraging Habitat
Within the PAA**

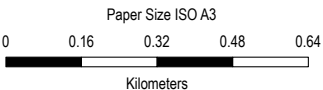
Project No. 12657323
Revision No. 1
Date 13/01/2026

Page 3 of 4
FIGURE 18

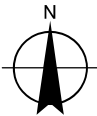








Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

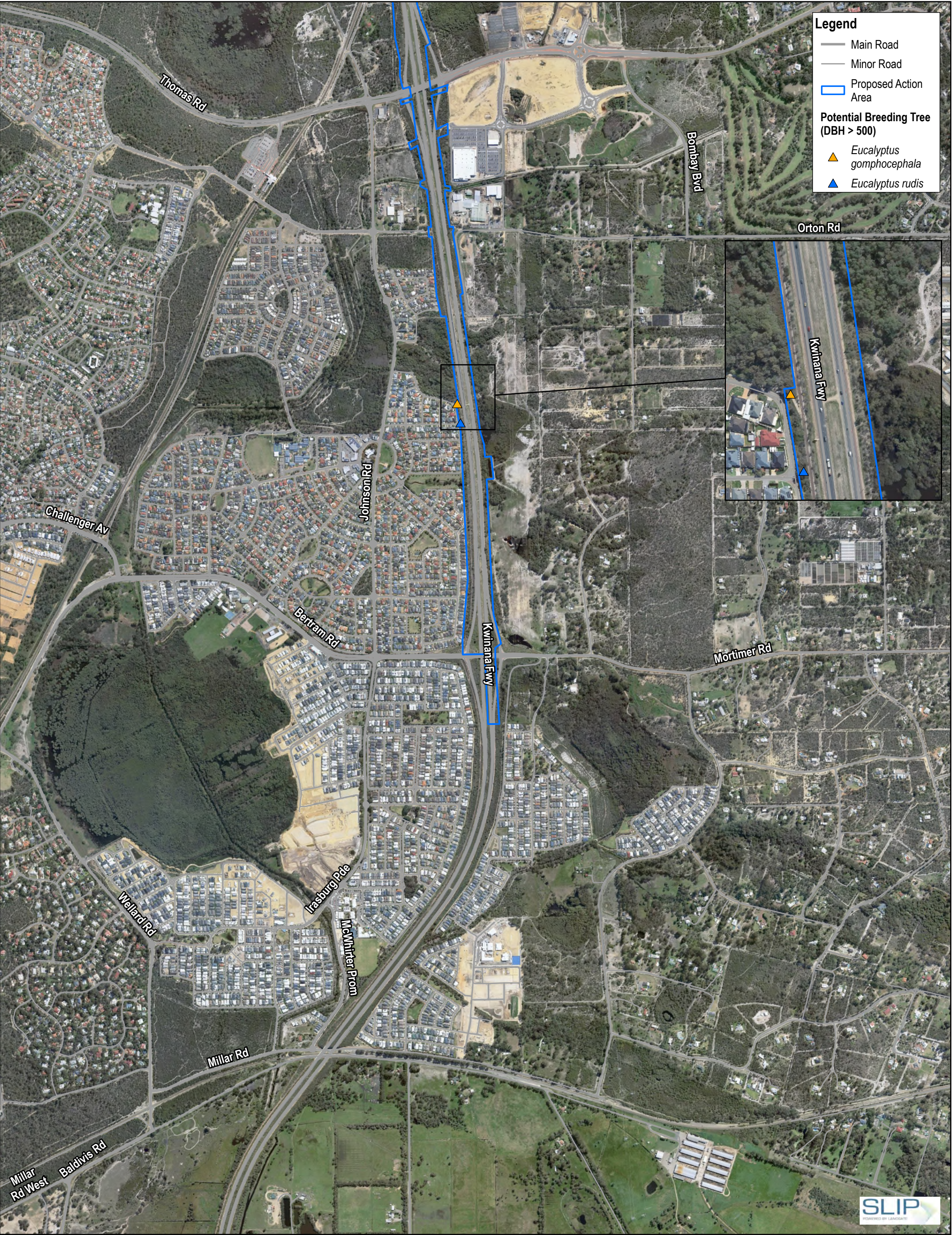


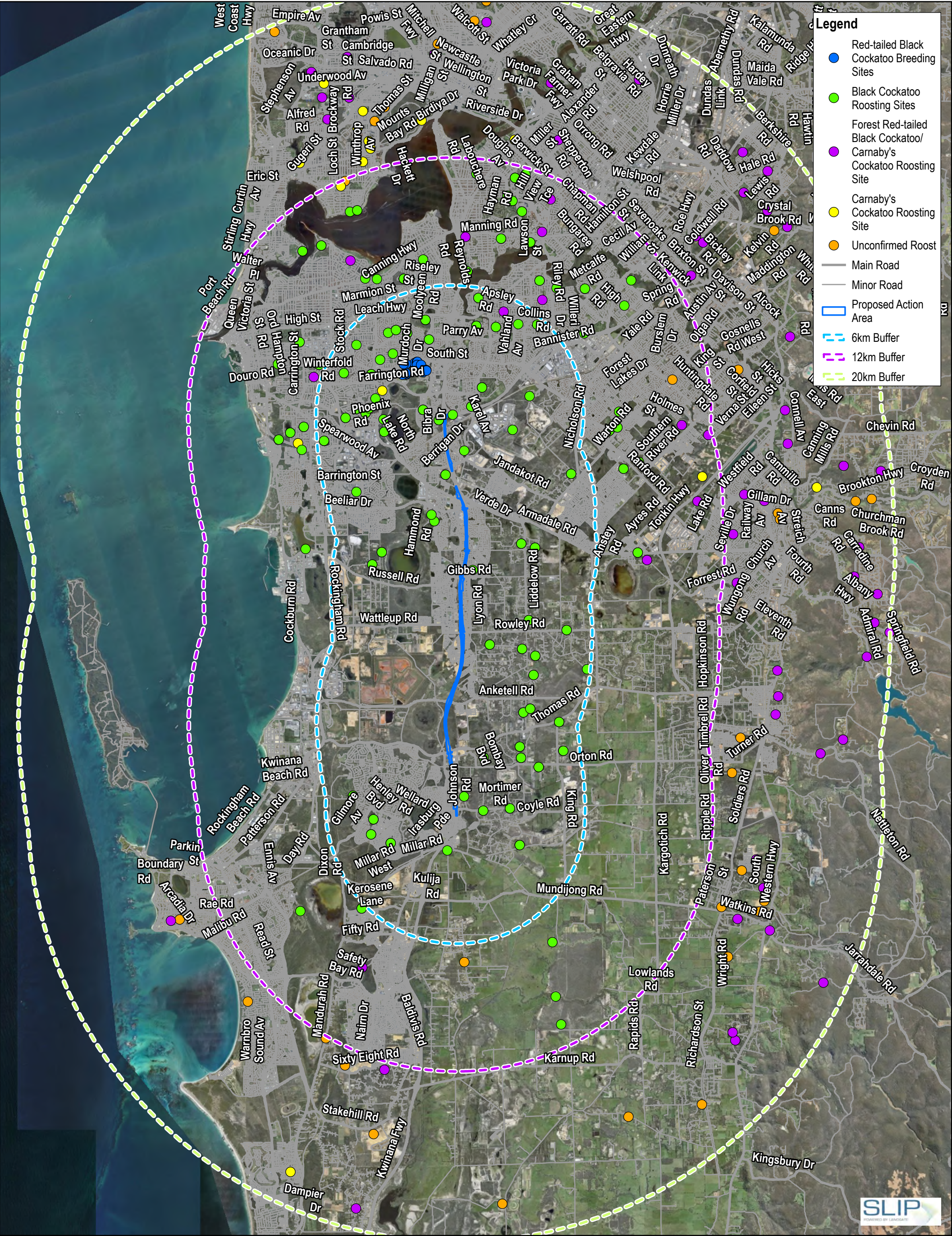
Main Roads Western Australia
Kwinana Freeway Widening – Roe Highway to Mortimer Road
Preliminary Documentation

Suitable DBH Trees
Within PAA

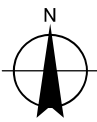
Project No. 12657323
Revision No. 2
Date 27/03/2026

Page 3 of 4
FIGURE 20





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



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

Black Cockatoo Breeding and Roosting
Habitat Within 20km of the PAA

Project No. 12657323
Revision No. 1
Date 23/03/2026

FIGURE 21

Appendix 2: RFI Tables

Table A: Request for Further Information

Information Request		PD Section Reference
1.1	A description of the action should include the location of all works to be undertaken (including plans and maps) and elements of the action that may have impacts on EBPC Act listed threatened species. It must also include details on how the works are to be undertaken (including stages of development and their timing) and design parameters for any structural elements of the action that may have impacts on EBPC Act listed threatened species. Please highlight changes that have been made to the project since referral documentation was submitted.	Changes to the proposal since referral have been outlined in Section 1.3 - Variations to the Proposed Action.
2. Baseline information		
2.1 Black Cockatoos: Carnaby's Black Cockatoo (<i>Zanda latirostris</i> listed as <i>Calyptorhynchus latirostris</i>) (CBC) – Endangered; and Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>) (FRTBC) – Vulnerable	2.1.1 Baseline data The following information is required for the department to further assess the impacts to these species. - Include a discussion on the adequacy of the surveys conducted along the section of Roe Highway, as the department is currently unable to confirm whether surveys have been undertaken in this area. This uncertainty arises because the survey area boundary shown in Figure 3 (Biological Survey) does not encompass the full extent of the proposed action area. - Provide information on the presence and prevalence of plant disease (such as dieback disease <i>Phytophthora</i> spp., or any other plant disease within the proposed action area and in the surrounds). - Clearly outline the extent of roosting habitat present within the proposed action area and details (number, type, and size) of potential roosting trees. - Provide details (number, type and size) of trees with DBH > 50cm. - Include a discussion of previous and future clearing of CBC and FRTBC foraging habitat in the surrounding areas to support the assessment of cumulative impacts.	- Roe Highway Surveys now attached as Attachments 2, 3 and 4. - Dieback survey was undertaken as outlined in Attachment 7 and results discussed in Section 4.7.5 - Dieback. - No roosting habitat is present within the PAA, as per Section 5.5 Threatened Fauna and Figure 22. - Presented in Table 6-8 (Section 6.5.1) - Presented in Section 6.1.3 Cumulative impacts and Table 6-3

	2.1.2 Regional context The following additional information is required in relation to the regional context: a. The size of suitable breeding habitat and roosting habitat in proximity (i.e., up to 12 km and 20 km respectively) from the proposed action area (where possible, identify distance from known roosting sites and breeding habitats). b. An updated map that shows confirmed roost sites with an identified 6 km and 12 km radius. Based on the best information available, identify whether the roosts are used by CBC, FRTBC or joint roosts, and estimated flock sizes. c. Occurrence data/records for CBC and FRTBC where available, including current and historical records.	a. Breeding habitat within 12km and roosting habitat within 20km is presented in Figure 22 and discussed in Section 5.5. b. Figure 21 c. Attachment 10 for occurrence data records.
	2.1.3 Assessment of impacts The preliminary documentation must include an assessment of potential impacts (including direct, indirect, consequential and cumulative impacts) on CBC and FRTBC that are likely to be present within the proposed action area and surrounds. The impacts of the proposed action should be considered at the broadest scope and consider the following: a. The scale, duration and intensity of the proposed action. b. The amount (in ha) and quality of habitat or vegetation likely to be impacted. c. The number of affected individuals and/or habitat features (e.g. potential foraging habitat etc.) relevant to CBC and FRTBC. d. Characterise the nature of impacts, including timing and whether the impact is temporary or permanent. e. Discussion surrounding the potential short-term and long-term impacts to local flocks of CBC and FRTBC. f. The possible impacts to CBC and FRTBC caused by the clearing and subsequent development of the project area at a local and regional scale. This should include discussion on the potential for abiotic impacts such as dust, noise, sound, vehicle strike etc., as well as biotic impacts such as loss of foraging habitat and subsequent potential nutrient deficits, presence and prevalence of plant disease (such as dieback disease <i>Phytophthora</i> spp., or any other plant diseases) etc. g. Update a risk assessment of the potential impacts of the proposed action, including whether the nature and/or scale of the potential impacts are unknown, unpredictable or irreversible, and what confidence is placed on the predictions of relevant impacts.	a. 6.1 Summary of impacts and 6.5 Black Cockatoos b. 6.1 Summary of impacts and 6.5.1 Direct impacts c. 6.1 Summary of impacts and 6.5.1 Direct impacts d. 6.5 Black Cockatoos e. 6.5.1.2 Short-term and long-term impacts to local flocks, Table 6-10 f. 6.5.2.7 Abiotic aspects, 6.5.2.5 Increased risk of vehicle strike, 6.5.2.4 Increased risk of fire, 6.5.2.2 Introduction and/or spread of weeds, 6.5.2.3 Introduced and/or spread of <i>Phytophthora cinnamomi</i> Dieback, 6.5.2.1 Fragmentation and edge effects, 6.5.2.6 Movement barriers, Table 6-10: Assessment against Significant Impact Guidelines 1.1 for Black Cockatoos discusses disease specific,

		fragmentation, reduction to habitat quality to CBC and FRTBC g. Section 7 and Appendix 3.
2.2 TEC Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plain threatened ecological community (Tuart TEC) – Critically Endangered; and Carnaby's Black Cockatoo (<i>Zanda latirostris</i> listed as <i>Calyptorhynchus latirostris</i>) (CBC) – Endangered; and Banksia Woodlands of the Swan Coastal Plain ecological community (Banksia TEC) – Endangered	2.2.1 Baseline data The following information is required for the department to further assess the impacts to the Tuart TEC and Banksia TEC: a. Include a discussion of previous and future clearing of Tuart TEC and Banksia TEC in the surrounding areas to support assessment of cumulative impacts.	a. Presented in Section 6.1.3 Cumulative impacts and Table 6-3
	2.2.2 Habitat quality scoring values Please include the equivalent habitat quality score relevant to the department's HQS tool (the department will provide the habitat scoring system used for the assessment of Tuart TEC and Banksia TEC).	Attachment 9
	2.2.3 Assessment of impacts The department needs to be aware of the potential impacts (including direct, indirect, consequential, and cumulative impacts) of the proposed action on the Tuart TEC and Banksia TEC within the proposed action and the surrounding area prior to, during and post-clearing for ensuring its adequate management. The impacts of the proposed action should be considered at the broadest scope, and consider the following:	a. Section 6.2 Tuart TEC discusses the potential impacts. b. 6.3 Banksia TEC discusses the potential impacts. c. Abiotic impacts are discussed in Sections 6.2.2.6 and 6.3.2.6.

	a. A description of all potential impacts on the 3.04 ha Tuart TEC that may be posed by land clearing and earthworks activities within the proposed action area and the surrounds. This can include, but not be limited to, a discussion on the impacts of fragmentation and edge effects on the remaining Tuart TEC patches in the surrounding areas, noting that three patches, measuring approximately 10.4 ha, 7.42 ha, and 1.95 ha are located outside the project area. b. Provide a description of all potential impacts on the 7.24 ha Banksia TEC that may be posed by land clearing and earthworks activities within the proposed action area and the surrounds. This can include but not limited to a discussion on the impacts of edge effects on the remaining Banksia TEC patches in the surrounding areas considering the buffer zone measures outlined within the conservation advice, noting that five patches, measuring approximately 12.63 ha, 16.39 ha, 60.80 ha, 6.04 ha, and 50.61 ha are located outside the project area. c. Impact of abiotic (non-living) factors such as water, nutrients, and soil necessary for the survival of Tuart TEC and Banksia TEC in the surrounding patches; d. Habitat degrading processes such as weed invasion and <i>Phytophthora cinnamomi</i> dieback into the project area and the surrounding areas; e. Discussion surrounding the potential short-term and long-term impacts to Tuart TEC and Banksia TEC; and f. Update a risk assessment of the potential indirect impacts of the proposed action on nearby uncleared TECs, including whether the nature and/or scale of the potential impacts are unknown, unpredictable or irreversible, and what confidence is placed on the predictions of relevant impacts.	d. Weeds are discussed in 6.2.2.3 and 6.3.2.3; and dieback is discussed in 6.2.2.4 and 6.3.2.4. e. Assessment of significance is presented in Sections 6.2.3 and 6.3.3. f. Risk assessment is presented in Section 7 and Appendix 3.
2.3 Orchids - Glossy-leafed Hammer Orchid (<i>Drakaea elastica</i>) – Endangered - King Spider-orchid (<i>Caladenia huegelii</i>) – Endangered - Dwarf Bee-orchid (<i>Diuris micrantha</i>) – Vulnerable	2.3.1 Baseline data The department notes that flora surveys were undertaken at the proposed action area and that Glossy-leafed Hammer Orchid and King Spider-orchid have not been identified. However, as orchid detectability is difficult, a non-detect result does not always support a 'not present' outcome. The department notes that the flora survey did not include a targeted search for Dwarf Bee-orchid. For this reason, the Department requires: a. Additional, targeted flora survey(s) of the proposed action area using a suitable methodology or justification that surveys were done in accordance with the Draft survey guidelines for Australia's threatened orchids for the three Orchid species, to provide confidence of the presence/absence of EPBC Act listed orchid species within the proposed action area.	a. Attachment 5 - Targeted Orchid Survey.
	2.3.2 Assessment of impacts If present on the proposed action area, provide a description of likely impacts (direct and indirect) on the orchid species present as a result of the proposed action, including but not limited to:	No orchid species were identified as being present in the PAA.

	a. The impacts on abiotic (non-living) factors (such as water, salinity, nutrients, and soil) necessary for the survival of the orchids in the proposed action area and surrounding areas. b. The impact of invasive species (including weeds) into the proposed action area and surrounding areas. c. The introduction of diseases such as Dieback (<i>Phytophthora cinnamoni</i>) into the proposed action area and surrounding areas.	a. Direct and indirect impacts are discussed in Sections 6.4.1 and 6.4.2, respectively. b. Section 6.4.2 discusses indirect impacts. c. Section 6.4.2 discusses indirect impacts.
3. Avoidance and Mitigation		
3.1 • Carnaby's Black Cockatoo • Forest Red-tailed Black Cockatoo • Tuart TEC • Banksia TEC • Glossy-leafed Hammer Orchid • King Spider-orchid • Dwarf Bee-orchid.	Refer to the following link for more information on the mitigation hierarchy: https://www.dcceew.gov.au/environment/epbc/advice-for-complying-with-the-epbc-act/environmental-offsets-under-epbc/environmental-offsets-guidance/offsets-mitigation-hierarchy Provide details of avoidance and mitigation measures proposed for direct and indirect impacts on CBC, FRTBC, Tuart TEC, Banksia TEC and Orchid species from the proposed action. This may be in the form of a Construction Environmental Management Plan (CEMP). The CEMP is to be EPBC specific and detail the management of potential environmental impacts to the above listed threatened species and ecological communities associated with the proposed action. The CEMP provided should be developed consistent with the Department's Environmental Management Plan Guidelines (2014) (see Table C below). The CEMP should include (but not limited to): a. Project specific details such as hours of operation and activity schedules. b. Details of pre-clearance and clearance procedures. c. Mitigation measures to minimise risk of injury and death of CBC and FRTBC, such as from vehicle strike. d. Mitigation measures to minimise impacts on surrounding areas used by CBC and FRTBC. this may include noise, dust, light pollution etc. e. Mitigation measures to manage unexpected finds (e.g. active nests) or injuries/death of fauna. f. Mitigation measures to reduce the introduction of edge effects into the patches outside of the proposed site for both TECs. g. Mitigation to reduce the introduction of invasive species and weed management, chemical waste run off procedures, native species loss etc. If there are significant residual impacts, after avoidance and mitigation measures, then provide an offset proposal/strategy as detailed later (see below).	CEMP included as Attachment 8 and addresses the following items in the below nominated sections of the CEMP: a. Section 1.3 b. Section 2 c. Table 10 d. Table 10 e. Table 10 f. Table 10 g. Table 10
4. Offsets		5.

4.1 Environmental Offsets	Environmental offsets are the final step in the Offsets mitigation hierarchy and should only be applied once impacts have been avoided and mitigated. Offsets must meet the principles of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) - environmental offsets policy - DCCEEW. In the event that the impacts of your proposal cannot be avoided or mitigated, the preliminary documentation is to provide an offset proposal to compensate for all predicted or potential residual significant impacts (direct and indirect) to EPBC Act listed threatened species and communities. Early and proactive engagement about any proposed offsets with the department is encouraged. See environmental offsets under the EPBC Act. The offset proposal/strategy must include, but not be limited to, the following (details of proposed direct offsets): - Demonstration of how the Offsets mitigation hierarchy has been applied. - An outline of the remaining residual significant impacts, after considering avoidance and mitigation measures, that the offset will compensate. - A description of the proposed offset site(s) including location, size, distance from the impact site, current condition and relevant ecological/species habitat features, landscape context and cadastre boundaries of the offset site(s), supported by mapping which meets the Guide to providing maps and boundary data for EPBC Act projects. - Baseline survey information to determine the presence of CBC, FRTBC, Tuart TEC and Banksia TEC and the extent and quality of the habitat at the offset site(s) in accordance with the various relevant Departmental Guidelines, Recovery Plans, Conservation Advice and Threat Abatement Plans (mentioned in Table C), using a scientifically robust and repeatable methodology. - Evidence of the presence of, or usage by, relevant protected matter(s) on, or adjacent to the offset site(s), and the presence and quality of habitat type for protected matter(s) on the offset site. These details should be based on recent site surveys or analysis of available contemporary site data, reference to research, studies, or other publications relevant to the protected matter(s) and include reference to the site survey and habitat assessment methodology used for the impact site. - A discussion on how the qualities of the site are 'like-for-like' in comparison to the impacts at the proposed action area. - The expected environmental outcomes and their timeframes that will be achieved for each MNES along with specific milestones and performance targets. - An outline of the	- Offset Strategy (Attachment 10), Section 2 - Offset Strategy (Attachment 10), Section 3 - Offset Strategy (Attachment 10), Sections 6, 7 and 8 - Offset Strategy (Attachment 10), Sections 6.1, 6.2, 7.1, 7.2, 8.1, 8.2, Appendix 1 - Offset Strategy (Attachment 10), Sections 6.1, 6.2, 7.1, 7.2, 8.1, 8.2, Appendix 1 - Offset Strategy (Attachment 10), Sections 6.1, 6.2, 7.1, 7.2, 8.1, 8.2, Appendix 1 - Offset proposal Attachment 10 - Offset proposal Attachment 10 - Offset proposal Attachment 10 - Offset proposal Attachment 10 - Offset proposal Attachment 10
----------------------------------	--	---

	i) management and monitoring strategies and actions proposed to ensure the offset site attains and/or maintains the same or better habitat quality as the quality of the impact site. ii) a risk assessment of the management actions. iii) associated triggers and the relevant corrective actions if the risks are realised. iv) final completion criteria by which the environmental outcomes will be achieved. i. A discussion of how the offset proposal meets the principal of 'additionality', which is in comparison to that of a business-as-usual situation for the offset site(s) (i.e. if the offset were not to be managed, what would the future state of the offset site(s) be). j. Outline the governance and land tenure arrangements of the proposed offset site and details of how the offset site will be legally secured for the full duration of the impact and detail how the offset(s) will be protected, and ecological benefits maintained, in perpetuity. k. Identification of parties who will manage the site until the offset completion criteria is met. l. Justification and evidence to demonstrate how the offset proposal/strategy package meets the requirements of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) - environmental offsets policy - DCCEEW.	
6. Plans		7.
5.1 Environmental Management Plan/s	Any additional management plan included in the preliminary documentation should be developed consistent with the Environmental Management Plan Guidelines (2014) (see Table C).	No additional Management Plans.

Table B: Information from the referral

Information Request		PD Section Reference
	A description of all components of the action, as described in the referral documentation.	Section 3
2. Description of the environments	A description of all environments, as it relates to the proposed action, as described in the referral documentation.	Section 4
3. Relevant matters of National environmental significance (MNES)	Details of the relevant MNES, as described in the referral documentation.	Section 5
4. Baseline information	Description of the baseline data contained in the referral documentation.	Section 5
5. Impacts	Description of the impacts contained in the referral documentation, including: a. 16.24 ha of Carnaby's Black Cockatoo foraging habitat b. 16.24 ha of Forest Red-tailed Black Cockatoo foraging habitat c. 7.27 ha of Banksia TEC d. 3.04 ha of Tuart TEC e. Habitat fragmentation, resulting in loss of habitat quality and edge effects. f. Possible indirect impacts to retained and surrounding native vegetation providing habitat for MNES through construction via noise, dust, vibration, weed, and pathogen spread, increased vehicular access, increased exposure to domestic and feral animals.	Section 6
6. Proposed avoidance and mitigation measures	Description of the avoidance and mitigation measures proposed in the referral documentation and offset strategy (if residual impacts cannot be mitigated).	Section 8

Table C: General content, style and formatting requirements

Information Request		PD Section Reference
1. Considerations for decision making		
1.1 Ecologically Sustainable Development (ESD)	A description of how the proposed action meets the principles of ESD (see Table C item 2.4c), as defined in section 3A of the EPBC Act. The following principles are principles of ecologically sustainable development: a. Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations; 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; c. The principle of inter-generational 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; d. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making; and e. Improved valuation, pricing and incentive mechanisms should be promoted.	Section 10
1.2 Economic and social matters	An analysis of the economic and social impacts of the action, both positive and negative. Details of any public consultation activities undertaken and their outcomes.	Section 11
	Details of any consultation with Indigenous stakeholders. Indigenous engagement Identify existing or potential native title rights and interests, including any areas and objects that are of particular significance to Indigenous peoples and communities, possibly impacted by the proposed action and the potential for managing those impacts. Describe any Indigenous consultation that has been undertaken, or will be undertaken, in relation to the proposed action and their outcomes. The department considers that best practice consultation, in accordance with the <i>Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act</i> (2016) includes: a. Identifying and acknowledging all relevant affected Indigenous peoples and communities; b. Committing to early engagement; c. Building trust through early and ongoing communication for the duration of the project, including approvals, implementation, and future management; d. Setting appropriate timeframes for consultation; and	Section 11

	e. Demonstrating cultural awareness. Describe any state requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action with regards to Indigenous peoples and communities. Projected economic costs and benefits of the project, including the basis for their estimate through cost/benefit analysis or similar studies. Employment opportunities expected to be generated by the project (including construction and operational phases).	
1.3 Environmental record of the person(s) proposing to take the action	Include details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against: - The person proposing to take the action; - For an action for which a person has applied for a permit, the person making the application; - If the person is a body corporate—the history of its executive officers in relation to environmental matters; and - If the person is a body corporate that is a subsidiary of another body or company (the parent body)—the history in relation to environmental matters of the parent body and its executive officers.	Section 12
1.4 International obligations	Justify, with supporting evidence, how the proposed action will not be inconsistent with Australia's obligations under: - The Bonn Convention; - China-Australia Migratory Bird Agreement; - Japan-Australia Migratory Bird Agreement; - International Agreement – Republic of Korea-Australia Migratory Bird Agreement; and - Any international agreement approved under subsection 209(4) of the EPBC Act.	Section 13
1.5 Other approvals and conditions	The preliminary documentation must include information on any other requirements for approval or conditions that apply, or that you reasonably believe are likely to apply, to the proposed action if applicable. This must include: - A description of any approval obtained or required to be obtained from a State or Commonwealth agency or authority (other than an approval under the EPBC Act), including any conditions that apply (or are reasonably expected to apply) to the action; and - A description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Section 14
2. Content, style and formatting requirements		
2.1 Style	Be written so that any conclusions reached can be independently assessed. Include all key claims, findings, proposals, and undertakings in the main document.	Noted.
2.2 Format	Be in a suitable format to be published in hardcopy (A4 or A3 size, with maps and diagrams in A4 or A3 size and in colour) and published in electronic format (e.g., MSWord or PDF) on the internet.	Noted.

2.3 Content	Include a cross-reference table indicating where the information fulfilling the requirements in Table 1, 2 and 3 is included in the preliminary documentation.	Appendix 2
2.4 Relevant standards, policies, and other guidance material	Refer to all relevant standards, policies and other guidance material published by the department. Any instances where published guidance is not followed must be justified. Where no Commonwealth standards exist, state government and industry standards may be useful. Relevant standards, policies and other guidance material include, but are not limited to: a. Department of Agriculture, Water and the Environment (2021). Guide for providing maps and boundary data for EPBC Act projects. Canberra, ACT: Commonwealth of Australia. Available from: https://www.environment.gov.au/system/files/resources/5bb0509e-c4b5-4f7a-910b-5b04d82db491/files/epbca-maps-data-guidelines.pdf b. Department of the Environment (2014). Environmental Management Plan Guidelines. Canberra, ACT: Commonwealth of Australia. Available from: Environmental Management Plan Guidelines 2014 (dcceew.gov.au) c. Department of the Environment (2003). Criteria for Determining ESD Relevance. Commonwealth Department of Climate Change, Energy the Environment and Water, Canberra. Available from: https://www.dcceew.gov.au/sites/default/files/documents/esd-criteria-relevance.pdf d. Department of Agriculture, Water and the Environment (2022). Referral guideline for 3 WA threatened black cockatoo species. Canberra, ACT: Commonwealth of Australia. Available from: Referral guideline for 3 WA threatened black cockatoo species (dcceew.gov.au) e. Department of Sustainability, Environment, Water, Population and Communities (2012). Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. Canberra, ACT: Commonwealth of Australia. Available from: https://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf f. Department of Parks and Wildlife (2013). Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia. Available from: Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>) Recovery Plan (dcceew.gov.au) g. Department of the Environment, Water, Heritage and the Arts (2009). Approved Conservation Advice for <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo). Available from: <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo) - approved conservation advice (environment.gov.au) h. Department of the Environment and Energy (2018). Threat abatement plan for disease in natural ecosystems caused by <i>Phytophthora cinnamomi</i>. Canberra: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi-2018 i. Department of the Environment, Water, Heritage and the Arts (2010). Survey guidelines for Australia's threatened birds. Available from: Survey guidelines for Australia's threatened birds (dcceew.gov.au) j. Department of the Environment and Energy (2019). Approved Conservation Advice (incorporating listing advice) for the Tuart	Noted.

	(<i>Eucalyptus gomphocephala</i>) woodlands and forests of the Swan Coastal Plain ecological community. Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf k. Threatened Species Scientific Committee (2016). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf l. Department of Environment and Conservation (2009) Glossy-leaved Hammer Orchid (<i>Drakaea elastica</i>) Recovery Plan. Available from: https://www.dcceew.gov.au/sites/default/files/documents/drakaea-elastica.pdf m. Department of the Environment, Water, Heritage and the Arts (2008). Approved Conservation Advice for <i>Diuris micrantha</i> (Dwarf Bee-orchid). Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/55082-conservation-advice.pdf n. Department of the Environment (2013). Draft survey guidelines for Australia's threatened orchids. Available from: https://www.dcceew.gov.au/sites/default/files/documents/draft-guidelines-threatened-orchids.pdf o. Department of the Environment, Water, Heritage and the Arts (2008). Grand Spider Orchid (<i>Caladenia huegelii</i>) RECOVERY PLAN. Available from: https://www.dcceew.gov.au/sites/default/files/documents/caladenia-huegelii.pdf p. Department of the Environment, Matters of National Environmental Significance, Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999– (2013). Available from: https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance q. Department of Sustainability, Environment, Water, Population and Communities, HOW TO USE THE OFFSETS ASSESSMENT GUIDE (2012). Available from: https://www.dcceew.gov.au/sites/default/files/documents/offsets-how-use.pdf	
2.5 Maps, diagrams and images	a. Maps, plans, diagrams, technical information (e.g. specifications, schematics) and images provided must be clearly annotated, in colour and of high resolution b. All maps submitted as part of the response must be consistent with the department's Guide for providing maps and boundary data for EPBC Act projects (2021) (see Table C item 2.4a).	Noted. Appendix 1
2.6 Referencing standards	Reference all sources using the Harvard standard of referencing. Ensure that other supporting documents (e.g. academic studies, regulatory standards) are publicly accessible, with electronic links provided where possible.	Section 17
2.7 Evidence based conclusions	Where appropriate, the information provided must be supported by: a. Evidence-based conclusions based on the best available peer-reviewed scientific literature with supporting references cited or expert opinion provided and/or the views of suitably qualified experts; b. Scientifically robust methodologies that are appropriate for purpose, and sufficient description of the methodology used and justification of why the methodology was selected; and	a. Noted. b. Appendix 4 c. Noted. Section 19

OFFICIAL

Kwinana Freeway Upgrade (Roe Highway to Mortimer Road) Preliminary Documentation

	c. Include detailed technical information, studies or investigations necessary to support the information in the stand-alone document as appendices.	
2.8 Inclusion of sensitive information	Must not contain any commercial in confidence markings. If the preliminary documentation contains sensitive information, please discuss this with the assessment officer. Redact the contact details of departmental officers. Include the names, roles and qualifications (where relevant) of all persons involved in preparing the preliminary documentation. The response will form part of the preliminary documentation that must be published for public comment. Therefore, the contact details of departmental officers must not be included in the response. The response should not contain commercial in confidence markings. If the response contains sensitive information, please discuss with the department.	Noted.
2.9 Ecological data	The preliminary documentation must include an appendix of occurrence records (both sightings and evidence of presence) for all listed threatened and migratory species identified during field surveys for the proposed action. This data may be used by the department to update the relevant species distribution models that underpin the publicly available Protected Matters Search Tool (PMST). The species occurrence records must be provided in accordance with the department's Guidelines for biological survey and mapped data (2018) using the species observation data template provided with this request for additional information. Sensitive ecological data must be identified and treated in accordance with the department's Sensitive Ecological Data – Access and Management Policy V1.0 (2016) or subsequent revision.	Appendix 5

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 10.58 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 10.58 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 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. 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 - 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 unfested vegetation. Unauthorised site access introducing or spreading dieback to unfested 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 Wandio1 or CSQ2 to ensure a negligible impact occur. Dewatering is unlikely to be required for the Proposed Action within 800 m of the Organic Mounds TEC. If groundwater drawdown is found to be adversely impacting ecological communities, remedial measures (e.g. infiltration trenches, diaphragm walls) will be implemented to	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
			restore groundwater levels.			
Indirect impacts to condition of adjacent native vegetation including: • Tuart TEC • Banksia TEC • Habitat for Black Cockatoos	Surface water runoff and spills during construction causing erosion, sedimentation and/or contamination.	The nature of the potential impact is known as construction will involve ground disturbance, 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.	Temporary erosion and sediment controls will be 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).	Unlikely	Minor	Low
Indirect impacts to condition of adjacent native vegetation	Accidental fires caused by construction	The nature of the potential impact is known, as the Banksia TEC are known to be vulnerable to more frequent/intense fire regimes. Other MNES are expected to be resilient to fire in the	Hot work will be undertaken in accordance standard construction site	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
including: - Tuart TEC - Banksia TEC - Habitat for Black Cockatoos	activities.	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. Construction fires resulting from hot works are expected to be immediately brought 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.	procedures. Vehicles, plant and equipment to be fitted with fire extinguishers and 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	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.	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
		unpredictable for ASS as it is dependent on the location and extent of excavation, dewatering 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.	Construction bore locations to be outside of high and moderate risk areas. Unexpected contamination finds will trigger an appropriate response consistent with the <i>Contaminated Sites Act 2003</i> (WA).			
Injury or mortality to Black Cockatoo individuals.	Vehicle collision with birds during construction.	Coyle (2021) mapped 2011-2020 vehicle strikes on Black Cockatoos for the Perth Metropolitan Region and identified the PAA as between "Low" to nil for FRTBC and between "Low" to nil for Carnaby's Cockatoo. Black Cockatoo vehicle strikes within the PAA is rare. The controlled action is expected to reduce the likelihood of vehicle bird strikes during construction as speeds within the PAA will be significantly reduced. With regards to construction activities, vehicle bird strikes are not known to have occurred at a construction location given the lower speeds, the few vehicles present and the open nature	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	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
		of the construction site. No loss is expected to occur during the construction phase due to construction activity. Due to the indirect benefit of slowing traffic in adjacent lanes, the likelihood of the road users striking Black Cockatoos is expected to be reduced. Moderate confidence in prediction of nature and scale of impacts.	personnel on reducing the risk of fauna injury and the 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 unknown Black Cockatoo breeding occurring is expected to be rare. High confidence in prediction of nature and scale of impacts.	Fauna observers will be employed for vegetation clearing.	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
Disturbance of Black Cockatoo individuals.	Construction activities causing noise, light, vibration and dust emissions.	The nature of the potential impact is known as the PAA is adjacent to Black Cockatoo habitat with the noise, light, vibration and dust emissions being comparable to the existing freeway. 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. If birds were disturbed by the construction's noise, light, vibration and dust emissions, this disturbance would be temporary and reversible, with no population impacts expected. High confidence in prediction of nature and scale of impacts.	Construction works will be 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.	Possible	Minor	Low
Indirect impacts to condition of adjacent native vegetation	Surface water runoff from road surface during	The nature of the potential impact is known as the PAA will comprise upgraded freeway that will generate stormwater runoff, and lie	Drainage design will integrate Water Sensitive Urban Design principles.	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
including: - Tuart TEC - Banksia TEC - Habitat for Black Cockatoos	operation causing erosion, sedimentation and/or contamination (additional impact above and beyond existing road).	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, with the design giving consideration to infrequent storm events. Action relates to upgrade of existing freeway that has a long history of effectively managing stormwater runoff. The impact is expected to be reversible as erosion; sediment deposition and contamination can be remediated with established technologies and maintenance works. High confidence in prediction of nature and scale of impacts.	Drainage design will be implemented to maintain existing modified hydrological flow regimes and control stormwater run-off.			
Indirect impacts to condition of adjacent native vegetation including: - Tuart TEC - Banksia 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 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.	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	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 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 the additional lanes will have on fires is expected to be reversible through recovery of most vegetation that is adapted to fires. The additional lanes are unlikely to create additional risks to the condition of adjacent native vegetation. It is considered that the additional lanes may improve emergency response times. Moderate confidence in prediction of nature and scale of impacts.	notifying and information emergency fire services.			
Injury or mortality to Black Cockatoo individuals	Vehicle collision with birds during operations (additional impact above and beyond existing road)	Coyle (2021) mapped 2011-2020 vehicle strikes on Black Cockatoos for the Perth Metropolitan Region and identified the PAA as between "Low" to nil for FRTBC and between "Low" to nil for Carnaby's Cockatoo. Black Cockatoo vehicle strikes within the PAA is rare. The controlled action is expected to reduce the likelihood of vehicle bird strikes during operation due to the removal of foraging habitat within 10 m of the sealed road surface. In addition the road design will avoid water pooling on the road surface and shoulders,	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

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
		removing a potential water source for birds. Therefore any 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.				
Disturbance of Black Cockatoo individuals.	Operation of the road causing noise and light emissions (additional impact above and beyond existing road).	As the proposed works primarily relates to adding lanes to an existing freeway, there will be no increase in the scale and nature of the operational impact. 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 proposed action will not result in an increase in impact on Black Cockatoos during operation. High confidence in prediction of nature and scale of impacts.	Road lighting will be implemented in accordance with Main Roads Lighting Design Guideline for Roadway and Public Space and relevant Australian Standards.	Unlikely	Minor	Low

Appendix 4: Methods Statement

The methods used to estimate the extent of TEC and species habitats' locally and regionally as requested throughout the RFI are described below.

Tuart TEC

Datasets from [DataWA](#) and [Find Environmental Data](#) were used to estimate the extent of the Tuart TEC locally (within 10 km of the PAA) and regionally (SCP). A pairwise intersect of the [Tuart Woodlands \(DBCA-048\)](#) and [Native Vegetation Extent \(DPIRD-005\)](#) datasets was completed with the resulting output clipped to a 10 km buffer of the PAA or the Swan Coastal Plain ([SWA IBRA Bioregion](#)). A pairwise intersect with [DBCA - Legislated Lands and Waters \(DBCA-011\)](#) was completed to estimate the extent within conservation reserves (within 10 km buffer of the PAA).

The DBCA TEC/PEC database (DBCA 2024b) provided buffered occurrences of Tuart TEC within 10 km of the PAA. This extent was queried and produced the same extent for a 10 km buffer of the PAA as calculated via the method outlined above.

Banksia TEC

Datasets from [DataWA](#) and [Find Environmental Data](#) were used to estimate the extent of the Banksia TEC locally (within 10 km of the PAA) and regionally (SCP). A pairwise intersect of the [Vegetation Complexes - Swan Coastal Plain \(DBCA-046\)](#) and [Native Vegetation Extent \(DPIRD-005\)](#) was completed with the resulting output clipped to a 10 km buffer of the PAA or the Swan Coastal Plain ([SWA IBRA Bioregion](#)). A filter for Vegetation Complexes strongly and moderately associated with the Banksia TEC was applied (DEE 2016a, Table C2 a) & b)).

The DBCA TEC/PEC database (DBCA 2024b) provided buffered occurrences of Banksia TEC within 10 km of the PAA. This extent was queried and produced the same extent for a 10 km buffer of the PAA as calculated via the method outlined above.

Carnaby's Black Cockatoo

Datasets from [DataWA](#) and [Find Environmental Data](#) were used to estimate the extent of Carnaby's Cockatoo foraging habitat within 12 km of the PAA. A pairwise intersect of the [Carnabys Cockatoo Areas requiring investigation as feeding habitat in the Swan Coastal Plain \(SCP\) IBRA Region \(DBCA-057\)](#) and [Native Vegetation Extent \(DPIRD-005\)](#) was completed with the resulting output clipped to a 12 km buffer of the PAA.

FRTBC

Datasets from [DataWA](#) and [Find Environmental Data](#) were used to estimate the extent of FRTBC foraging habitat within 12 km of the PAA. A pairwise intersect of the [Vegetation Complexes - Swan Coastal Plain \(DBCA-046\)](#) and [Native Vegetation Extent \(DPIRD-005\)](#) was completed with the resulting output clipped to a 12 km buffer of the PAA. A filter for Vegetation Complexes likely to provide foraging resources, based on a vegetation summary description and reported FRTBC foraging species (DAWE 2022) was applied. This included the following vegetation complexes: Abba, Bassendean-Central and South, Bassendean-Central and South Transition, Beermullah, Cannington, Cartis Cottesloe-Central and South, Dardanup, Forrestfield, Gingin, Guildford, Karamal-North, Karamal-South, Karrakatta-Central and South, Mogumber-South, Mungala, Pinjar, Southern River, Vasse, Wannamal, Yoongarillup.

Appendix 5: Occurrence records

TaxonName	CommonName	Datum	Latitude	Longitude	Precision	SiteName	DateObs	Abundance	ObsMethod	EPBCActRef	Author	Citation
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.093158	115.849719	0	No Site	30/09/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.094197	115.849828	0	No Site	30/09/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.210534	115.851111	0	No Site	12/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.210848	115.85085	0	No Site	12/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.21088	115.850933	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.245273	115.852047	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24637	115.852143	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.246148	115.852108	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.246003	115.852093	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24593	115.852081	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.245822	115.85208	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.245341	115.851992	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.168842	115.857029	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.21116	115.850652	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.211169	115.850701	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.211272	115.850668	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.211488	115.850517	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.211791	115.850418	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.212103	115.850316	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.243093	115.851672	0	No Site	13/11/2024	0	Heard calling	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.242962	115.851631	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.242608	115.851584	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24238	115.851558	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.241218	115.851363	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185472	115.856771	0	No Site	13/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.184692	115.856719	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.179586	115.856235	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.176562	115.856471	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185374	115.856762	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.18533	115.856782	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185267	115.856786	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.18523	115.856752	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185289	115.856746	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185233	115.856781	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185026	115.856723	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.185086	115.856726	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.184978	115.856713	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.184861	115.856699	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.184722	115.856712	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.184691	115.8567	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.17956	115.856228	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Zanda latirostris	Carnaby's cockatoo	GDA2020	-32.17948	115.856247	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24296	115.85164	0	No Site	14/11/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24154	115.85139	0	No Site	20/09/2024	0	Foraging evidence	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.24296	115.851637	0	No Site	20/09/2024	4	observed feeding	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads
Calyptrorhynchus banksii naso	Forest red-tailed black cockatoo	GDA2020	-32.241537	115.851386	0	No Site	20/09/2024	4	observed feeding	2025-10266	GHD Pty Ltd	GHD 2025. MRWA Kwinana Freeway widening - Biological survey. Unpublished report prepared for Main Roads

19 ATTACHMENTS

Attachment	Title	Source
Attachment 1	Kwinana Freeway widening - Biological Survey	GHD, 2025a
Attachment 2	Roe Highway widening – Targeted Flora, Vegetation and Wetland Assessment	GHD, 2025b
Attachment 3	Roe Highway widening – Basic Fauna and SRE Survey	GHD, 2025c
Attachment 4	Roe Highway widening – Targeted Black Cockatoo Survey	GHD, 2025d
Attachment 5	Targeted Orchid Survey Kwinana Freeway Upgrade	GHD, 2025e
Attachment 6	Anketell Road Upgrade Biological Survey	Biota, 2025
Attachment 7	Phytophthora Dieback Occurrence Report for Kwinana Freeway Upgrade Assessment	Glevan Consulting, 2025
Attachment 8	Construction Environmental Management Plan	Main Roads, 2026a
Attachment 9	Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plain threatened ecological community and Banksia Woodlands of the Swan Coastal Plain threatened ecological community habitat quality scoring	GHD, 2026
Attachment 10	Offset Strategy	Main Roads, 2026b
Attachment 11	Kwinana Freeway Upgrade: Risk of groundwater abstraction to Thomsons Lake	Main Roads, 2025