



Main Roads Western Australia
Albany Ring Road Stage 2 and 3b (EPBC 2020/8769)
Preliminary Documentation

September 2021

Executive summary

Main Roads Western Australia (Main Roads) is proposing the construction of a new seven km long section of the Albany Ring Road (ARR) from the intersection of South Coast Highway and Link Road, to Frenchman's Bay Road in the City of Albany in Western Australia (WA) (the Proposed Action). The Proposed Action will cover two stages of the ARR:

- Stage 2 – the southern link of the ring road located between the Lower Denmark Road and Frenchman Bay Road. Stage 2 works end west of Festing Street.
- Stage 3b – from South Coast Highway along George Street to Lower Denmark Road.

Road construction and associated infrastructure for the Proposed Action includes the following components:

- Approximately 7 km of new dual carriage road
- Grade separated interchanges at South Coast Highway and Frenchman Bay Road
- Bridges and culverts
- Water retention basins and other drainage structures
- Landscaping and revegetation works
- Modifications to local roads
- Realignment to the Albany-Wagin railway line between George Street and the Hanrahan/Frenchman Bay Interchange
- Other road infrastructure including, but not limited to; lighting, noise barriers, fencing, road safety barriers, a fauna underpass and a rope bridge, and signs.

As the Proposed Action may have a significant impact on Matters of National Environmental Significance (MNES), Main Roads was required to prepare Preliminary Documentation in response to a request by Department of Agriculture, Water, and Environment (DAWE) on 14 October 2020 for additional information to support assessment of impacts for the Proposed Action (EPBC 2020/8769) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Preliminary Documentation will inform the assessment of the relevant impacts of the Proposed Action.

The Preliminary Documentation has been subsequently revised to reflect a varied Proposed Action development envelope reduction. This has been documented via a section 156a request.

The Proposed Action will have residual impacts to Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and the Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*). Impacts to these species include:

- Clearing of 37.89 ha of Black Cockatoo habitat, which represents:
 - 5.80 ha of breeding habitat
 - 37.75 ha of roosting habitat
 - 5.80 ha of high-quality foraging and 1.22 ha of low-quality foraging habitat.
- Clearing of up to 236 suitable diameter at breast height (DBH) Black Cockatoo breeding trees, none of which contain known nesting hollows. Twenty-four trees contain hollows, with 10 of these trees having one or more potentially suitable hollows (14 hollows in total) for nesting by Black Cockatoos

- Clearing of 19.18 ha of WRP habitat comprising:
 - 0.88 ha of Core habitat
 - 0.19 ha of Core (Urban) habitat
 - 18.11 ha of Supporting habitat
 - 5 dreys.

Habitat types for Black Cockatoos overlap, with 5.80 ha of Black Cockatoo habitat within the Proposed Action Area categorised as breeding, roosting and high-quality foraging (Southern Ecology 2020a). Although low-quality breeding habitat was also identified in the Southern Ecology (2020a) survey, this habitat type has been excluded from mapping and is not considered in this document as it was found to contain a low number of suitable DBH trees, none of which contain hollows. It is considered that the low-quality breeding habitat would be already represented in the 236 breeding trees identified in the Proposed Action Area which were assessed for hollows.

The Proposed Action will not result in impacts to known Black Cockatoo nesting hollows nor roosting sites. The Proposed Action is unlikely to fragment threatened species habitat, with clearing being limited to the edges of existing disturbed corridors.

The Proposed Action will also clear up to 20.20 ha of Linkage and Likely Linkage habitat that may be utilised by WRP. This is habitat that does not contain resident individuals but is habitat that facilitates their movement across the landscape.

Impacts of the Proposed Action on the three species of Black Cockatoo and the WRP will be managed under a Conservation Significant Fauna Environmental Management Plan (CSFEMP, Appendix A). The Proposed Action is not expected to result in significant indirect impacts to Carnaby's Cockatoo, FRTBC, Baudin's Cockatoo or the WRP.

The Proposed Action will occur over and adjacent to areas of dieback (*Phytophthora cinnamomi*) infestation and has the potential to cause spread of dieback to uninfested areas. The Proposed Action may also spread introduced flora species including Weeds of National Significance (WoNS) and species listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Potential impacts to Black Cockatoo and WRP habitat from dieback and introduced flora species will be managed under the CSFEMP (Appendix A).

Main Roads proposes an offset to counterbalance the potential significant residual impacts to Black Cockatoos and WRP. The offset strategy will include a direct land transfer to DBCA of land containing habitat for these species (Appendix B).

Social and economic benefits of the Proposed Action have been considered in the planning and design phases of the project. The Proposed Action will have significant social benefits including enabling the effective movement of freight to and from the Port of Albany. Additionally, an estimated 1000 employment opportunities will be created throughout the project lifecycle of Proposed Action. Economic benefits from the Proposed Action have been estimated to be between AU \$62M and AU \$160M.

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Appendices

Appendix A – Conservation Significant Fauna Environmental Management Plan

Appendix B – Offset Strategy

Appendix C – Phytophthora Dieback Management Plan: Albany Ring Road (Southern Ecology 2020b)

Appendix D – Memorandum to Main Roads Western Australia, Defining habitat categories for Western Ringtail Possum in the South Coast population. (Southern Ecology 2019)

Appendix E – Biological Survey: Albany Ring Road (Southern Ecology 2020a)

Appendix F – Albany Ring Road Black-Cockatoo Habitat Assessment (Biota 2019a)

Appendix G – Albany Ring Road Western Ringtail Possum Assessment (Biota 2020)

Acronyms

Abbreviation	Description
ARR	Albany Ring Road
ARVS	Albany Regional Vegetation Survey
ASS	Acid Sulfate Soils
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
CALM	Department of Conservation and Land Management
CoE	Clean on Entry/Exit
DAWE	Department of Agriculture, Water and Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter Breast Height
DEWHA	Department of Environment, Water, Heritage and Arts
DoEE	Department of the Environment and Energy
DPaW	Department of Parks and Wildlife
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FRTBC	Forest Red-tailed Black Cockatoo
CSFEMP	Conservation Significant Fauna Environmental Management Plan
GoWA	Government of Western Australia
LGA	Local Government Authority
Main Roads	Main Roads Western Australia
MNES	Matters of National Environmental Significance
PTA	Public Transport Authority
WA	Western Australia
WRP	Western Ringtail Possum
WoNS	Weeds of National Significance

1. Introduction

1.1 Background

Main Roads is proposing to construct the Albany Ring Road (ARR) to provide for the long-term transport needs of Albany. The ARR will be a dedicated freight route around the City of Albany, in the Great Southern Region of Western Australia (WA) enabling the effective movement of freight to and from the Port of Albany. The ARR will cater for the travel demands associated with growth in grain, woodchip and other agricultural industries, increased mining production, increased population growth, urban expansion and the expected increase in tourists.

The location of the Port of Albany, adjacent to the Central Business District, presents a challenge for the movement of freight. The current access to the Port of Albany through the Albany townsite is inefficient due to the presence of major intersections and local traffic conditions. It passes through residential areas, commercial and light industrial zones which is also a safety concern.

The ARR alignment will allow for improved safety and efficient access to the Port of Albany, facilitate future growth in agricultural production and mining across the Great Southern Region by improving freight productivity and access to freight gateways. In addition to improving connectivity between major freight infrastructure, including airports and commercial and industrial areas, the construction of the ARR will also reduce the number of heavy vehicles sharing roads with local residents and tourists.

The current alignment of the ARR consists of four stages (Figure 1):

- Stage 1 of the ARR is the east to west connection of Menang Drive linking Chester Pass Road to Albany Highway. Construction of one carriageway of Stage 1 was completed in March 2007
- Stage 2 of the ARR is the southern link of the ring road and is located between the Lower Denmark Road Link and Frenchman Bay Road. Stage 2 works end to the west of Festing Street
- Stage 3 of the ARR is the western link of the ring road and is located between the intersection of Albany Highway and Lower Denmark Road. Stage 3 is separated into two sections for environmental approvals purposes:
 - Part a – from Albany Highway along Link Road to South Coast Highway
 - Part b – South Coast Highway to Lower Denmark Road
- Stage 4 of the ARR is the duplication of Princess Royal Drive from Hanrahan Road to York Street, including duplication of the existing Princess Royal Drive Bridge over rail east of Festing Street.

This document and the Proposed Action relate to Stages 2 and 3b of ARR only (Figure 2).

1.2 Purpose of this document

On 1 October 2020, a delegate of the Minister for the Environment determined the Proposed Action was a 'Controlled Action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to be assessed by Preliminary Documentation. The relevant controlling provisions are listed threatened species and communities (s18 and 18A).

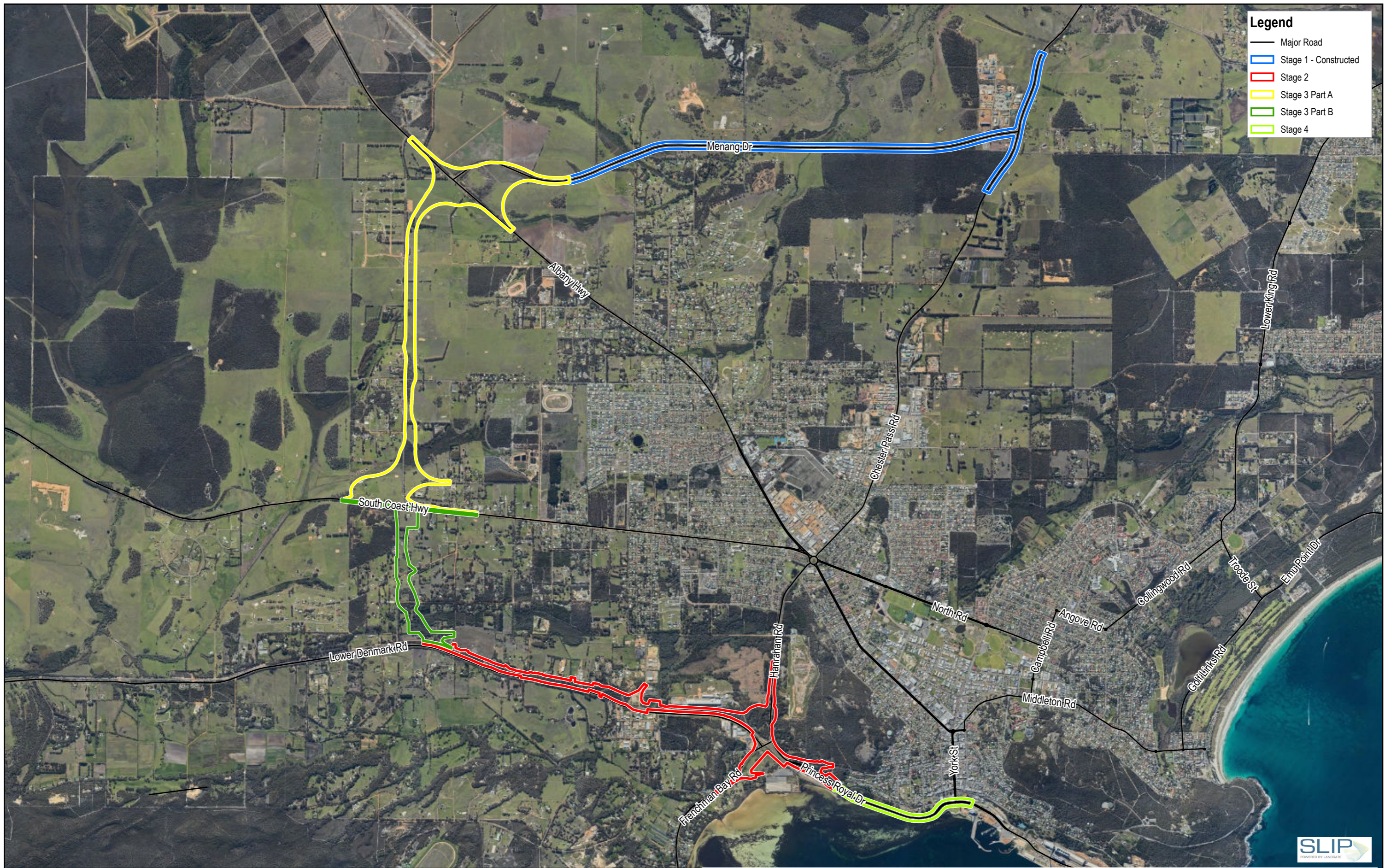
On 14 October 2020, the Department of Agriculture, Water, and Environment (DAWE) requested additional information to inform the assessment of the relevant impacts of the

Proposed Action. In making the request, DAWE considered the Proposed Action may impact Matters of National Environmental Significance (MNES) including, but not limited to:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (Endangered)
- Baudin's Cockatoo (*Calyptorhynchus baudinii*) (Endangered)
- Forest Red-Tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*) (Vulnerable)
- Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*) (Critically Endangered).

DAWE requested additional information to inform assessment of potential impacts of the Proposed Action. This document has been prepared to address DAWE's request for further information to support assessment of a controlled action by Preliminary Documentation. The location of the further information requested is outlined in Section 3.

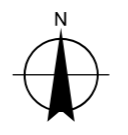
It is important to note this document reflects a varied Proposed Action, via a section 156a request, which is detailed further in Section 2.1.2.



Legend

- Major Road
- ▭ Stage 1 - Constructed
- ▭ Stage 2
- ▭ Stage 3 Part A
- ▭ Stage 3 Part B
- ▭ Stage 4

Paper Size ISO A3
 0 250 500 750 1,000
 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



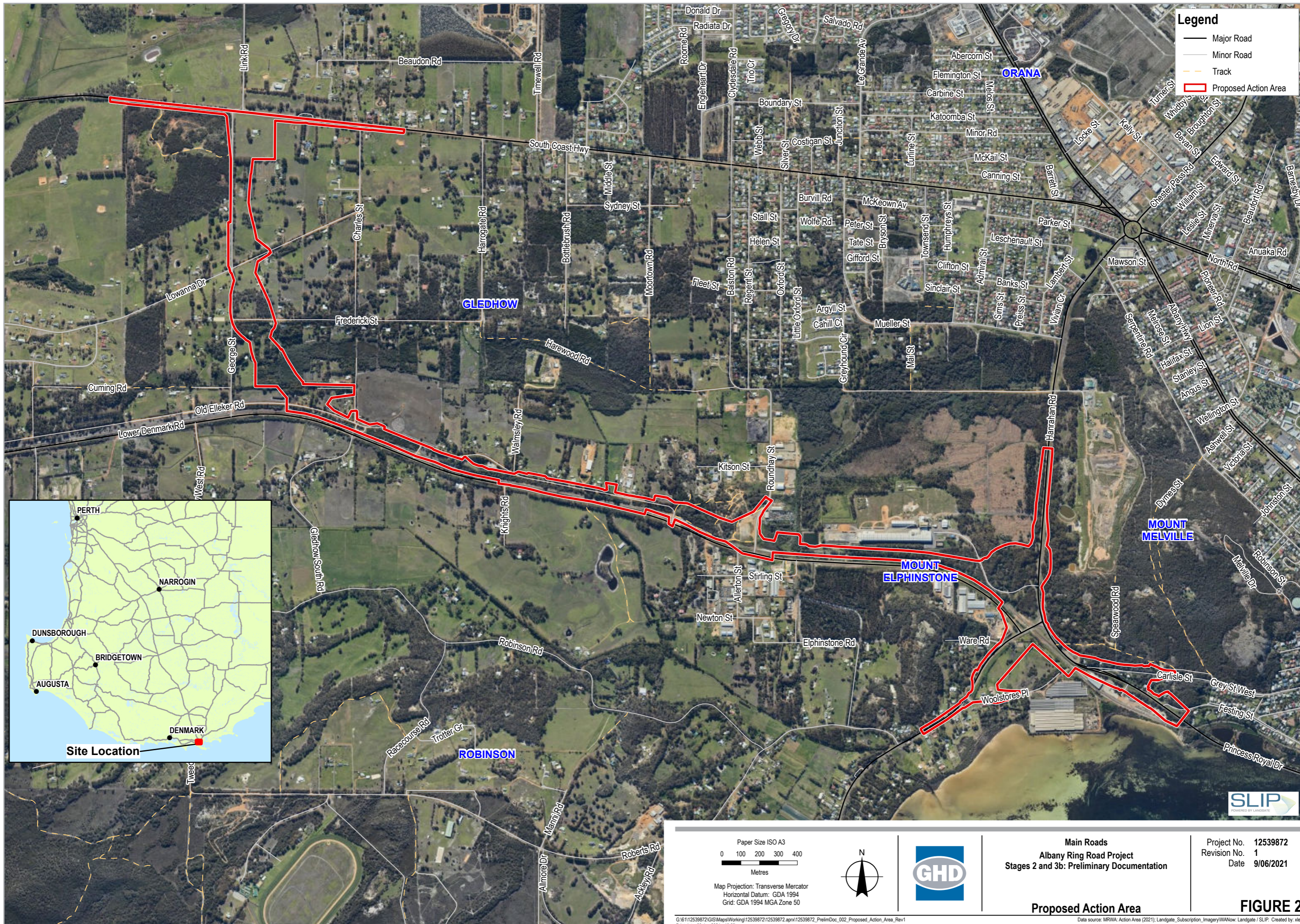
Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Project No. 12539872
 Revision No. 1
 Date 9/06/2021

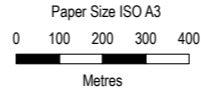
**Indicative Staging of
 ARR Development**

FIGURE 1

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 Print date: 09 Jun 2021 - 15:05
 Data source: GHD: Proposed Stages (2021); Landgate_Subscription_Imagery\WAnow; Landgate / SLIP. Created by: xie



- Legend**
- Major Road
 - Minor Road
 - Track
 - ▭ Proposed Action Area



Main Roads
Albany Ring Road Project
Stages 2 and 3b: Preliminary Documentation

Project No. 12539872
 Revision No. 1
 Date 9/06/2021

Proposed Action Area

FIGURE 2

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 Print date: 09 Jun 2021 - 15:07
 Data source: MRWA: Action Area (2021); Landgate_Subscription_Imagery\WAnow: Landgate / SLIP. Created by: xlee

2. Proposal Description

2.1 Description of the action

The Proposed Action is the development and operation of the ARR Stage 2 and 3b (Figure 2), which includes approximately 7 km of new dual carriageway. The Commissioner of Main Roads is proposing to commence the construction of Stage 2 and 3b of the ARR in 2021 pending environmental approvals.

The Proposed Action will comprise a dual carriageway road that connects the intersection of the South Coast Highway with ARR in the north and Hanrahan Road with ARR in the south. This will connect the intersection of South Coast Highway and Link Road, to the Port of Albany, bypassing the City of Albany. Stage 2 of the ARR is the southern link of the ring road located between the Lower Denmark Road George Street Intersection and Frenchman Bay Road. The end of the proposed Stage 2 works occurs west of Festing Street. Stage 3b proposes to connect South Coast Highway to Lower Denmark Road.

It is likely the Proposed Action Area will be staged. The initial phase of this Proposed Action involves the construction of a two-way single lane carriage way only. The completion of the two-way dual carriageway is likely to occur around 2050.

The Proposed Action works include:

- Road construction and associated infrastructure for the Proposed Action including the following components:
 - Approximately 7 km of new dual carriage road
 - Grade separated interchanges at South Coast Highway and Frenchman Bay Road
 - Bridges and culverts
 - Water retention basins and other drainage structures
 - Landscaping and revegetation works
 - Modifications to local roads
- Realignment to the Albany-Wagin railway line between George Street and the Hanrahan/Frenchman Bay Interchange
- Other road infrastructure including, but not limited to, lighting, noise barriers, fencing, road safety barriers, a fauna underpass and a rope bridge, and signs.

2.1.1 Location of Proposed Action

The Proposed Action Area (see Figure 2) is 96.65 ha, comprised of the following:

- 15.67 ha (16.21%) of native vegetation
- 36.03 ha (37.28%) of non-native vegetation
- 44.95 ha (46.51%) of cleared and highly modified areas.

2.1.2 Modifications to Referred Proposal

Subsequent to the 'Controlled Action' decision on 1 October 2020, Main Roads has undertaken a comprehensive review of the design and revised infrastructure components to further reduce potential impacts to listed threatened fauna species and their habitat.

The review identified reductions to the development envelope throughout the Proposed Action Area, with the majority of the refinement occurring within south-east portion, between Hanrahan

Road and Princess Drive. These modifications will result in the Proposed Action Area being reduced to 96.65 ha.

The design changes avoid impacts to a large area of fauna habitat that supports trees suitable for three species of Black Cockatoos and core habitat for WRP. In addition, the changes also reduce potential impacts to World War II tanks located within the vegetation between Hanrahan Road and Princess Drive.

On 17 June 2021, Main Roads submitted a variation request under section 156A of the EPBC Act to satisfy Parts 5.07 and 5.08 of the EPBC Regulations. Subsequently, on the 27 July 2021, DAWE accepted the variation to the proposal and issued a notice recording this decision.

The extent of the change associated with the modification to the referred Proposed Action is summarised in Table 2-1.

Table 2-1 Extent of design changes to avoid impacts to MNES

Matter	Varied Proposed Action (ha)	Proposed Action Area determined a 'Controlled Action' (ha)	Net reduction in impact (ha)	Net reduction (%)
Proposed Action Area	96.65	129.75	33.10	25.51
Black Cockatoos				
Total habitat	37.89	53.68	15.79	29.42
Breeding	5.80	11.17	5.37	48.08
Roosting	37.75	51.73	13.98	27.02
Low-quality foraging	1.22	1.96	0.74	37.64
High quality foraging	5.80	11.17	5.37	48.08
Black Cockatoo trees				
Total potential breeding trees (>500 mm DBH)	236	502	266	53.00
Trees with hollows suitable for Black Cockatoo breeding	10	11	1	9.09
Western Ringtail Possum				
Total habitat (Core, Core (urban) and Supporting only)	19.18	35.55	16.37	46.05
Core	0.88	4.50	3.62	80.44
Core (urban)	0.19	0.88	0.69	78.41
Supporting	18.11	30.17	12.06	39.97
Linkage and Likely Linkage	20.20	24.06	3.86	16.04
Dreys	5	6	1	16.67

3. Summary of Preliminary Documentation

This Preliminary Documentation presents the additional information requested by DAWE, to support the assessment of the Albany Ring Road Stages 2 and 3b, WA (EPBC 2020/8769, the Proposed Action) under the EPBC Act. The structure and content of this Preliminary Documentation has been prepared in accordance with DAWE’s request for additional information (see Table 3-1).

Table 3-1 Requested information and corresponding section in this report

Information requested	Section
<p>Provide additional information, for example as a table, describing in detail the different types of habitats, their quality and extent in ha for Black Cockatoos within the Proposed Action Area.</p> <p>Provide descriptions of any avoidance and mitigation measures proposed to reduce impacts to Black Cockatoos and their habitat. The proponent may provide this information in an Environmental Management Plan (EMP), however if this is the case, the EMP must be provided to the Department for review.</p>	<p>Section 5.1.1</p> <p>Section 5.1.3</p> <p>Appendix A</p>
<p>Provide further detail for any avoidance and mitigation measures proposed to reduce this impact prior to, during and/or post construction activities. In addition, describe and assess the likely effectiveness of the proposed measures on Black Cockatoos.</p>	<p>Section 5.1.3</p>
<p>Provide further details and clear maps of the WRP habitat in the Proposed Action Area, including the quality and condition of habitat proposed to be cleared, and the location of primary corridors within core and supporting habitat in the Proposed Action Area.</p> <p>Provide descriptions of any avoidance and mitigation measures proposed to reduce impacts to the WRP and their habitat.</p>	<p>Figure 5 and Figure 6</p> <p>Section 5.2.1</p>
<p>The referral documentation proposed the development of fauna movement facilitating infrastructure as a potential measure to mitigate the clearing of linkage habitat. Please provide further details regarding the development of this proposed infrastructure, including the intended implementation, the persons responsible and potential effectiveness as a measure to mitigate the impacts on the WRP.</p>	<p>Section 1.1.1</p>
<p>The Department notes that dieback (<i>Phytophthora cinnamomi</i>) infestation was detected by surveys undertaken within the Proposed Action Area. The Department is of the view this infestation may have a potential impact on foraging and breeding habitat for Black Cockatoos. Provide details of avoidance and mitigation strategies intended to prevent the spread of dieback.</p>	<p>Section 5.1.2</p> <p>Section 5.1.3</p> <p>Appendix A</p> <p>Appendix C</p>
<p>Please provide a copy of the proposed EMP, including the avoidance and mitigation measures proposed in the referral</p>	<p>Appendix A</p>

Information requested	Section
documentation in relation to vegetation clearing, native fauna, weed control and dieback management measures, for the Department's review.	
<p>Please provide details of all compensatory measures (i.e. environmental offsets) proposed to compensate for the residual significant impacts on EPBC Act listed threatened species and communities, including:</p> <ul style="list-style-type: none"> • The type of offset(s) proposed • Extent to which the proposed offset actions correlate to, and adequately compensate for, EPBC Act listed species and communities • Suitability of the location of any proposed offset site for EPBC Act listed species and communities, including evidence of the presence of, or usage by, relevant protected matter(s) • Conservation gain to be achieved by the offset i.e. positive management strategies that improve the site or averting the future loss, degradation or damage of the protected matter • Time it will take to achieve the proposed conservation gain • Level of certainty that the proposed offset will be successful • Current land tenure of any proposed land-based offset and the method of securing and managing that offset. 	Section 6 Appendix B
Demonstrate how any proposed offset is consistent with the Department's EPBC Act Environmental Offsets Policy (October 2012), and provide a completed offsets assessment guide(s) and justifications for figures used to complete the offsets assessment guide(s).	Section 6 Appendix B
<p>Demonstrate that the action is not inconsistent with relevant conservation advice, and has regard to recovery plans and/or threat abatement plans, including but not limited to:</p> <ul style="list-style-type: none"> • Threatened Species Scientific Committee (2018). Conservation Advice <i>Calyptorhynchus baudinii</i> Baudin's cockatoo. Canberra: Department of the Environment and Energy. • Department of Parks and Wildlife (2013). Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia. • Department of the Environment, Water, Heritage and the Arts (2009a). Approved Conservation Advice for <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo). Canberra: Department of the Environment, Water, Heritage and the Arts. • Chapman, T. (2008). Forest Black Cockatoo (Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> and Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>) Recovery Plan. 	Section 5

Information requested	Section
<p>Department of Environment and Conservation, Western Australia.</p> <ul style="list-style-type: none"> 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. 	
<p>Provide further detail on the social and economic costs and/or benefits of undertaking the Proposed Action, including:</p> <ul style="list-style-type: none"> Estimate of any anticipated economic costs and/or benefits (in AUD) Basis for any estimations of costs and/or benefits Potential employment opportunities expected to be generated at each phase of the Proposed Action. <p>Details of any public and stakeholder consultation activities, including the outcomes.</p>	Section 7

4. Technical reports and survey effort

A number of field assessments were undertaken to support and inform the development of the Proposed Action. A summary of surveys relevant to MNES are detailed in Table 4-1 below.

Table 4-1 Studies and surveys relevant to the Proposed Action

Report name	Survey methodology and findings
Biological Survey: Albany Ring Road (Southern Ecology 2018)	A biological survey was undertaken over a 247.4 ha survey area, with field visits conducted over several weeks from October 2017 to January 2018. Targeted flora surveys were conducted in October and November 2017. Fauna habitat surveys and habitat tree measuring occurred in October 2017; November 2017; December 2017 and January 2018.
Memorandum to Main Roads Western Australia, Defining habitat categories for Western Ringtail Possum in the South Coast population. (Southern Ecology 2019) (Appendix D)	<p>Southern Ecology zoologist Sandra Gilfillan completed a review of WRP habitat categories for the sub population. These habitat categories were applied across the vegetation found within the Proposed Action Area.</p> <p>The review was conducted in collaboration with the University of Western Australia, Biota Environmental Sciences and the WRP Working Group.</p>
Biological Survey: Albany Ring Road (Southern Ecology 2020a) (Appendix E)	Southern Ecology completed a survey in August 2019 of additional areas (67.6 ha) outside of the 2018 Southern Ecology biological survey area, following the same methods as the 2018 survey. The 2019 survey focused on vegetation and habitat mapping, with a specific focus on habitat for WRP and Black Cockatoos. A spring survey was completed in September – October 2019 to identify conservation significant flora.
Phytophthora Dieback Management Plan: Albany Ring Road (Southern Ecology 2020b) (Appendix C)	Southern Ecology ecologist Damien Rathbone conducted a desktop assessment of existing dieback occurrence information and contextual vegetation and flora values within the study area. A field survey was then conducted over three days in 2019 to determine potential occurrence of dieback species in remnant vegetation. A majority of the survey area was determined to be excluded and uninterpretable. Of the remaining 18.35 ha, 1.05 ha was determined to be uninfested and 17.3 ha was determined to be infested.
Albany Ring Road Project: Western Ringtail Possum Assessment (Biota 2018)	Biota was commissioned to provide both local and regional context to the WRP habitat found within the ARR Proposed Action Area. A total area of 247.25 ha was assessed using a combination of strip and line transects. The results were modelled to yield the expected density and estimate possum numbers. Results within the Proposed Action Area were compared to those in nearby reserves and more broadly to develop estimates for the Albany area.

Report name	Survey methodology and findings
Albany Ring Road Black-Cockatoo Habitat Assessment (Biota 2019a) (Appendix F)	Biota completed a targeted Black Cockatoo Habitat Assessment where a total of 572 Suitable Diameter at Breast Height (DBH) Trees were assessed. From these trees, all hollows with entrance diameters of 10 cm or greater were investigated during a dedicated hollow assessment. The assessment included the use of a remotely piloted aircraft mounted with a camera. Potential foraging habitat within the Proposed Action Area was also assessed using existing detailed vegetation mapping and aerial imagery.
Albany Ring Road Western Ringtail Possum Assessment (Biota 2020) (Appendix G)	Biota completed a targeted WRP assessment. The purpose of the assessment was to provide wider, local and a regional context to the WRP habitat found within the Proposed Action Area. The study area targeted the Down Road Nature Reserve (777.3 ha), areas of suitable habitat within the Proposed Action Area (92.2 ha) and areas mapped as suitable habitat around Albany in the Albany Regional Vegetation Survey (ARVS) (124,415 ha).

4.1 Adequacy of surveys

Surveys for both Black Cockatoo and WRP have been extensive and followed appropriate survey methods. The biological surveys are suitable and adequate to inform the assessment of the Proposed Action.

4.1.1 Black Cockatoos

The biological surveys undertaken for the Proposed Action Area and its vicinity included a targeted Black Cockatoo habitat assessment in accordance with the EPBC Act referral guidelines (DSEWPaC 2012a). The field survey was undertaken in 2019 and during the breeding season and included observations of occupancy (visual and aural), foraging evidence, foraging species, potential roosting trees, potential breeding trees and investigation of hollows. The entire Proposed Action Area was surveyed and mapped for habitat quality and breeding habitat.

4.1.2 Western Ringtail Possum

WRP habitat was surveyed by Southern Ecology in 2019 and 2020 and then further targeted local and regional surveys were undertaken in 2020 by Biota. Biota completed a regional WRP assessment (Biota 2020), based on population estimates derived from distance sampling conducted across 43 locations over seven months across the species' documented geographic range (Burbidge and Zichy-Woinarski 2017). Surveys have been extensive and cover more than 10% of the documented geographic range of this species.

5. Listed Threatened Species and Ecological Communities

Southern Ecology (2020a) identified five fauna habitats, of which four are suitable for Black Cockatoos and/or WRP, including:

- The *Hakea spp.* Shrubland/Woodland Complex. This offers habitat for the WRP and potential foraging habitat for Black Cockatoos
- The Jarrah/Marri/Sheoak Laterite Forest offers potential foraging, breeding and roosting habitat for all three Black Cockatoo species, and provides potentially suitable habitat for WRP
- The *Homalospermum firmum*, *Callistemon glaucus* Peat Thicket offers potential foraging and roosting habitat for Black Cockatoos and WRPs
- Non-native planted vegetation offers potential roosting habitat for all three Black Cockatoo species.

5.1 Black Cockatoos

5.1.1 Habitat within the proposed Clearing Area

The Proposed Action involves the clearing of up to 37.89 ha of potential habitat for Black Cockatoos. An assessment of Black Cockatoo habitat categories undertaken by Southern Ecology (2020a) identified Black Cockatoo habitat using the descriptions presented in Table 5-1.

Table 5-1 Cockatoo habitat descriptions (Southern Ecology (2020a))

Habitat type	Description
High quality foraging habitat	Habitat patches consisting of a high coverage of feeding trees with a mature canopy
High quality breeding habitat	Habitat patches consisting of a high number of potential breeding trees (> 500 mm DBH)
High quality roosting habitat	Habitat patches consisting of a high number of potential roosting trees
Low quality foraging habitat	Habitat patches consisting of a low coverage of feeding trees with a mature canopy
Low quality breeding habitat	Habitat patches consisting of a low number of potential breeding trees (> 500 mm DBH)
Low quality roosting habitat	Habitat patches consisting of a low number of potential roosting trees

A total of 5.80 ha of Black Cockatoo habitat within the Proposed Action Area was categorised as breeding, roosting and high-quality foraging habitat as these areas satisfied all three criteria (Southern Ecology 2020a). Although low-quality breeding habitat was identified in the Southern Ecology (2020a) survey, this habitat type has been excluded from mapping and is not considered in this document as it was found to contain a low number of potential breeding trees,

none of which contain hollows. It is considered that the low-quality breeding habitat would be already represented by the breeding trees identified in the Proposed Action Area which were assessed for hollows.

High-quality and low-quality roosting habitat have been combined, and only roosting habitat as a whole will be considered further.

Biota (2019a) recorded foraging evidence from all three species of Black Cockatoo within the Proposed Action Area. Suitable foraging habitat was identified in the Jarrah/Marri/Sheoak Laterite Forest, Jarrah/Sheoak/*E. staeri* Sandy Woodland, Hakea spp Shrubland/Woodland Complex, Marri/Jarrah Forest/Peppermint Woodland and various planted trees including *Pinus radiata*, Marri and Jarrah (Biota 2019a). The Proposed Action Area comprises approximately 7.02 ha foraging habitat (Figure 3).

No known roosting sites were identified or observed during repeated visits to the Proposed Action Area during the Black Cockatoo habitat assessments (Biota 2019a, Southern Ecology 2020a). DSEWPaC (2012a) consider any tall tree is a potential roosting tree, especially the scattered Marri and introduced Eucalypts recorded throughout the Proposed Action Area. A total of 37.75 ha of roosting habitat is present within the Proposed Action Area (Figure 3).

Trees with a DBH > 500 mm have the potential to contain suitably sized hollows (Southern Ecology 2020a, Biota 2019a). Suitable DBH Trees were identified in the Jarrah/Marri/Sheoak Laterite Forest, Jarrah/Sheoak/*E.staeri* Sandy Woodland, Hakea spp Shrubland/Woodland Complex, Marri/Jarrah Forest/Peppermint Woodland and various planted trees including Marri and Jarrah (Biota 2019a) (Figure 3). 236 Suitable DBH Trees and 5.80 ha of high-quality breeding habitat were recorded within the Proposal Action Area.

Black Cockatoo habitat within the Proposed Action Area is outlined in Table 5-2 below.

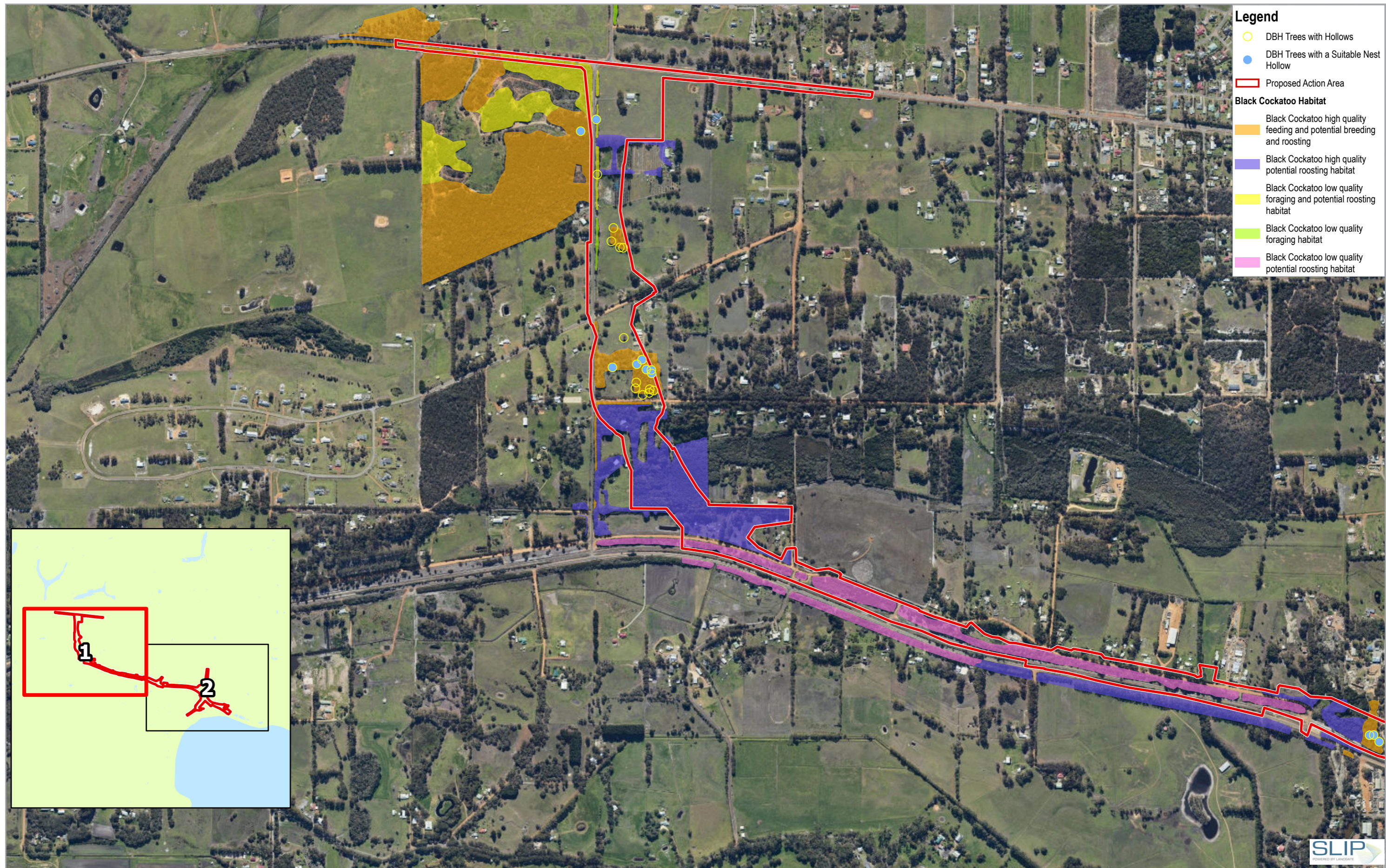
Table 5-2 Black Cockatoo habitat within the Proposed Action Area

Habitat type	Total (ha)
Foraging (low quality)	1.22 ha
Foraging (high quality)	5.80 ha
Breeding	5.80 ha
Roosting	37.75 ha

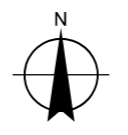
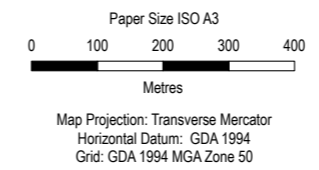
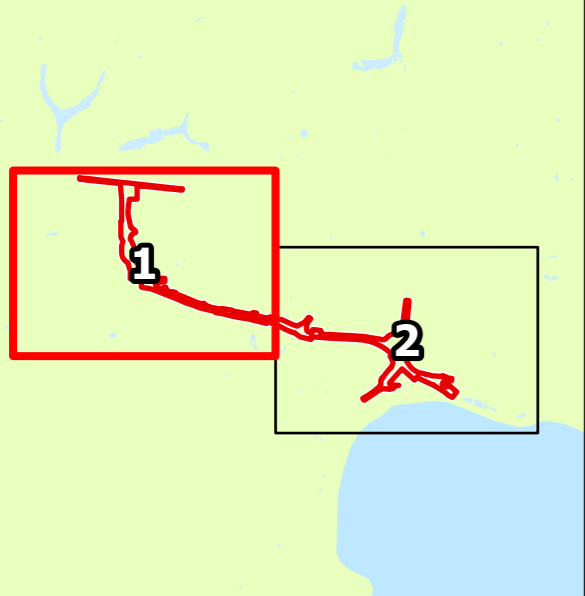
Clearing of Habitat

The Proposal will result in the clearing of:

- No known Black Cockatoo roosting habitat
- No known Black Cockatoo nesting hollows
- 37.89 ha of Black Cockatoo habitat
- 236 trees with a Suitable DBH, of which:
 - 14 trees contain one or more unsuitable hollows
 - 10 trees contain 14 potentially suitable hollow with possible past signs of use that are not actively being used
- No confirmed breeding sites were identified within 12 km of the Proposed Action.



- Legend**
- DBH Trees with Hollows
 - DBH Trees with a Suitable Nest Hollow
 - Proposed Action Area
- Black Cockatoo Habitat**
- Black Cockatoo high quality feeding and potential breeding and roosting
 - Black Cockatoo high quality potential roosting habitat
 - Black Cockatoo low quality foraging and potential roosting habitat
 - Black Cockatoo low quality foraging habitat
 - Black Cockatoo low quality potential roosting habitat

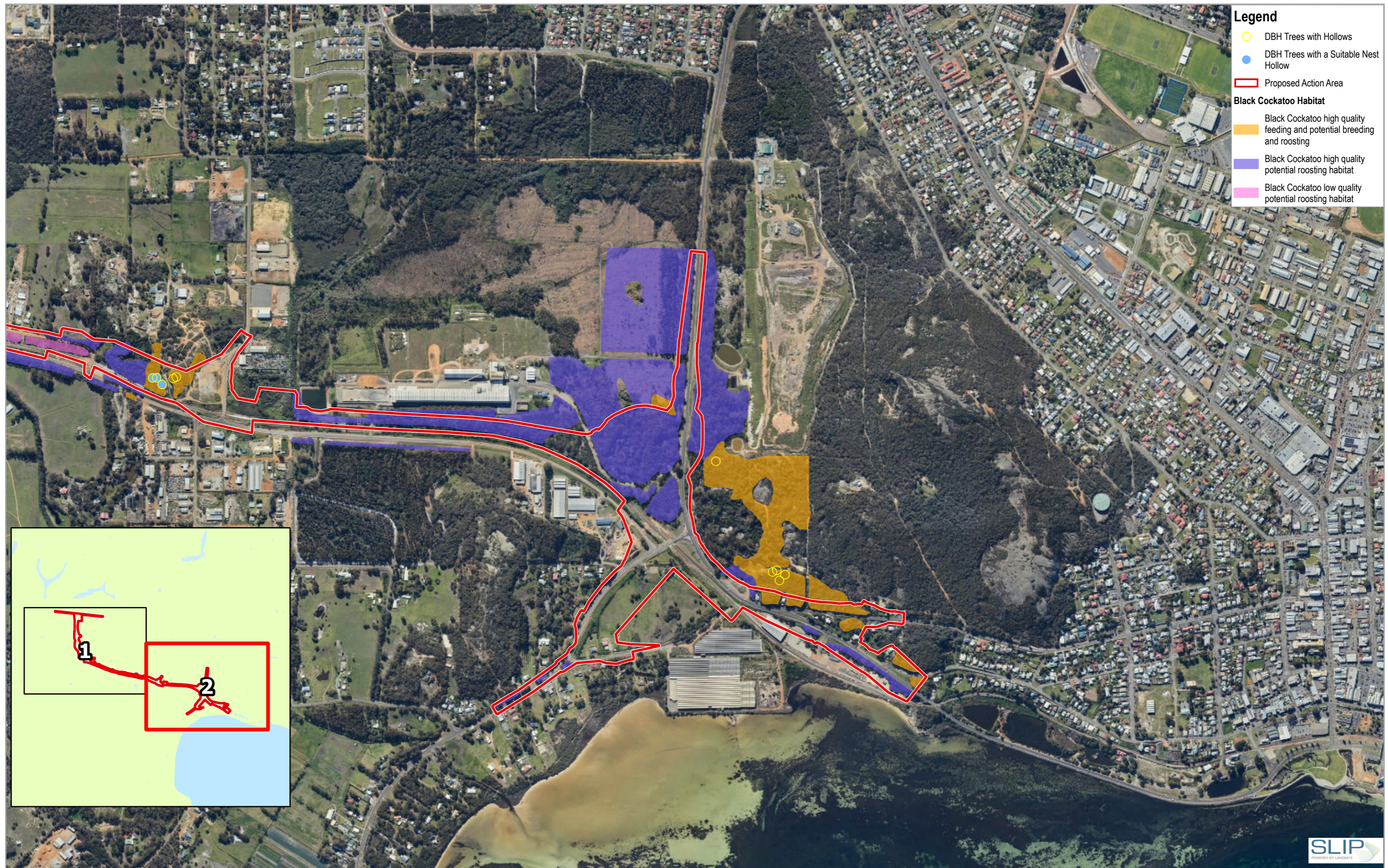


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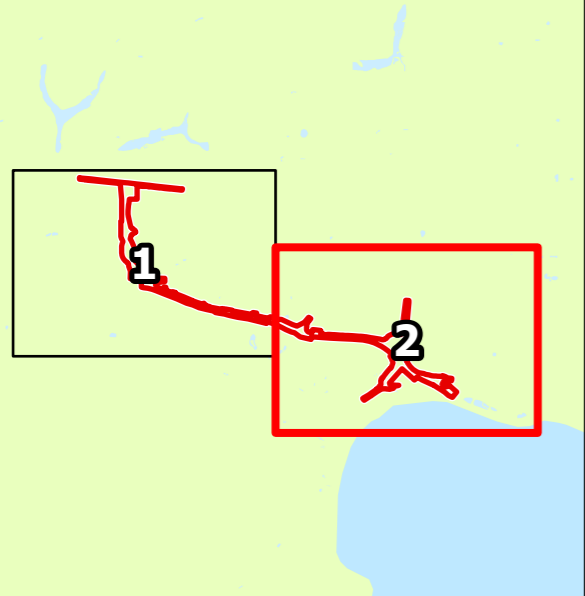
Black Cockatoo Foraging, Roosting and Breeding Habitat

Project No. 12539872
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Page 1 of 2
FIGURE 3

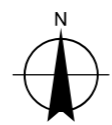


- Legend**
- DBH Trees with Hollows
 - DBH Trees with a Suitable Nest Hollow
 - Proposed Action Area
- Black Cockatoo Habitat**
- Black Cockatoo high quality feeding and potential breeding and roosting
 - Black Cockatoo high quality potential roosting habitat
 - Black Cockatoo low quality potential roosting habitat



Paper Size ISO A3
 0 100 200 300 400
 Metres

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
 Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

**Black Cockatoo Foraging,
 Roosting and Breeding Habitat**

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FIGURE 3



Habitat within the surrounding area

On a regional scale, Black Cockatoo foraging habitat (which is represented by native and non-native vegetation) within the Proposed Action Area (7.02 ha), represents 0.07% of the recorded 8,756 ha of locally available native foraging habitat within a 12 km radius (Biota 2019a). The 12 km radius represents the typical maximum distance that Black Cockatoos will fly from roosting or breeding locations to forage (DSEWPC 2012a).

The Proposed Action will not result in impacts to known nesting hollows or roosting sites for Carnaby's Cockatoo, Baudin's Cockatoo or FRTBC (GoWA 2019a, 2019b).

5.1.2 Dieback and Black Cockatoo Habitat

The Proposed Action is located in a dieback susceptible region, based on rainfall (within the 600 – 800 mm rainfall zone), soils, drainage and susceptible vegetation (CALM 2003). Without controls, Proposal construction activities could spread or introduce Dieback or weeds to retained adjacent Black Cockatoo habitat.

Southern Ecology (2020b) conducted a desktop assessment of existing dieback occurrence information and contextual vegetation and flora values within a study area that incorporated the Proposed Action Area. The field interpretation combined with the soil and root sampling delineated the study area into four disease status categories for the purposes of managing the spread of dieback. No uninfested areas were recorded within the Proposed Action Area.

A large proportion of the study area was determined to be infested (17.3 ha), which included areas with symptomatic disease evidence or where soil and roots samples returned positive for dieback. This also included roadside drains and/or vegetated areas downslope of these locations (i.e., where water would naturally facilitate the dispersal of pathogens). Dieback infestations are present in the northwest section of Stage 3b just south of the South Coast Highway and in eastern sections of Stage 2, along Lower Denmark Road (Southern Ecology 2020b).

Areas were determined to be uninterpretable (22.8 ha) either due to a low natural incidence of indicator species (i.e., very long unburnt or wetland type vegetation) or where native vegetation was in Degraded to Good condition (i.e., other disturbances may have removed indicator species). No uninterpretable areas were considered as protectable due the water gaining hydrology and historic disturbance. Excluded areas (191.7 ha) consisted mainly of paddocks, agricultural areas or plantations, where dieback species may be present but are asymptomatic (Southern Ecology 2020b). Dieback hygiene management measures are outlined in the CSFEMP (Appendix A) and the Southern Ecology dieback report (Appendix C) (Southern Ecology 2020b).

5.1.3 Avoidance, mitigation and management

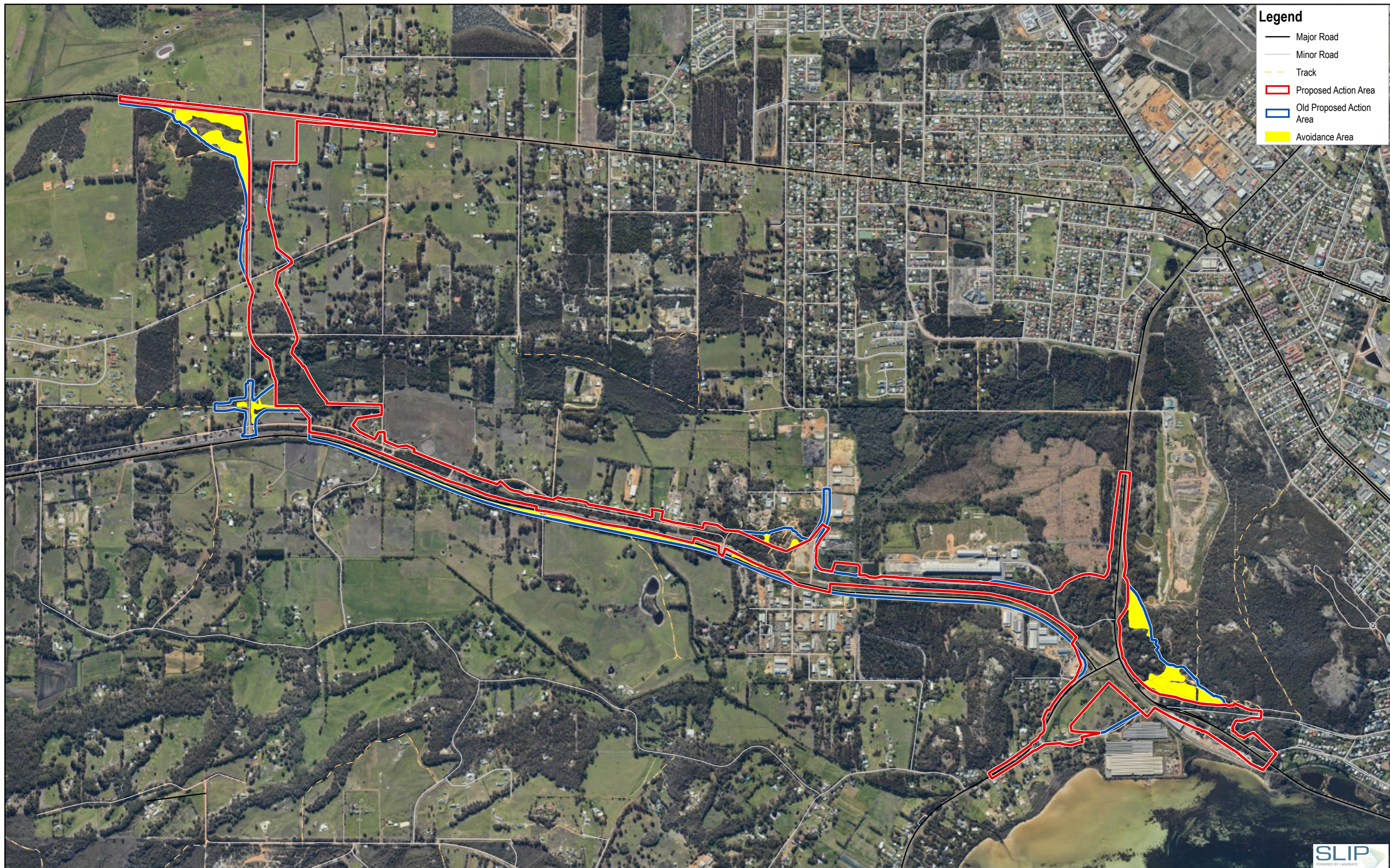
Avoidance

The design for the Proposal has continued to be developed, resulting in the avoidance of some patches of Black Cockatoo habitat. The most significant changes have been the reduction of clearing associated with the removal of the loop ramp at South Coast Highway and George Street, the removal of the connection at Lower Denmark Road and the avoidance of the large area of bushland between Hanrahan Road and Princess Drive (Figure 4). Table 5-3 quantifies the total reduction in impact due to these design changes to the Proposed Action.

Table 5-3 Impact avoidance of Black cockatoo habitat

Aspect	Original Proposal	Original Proposed Action	Revised Proposed Action	Total Reduction in Impact
Total habitat (ha) ¹	62.68	53.68	37.89	24.79
Foraging habitat (ha)	16.43	13.13	7.02	9.41
Roosting habitat (ha)	54.67	51.73	37.75	16.92
Breeding habitat (ha)	13.40	11.17	5.80	7.60
Suitable DBH Trees	572	502	236	336
Black Cockatoo trees with hollows	34	30	24	10
Black Cockatoo Trees with a Suitable Nest Hollow	Unknown	11	10	-

Note: ¹ Areas of Black Cockatoo foraging, roosting and breeding habitat overlap.

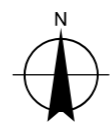


Legend

- Major Road
- Minor Road
- - - Track
- ▭ Proposed Action Area
- ▭ Old Proposed Action Area
- ▭ Avoidance Area



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
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**Impact Avoidance to
 Black Cockatoo Habitat**

FIGURE 4

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 Print date: 09 Jun 2021 - 15:36

Data source: GHD: Avoidance Area (2021); MRWA: Action Area (2021); Landgate_Subscription_Imagery\WAnow: Landgate / SLIP. Created by: xie

Mitigation and Management Measures

The following key management targets have been identified for Black Cockatoos:

- Construct and operate the Proposal to avoid and minimise impacts to Black Cockatoos
- No disturbance to nesting Black Cockatoos (adults and young).

Main Roads has devised SMART performance standards for Black Cockatoos (Table 5-4) and identified a range of management actions to be implemented to control and minimise direct and potential indirect impacts of the Proposal to Black Cockatoos and their habitat. These, along with the related performance targets, are detailed in Table 5-5 and in Appendix A.

The proposed performance targets and management actions have been informed by the results of field studies, best practice and recent experience on similar road projects in Western Australia. These will minimise potential residual impacts and achieve the identified management targets.

Table 5-4 SMART Performance Standards for Black Cockatoos

Threshold Criteria	Performance Indicator	Completion Indicator
Clearing of 7.02 ha of Black Cockatoo foraging habitat	Amount of Black Cockatoo foraging habitat cleared	Not more than 7.02 ha of Black Cockatoo foraging habitat cleared
Clearing of 37.75 ha of Black Cockatoo roosting habitat	Amount of Black Cockatoo roosting habitat to be cleared	Not more than 37.75 ha of Black Cockatoo roosting habitat cleared
Clearing of 236 trees with a DBH \geq 500 mm	Number of trees cleared with a DBH \geq 500 mm	Not more than 236 large trees (DBH \geq 500 mm) cleared
Clearing of 10 trees with a DBH \geq 500 mm which contain 14 potentially suitable nesting hollows	Number of trees with a DBH \geq 500 mm which contain a potentially suitable nesting hollow(s) cleared	Not more than 10 large trees (DBH \geq 500 mm) which contain 14 potentially suitable nesting hollows

Table 5-5 Black Cockatoo Management Actions

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
Detailed design phase	To avoid unauthorised impacts and minimise authorised impacts to Black Cockatoo	<ul style="list-style-type: none"> • Clearing of native vegetation will be avoided through consideration of potential impacts during the detailed design phase • The disturbance area will be minimised by using retaining walls and steepening batters where appropriate. 	Detailed design does not increase the clearing extent of native vegetation
Prior to clearing/ construction	To avoid unauthorised impacts and minimise authorised impacts to Black Cockatoo	<ul style="list-style-type: none"> • Black Cockatoo habitat (including Suitable DBH Trees) within the construction site boundary that is not required to be cleared will be marked and identified as no-go areas and demarcated on relevant drawings • A ground disturbance permit process will be developed by the Contractor and signed off by the Main Roads Superintendent or delegate • Dieback protectable areas will be identified and established within the Proposed Action area and adjacent land to guide dieback hygiene practices including restrictions on equipment and vehicle movement, soil movement, and Clean on Entry and/or Exit (CoE) • Prior to clearing, the final road design will be assessed against the proposed clearing area to ensure the required clearing area is no more than the approved area • Clearing areas will be clearly demarcated and marked with flagging and checked prior to clearing commencing. 	<ul style="list-style-type: none"> • Drawings showing environmental no-go areas developed • Project ground disturbance permit process developed and approved by Main Roads • Dieback areas clearly marked on site • Inductions include dieback hygiene • Reduce clearing of Black Cockatoo habitat to the extent practicable in final design • Environmental no-go areas clearly marked with flagging on site

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
	To avoid injury or mortality to Black Cockatoos.	<ul style="list-style-type: none"> • Within 7 days prior to clearing, trees with hollows used by or suitable for use by Carnaby's Cockatoo will be inspected by a suitably qualified person to confirm that there are no hollows being used by Black Cockatoo within the area to be cleared. Inspection will be undertaken via drone, pole camera or elevated platform • Where the trees with suitable nest hollow for Black Cockatoos will require clearing for the Proposal, the hollows will be visually inspected where safe and practicable via drone, pole camera or elevated platform. Where not in use the hollows will be 'blocked' to prevent breeding. Blocking may include wood nailed over the hollow, non-toxic expanding foam or similar • Where blocking of the nest hollow cannot be undertaken (e.g., timing, access), a pre-clearing fauna assessment will be undertaken by a suitably experienced person to determine if the hollow is being used by Black Cockatoos. 	<ul style="list-style-type: none"> • Survey of trees with hollows used by or suitable for use by Black Cockatoo undertaken within 7 days prior to clearing events • Preclude potential breeding within the proposed Clearing Area prior to construction
During clearing/construction	To avoid unauthorised impacts and minimise authorised impacts to Black Cockatoo	<ul style="list-style-type: none"> • Fire danger ratings and Shire vehicle movement bans will be observed and the requirements of these implemented • Hot work will be undertaken in accordance with Contractor's hot work procedure • Vehicles, plant and equipment to be fitted with fire extinguishers and restricted to designated cleared areas unless involved in clearing operations 	<ul style="list-style-type: none"> • Fire danger ratings applied to works • No fires started as a result of hot works • All vehicles fitted appropriately • All vehicles in designated cleared areas

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
		<ul style="list-style-type: none"> • 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 Black Cockatoo habitat • Clearing will be avoided for any temporary construction activities 	<ul style="list-style-type: none"> • Areas for ancillary services located in cleared areas or areas that do not contain Black Cockatoo habitat
	To avoid injury or mortality to Black Cockatoos.	<ul style="list-style-type: none"> • Directional clearing will occur (Figure 6) to allow fauna to relocate to areas of existing vegetation • No night-time clearing of vegetation will occur • A suitably experienced zoologist/environmental scientist will be on-site at all times during clearing of breeding habitat for Black Cockatoos and must maintain radio communication with machinery operators • Where a suitable nest hollow has been blocked prior to the Black Cockatoo breeding season, the tree may be felled as part of the standard vegetation clearing process • Where a suitable nest hollow has not been blocked and the pre-clearing fauna assessment has not identified any Black Cockatoo occupation of the nest hollow, prior to clearing the tree will be 'bumped gently' with a machine. The machine operator and zoologist will wait and observe the tree for a short time after. If no Black Cockatoo appears to be present following being bumped gently then the tree shall be pushed over slowly to minimise risk of injury to any undetected animal (if present) 	<ul style="list-style-type: none"> • No direct impacts to Black Cockatoos • Black Cockatoo habitat retained within 10 m of the edge of the seal of the road will be risk assessed and wildlife hazard signage installed as required • No incidents of speeding within the construction site boundary • A list of local wildlife rescue organisations and carers is on site at all times

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
		<ul style="list-style-type: none"> • If a Black Cockatoo nestling is present in the hollow, the tree will not be felled until the nestling has fledged. • Any Black Cockatoos showing signs of injury or illness will be recorded and taken by a qualified fauna handler to a veterinarian or qualified wildlife carer • Where trees that are known to be Black Cockatoo habitat are retained but are located within 10 m of the edge of the road seal the risk of vehicle strike will be assessed to determine if wildlife hazard signage is required • Speed limits between 40-80km /hr will be applied throughout the construction site for safety purposes which will consequently reduce the risk of fauna vehicle 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 	
Post-construction	To avoid unauthorised impacts and minimise authorised impacts to Black Cockatoo habitat	<p>Revegetation within the road reserve will use local native species. Species chosen will be selected based on habitat suitability for Black Cockatoo and potential to be resistant to drought. Key components to the revegetation will include:</p> <ul style="list-style-type: none"> • Species selection will be determined by a suitably qualified expert with experience in rehabilitation and/or landscaping • Revegetation will involve a combination of tube stock and/or direct seeding 	<ul style="list-style-type: none"> • Revegetation of roadside with suitable native species

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
	To avoid injury or mortality to Black Cockatoos	<ul style="list-style-type: none"> • Weed control will occur during the establishment period of the revegetation within the first two years of establishment. • A post-clearing survey shall be undertaken to ensure no injured Black Cockatoo individuals are present • Revegetation designs shall not include foraging or breeding plant species within 10 m of the road 	<ul style="list-style-type: none"> • No direct impacts to Black Cockatoos • Revegetation designs exclude foraging or breeding plant species within 10 m of the road

Dieback Management

The Proposed Action has the potential to cause limited indirect impacts to Black Cockatoo habitat through spread of dieback to uninfested areas. This will have the greatest impact on Carnaby's Cockatoos as some of the tree species considered suitable habitat for these birds (*Hakea*, *Banksia* and *Grevillea*) are species susceptible to dieback (Southern Ecology 2020a, 2020b). Baudin's Cockatoo species may also be impacted as they are known to feed on seeds of tree species (*Banksia* and *Hakea*) susceptible to dieback (Southern Ecology 2020a, 2020b). It is unlikely any habitat used by FRTBC will be impacted by dieback as the tree species used by FRTBC are not susceptible to dieback.

The Proposed Action is not expected to spread dieback through sediment in stormwater runoff, as stormwater will be captured and treated within basins/swales prior to discharge to waterways.

It is unlikely that dieback will indirectly impact FRTBC habitat. Dieback may indirectly impact Carnaby's Cockatoos and Baudin's Cockatoos as these species' habitat are, to an extent, susceptible to the disease. However, consistent with good environmental practice, measures to control the spread of dieback proposed as outlined in Table 5-6 and in the CSFEMP (Appendix A).

Through design consideration and construction management, the Proposed Action is unlikely to result in the introduction or spread of dieback that could result in significant impacts to Black Cockatoo habitat.

Access controls, weed treatment, hygiene and monitoring will be implemented during and after construction to prevent the introduction and spread of weeds within the Proposed Action Area and adjacent vegetation. Established control methods for all Declared Pests and dieback recorded within the Proposed Action Area are outlined in the CSFEMP (Appendix A) and will be implemented from the pre-construction through to post-construction phases of the project.

Table 5-6 Dieback Management Measures for Black Cockatoo Habitat

Key Impacts/ risks	Management Actions	Justification/ Quantification	Timing
<ul style="list-style-type: none"> Edge affects impacting adjacent areas of Black Cockatoo habitat Indirect impacts to Black Cockatoo habitat from the introduction and/or spread of dieback (<i>Phytophthora cinnamomi</i>) and 	<ul style="list-style-type: none"> Contractor induction will include familiarisation with and discussion of Black Cockatoos/WRP, <i>Phytophthora</i> dieback management and hygiene management Heavy plant and machinery will be inspected by the contractor prior to entry at the work site and be confirmed to be clean and free of vegetation and soil material. Entry and exit records will be kept for CoE points. Effective clean down prior to accessing the CoE point will be conducted to remove soil and plant material (including weed 	Preventing the spread of weeds and dieback into adjacent areas, which could potentially cause degradation of habitat for Black Cockatoos	<ul style="list-style-type: none"> During clearing During construction During revegetation

Key Impacts/ risks	Management Actions	Justification/ Quantification	Timing
introduced species	<p>seeds). The key components of a suitable washdown are:</p> <ul style="list-style-type: none"> – Effluent is captured during washdown i.e. sump, for later transport and disposal, or diverted into excluded/infested areas. – Cleaned objects exit washdown area without becoming re-contaminated; and – Safe entry, departure of vehicles by operators is maintained <ul style="list-style-type: none"> • Transportation of cleaned plant, equipment and vehicles to Protectable Areas should be undertaken via sealed roads where possible • Timing of all operations and construction (particularly in Protectable Areas) will be conducted in dry soil conditions where possible (generally between November and April) • Temporary drainage structures within or adjacent to Black Cockatoo or WRP habitat will be designed and constructed such that scouring or erosion within adjacent vegetated areas does not occur • Demarcation of Protectable Areas should be check/retaped shortly prior to construction • Basic raw material imported into Protectable areas should be low risk for Phytophthora contamination • WoNS and environmental weeds within the construction site boundary will be controlled according to the weed control management outlined by Weeds Australia (http://weeds.ala.org.au/) with 		

Key Impacts/ risks	Management Actions	Justification/ Quantification	Timing
	<p>the aim of controlling weed spread</p> <ul style="list-style-type: none"> • Topsoil containing Declared Pests or WoNS shall not be reused in revegetation or revegetation • Topsoil from infected or potentially infected dieback areas shall be segregated and not used in non-infected areas • Sediment to be captured in stormwater runoff and treated within basins/swales prior to discharge to waterways to prevent spread of dieback on site • Topsoil within the Proposed Action Area will be harvested, stockpiled and reused in accordance with Main Roads Environmental Guideline Topsoil Management. 		

5.2 Western Ringtail Possum

5.2.1 Habitat within proposed Clearing area

WRP feed on leaves of myrtaceous species, predominantly Peppermint (*Agonis flexuosa*), but also Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*). Home range sizes and possum density vary with the quality and productivity of the habitat. Home ranges are generally less than 5 ha, and those within peppermint dominated habitat are generally less than 2.0 ha and average 0.4 ha and 0.3 ha for females and males respectively (DPaW 2017).

Southern Ecology (2020a) and Biota (2018) have conducted a significant amount of work on the South Coast population to inform the assessment of the impacts of the Proposed Action. This included defining habitat categories for the South Coast population (Southern Ecology 2019) on the basis that some of the ecology for the South Coast WRP population is different to the Swan Coastal Plain population that are the subject of the Significant Impact Guidelines (DEWHA 2009b). For example, the presence of Peppermint (*Agonis flexuosa*) is not necessary for the presence of the species; habitats with high densities are largely confined to Marri/Jarrah/Sheoak communities within 20 km of the coast; diet can be quite broad, and a small percentage of individuals use refugia on the ground (Van Helden et al. 2018). The WRP habitat definitions applied to this assessment are included in Appendix D.

The WRP was observed by Southern Ecology and Biota ecologists within the Proposed Action Area (Biota 2020, Southern Ecology 2020a). WRP scats were observed widely across the biological survey area (Southern Ecology 2020a), in multiple habitats of varying condition. A

total of 14 dreys were also recorded in the biological survey, of which 5 are present within the Proposed Action Area. Core, Core (Urban) and Supporting habitats were identified (Figure 5).

Clearing of Habitat

The Proposal will result in the clearing of:

- 0.88 ha of Core habitat
- 0.19 ha of Core (Urban) habitat
- 18.11 ha of Supporting habitat
- 5 dreys.

All WRP habitat is considered high-quality to this species, including isolated trees in poor condition vegetation.

The Proposed Action will also clear up to 20.20 ha of Linkage and Likely Linkage habitat for WRP. This is habitat that does not contain resident individuals but is habitat that facilitates their movement across the landscape.

Population Estimate

Based on the Biota (2020) density estimate of 0.14 to 0.36 WRP individuals/ha for Supporting habitat, 2.45 individuals/ha for Core and Core (Urban) habitat (Biota 2019b), the home range of an estimated nine individual WRPs intersect the Proposed Action Area. This estimate excludes Linkage and Likely Linkage habitat as these habitat types does not contain any resident individuals.

Quality

An assessment of WRP habitat categories identified up to 19.18 ha of vegetation within the Proposed Action Area as suitable WRP habitat (Southern Ecology 2020a).

Core, Core (Urban) and Supporting habitat types (19.18 ha) are considered preferred habitat for the WRP as vegetation within these habitats are known to support resident possums (Southern Ecology 2019). These habitat types are important as WRPs utilise them regardless of condition.

Linkage and Likely Linkage habitat (20.20 ha) allows WRPs to move through a landscape, but these habitat types are not preferred by this species and do not support resident possums (Southern Ecology 2019).

Condition

Condition of Core, Core (Urban) and Supporting WRP habitat within the Proposed Action Area is outlined in the table below and is presented in Figure 6.

Table 5-7 Habitat types and vegetation condition

Condition	Core	Core (Urban)	Supporting
Completely degraded (ha)	-	-	3.32
Degraded (ha)	0.85	0.03	3.42
Good (ha)	-	-	0.95
Very Good (ha)	0.03	-	2.62
Excellent (ha)	-	-	0.70

Condition	Core	Core (Urban)	Supporting
N/A (ha)	0.01	0.15	7.10
Total (ha)	0.89	0.18	18.11

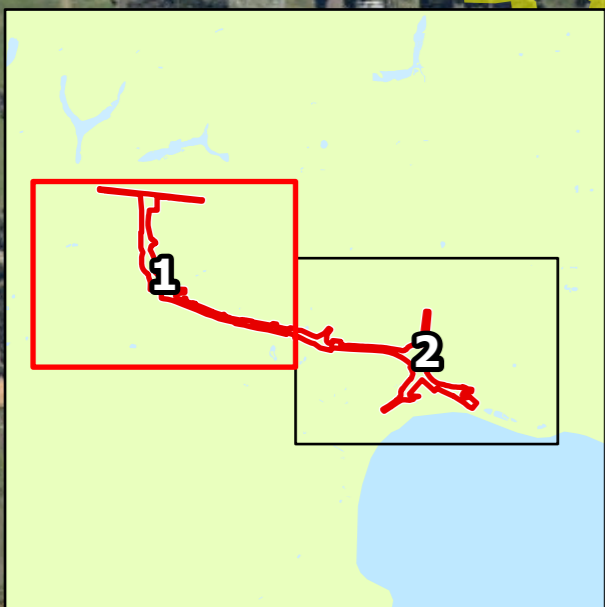
Non-native species were not assigned condition ratings (assigned 'N/A' in the table above).

Despite the differing condition of WRP habitat, all Core, Core (Urban) and Supporting habitat is considered important as this species is Critically Endangered.



Legend

- Proposed Action Footprint
- Western Ringtail Possum Habitat**
- Core
- Core (Urban)
- Supporting

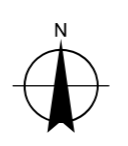


Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



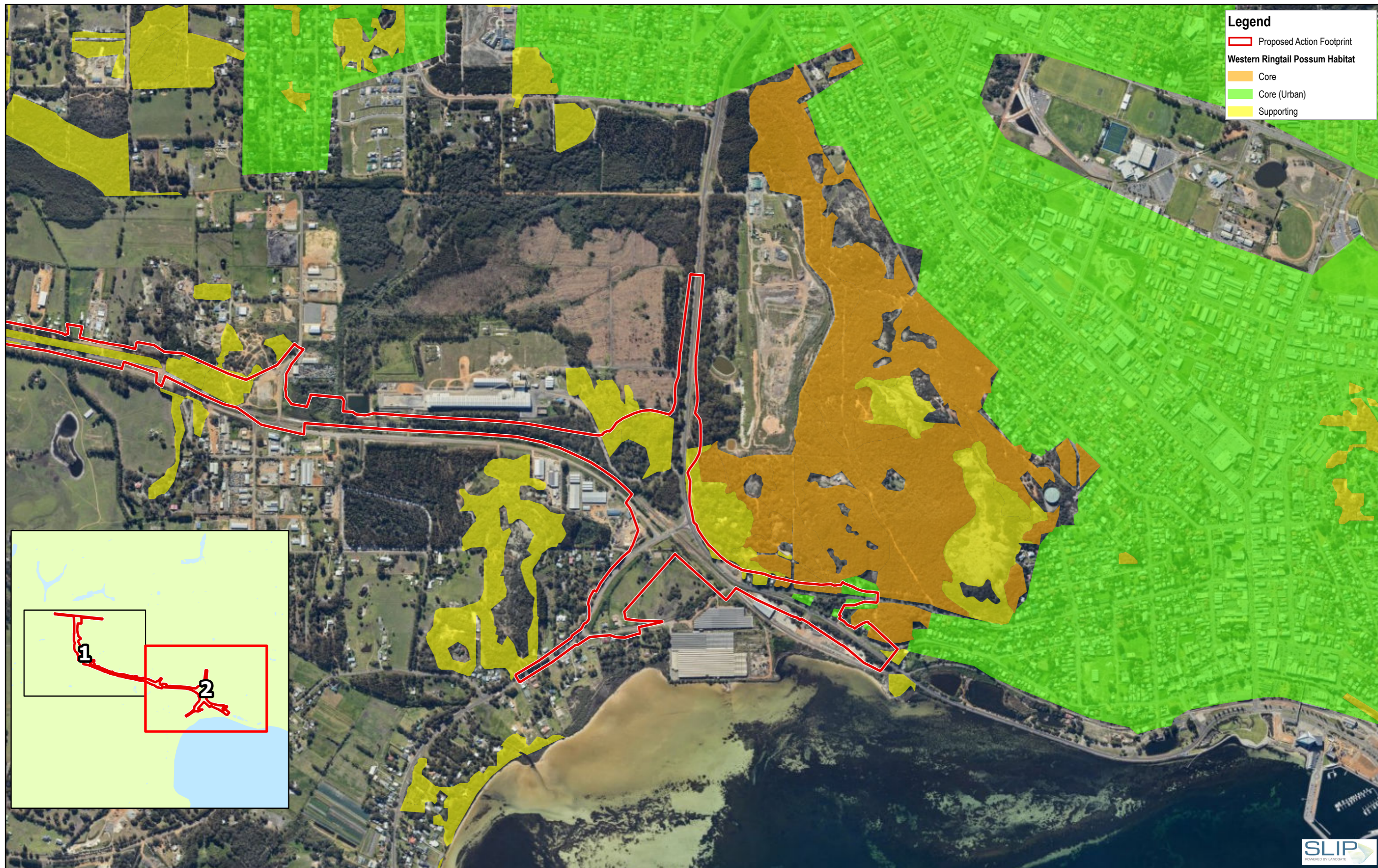
Main Roads
Albany Ring Road Project
Stages 2 and 3b: Preliminary Documentation

Western Ringtail Possum Habitat

Project No. 12539872
Revision No. 0
Date 9/06/2021

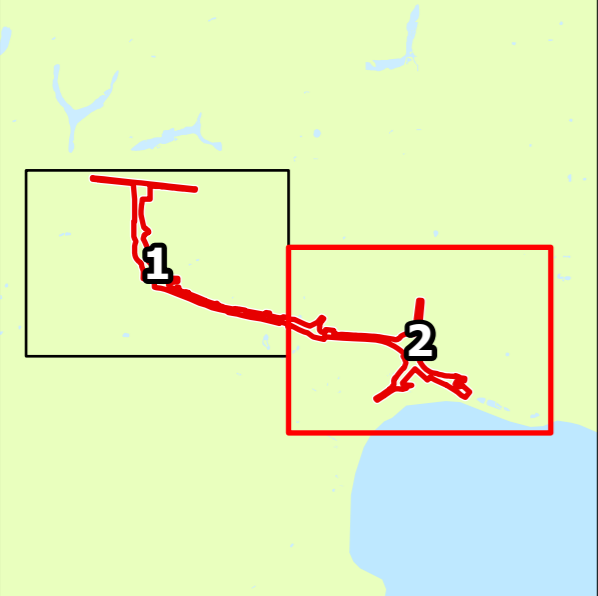
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Print date: 09 Jun 2021 - 15:35

Data source: MRWA: Action Area, Western Ringtail Possum Habitat (2021); Landgate_Subscription_Imagery\WAnow; Landgate / SLIP. Created by: xie

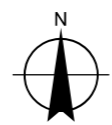


Legend

- Proposed Action Footprint
- Western Ringtail Possum Habitat**
- Core
- Core (Urban)
- Supporting



Paper Size ISO A3
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 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Project No. 12539872
 Revision No. 0
 Date 9/06/2021

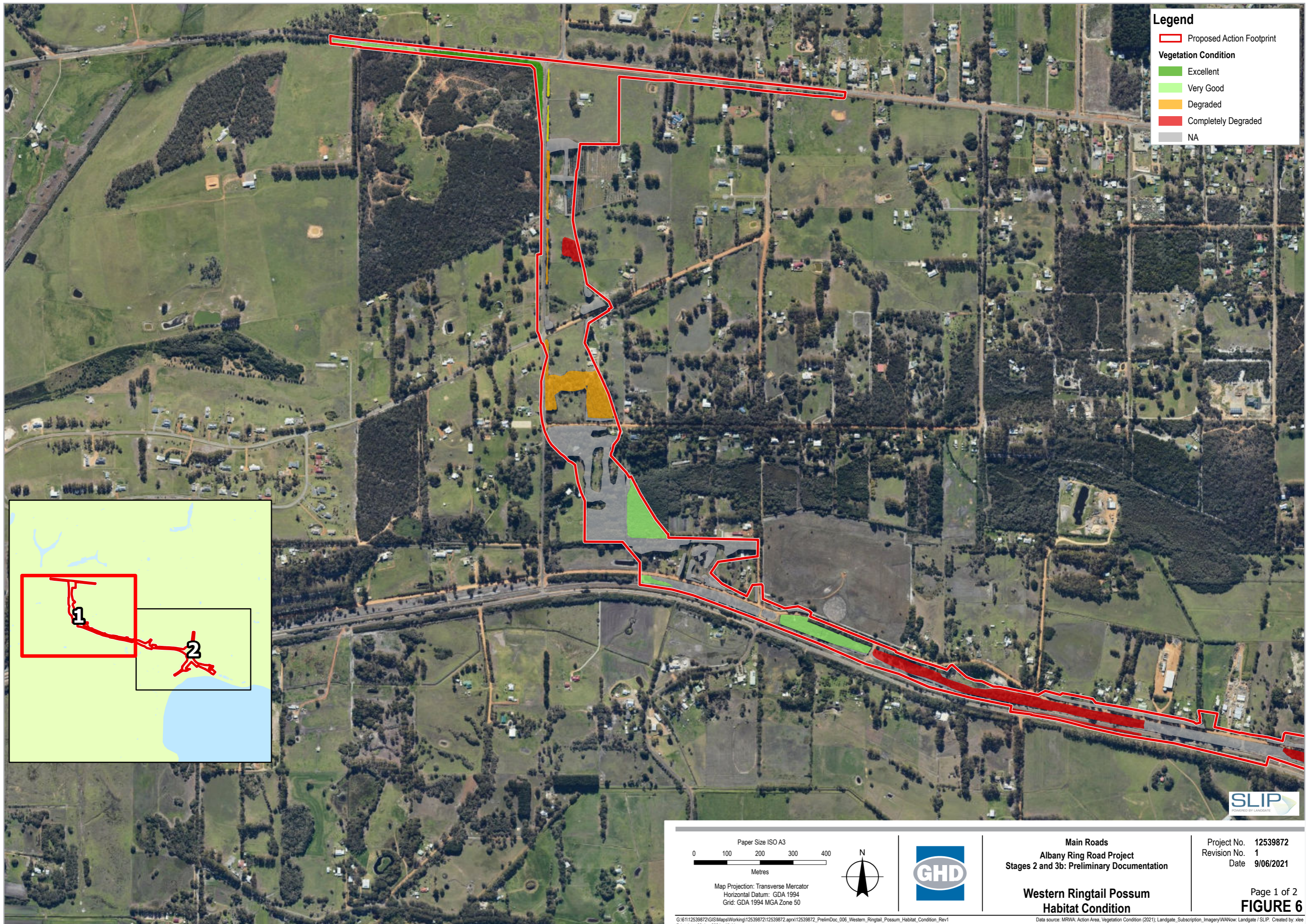
Western Ringtail Possum Habitat

Page 2 of 2
FIGURE 5

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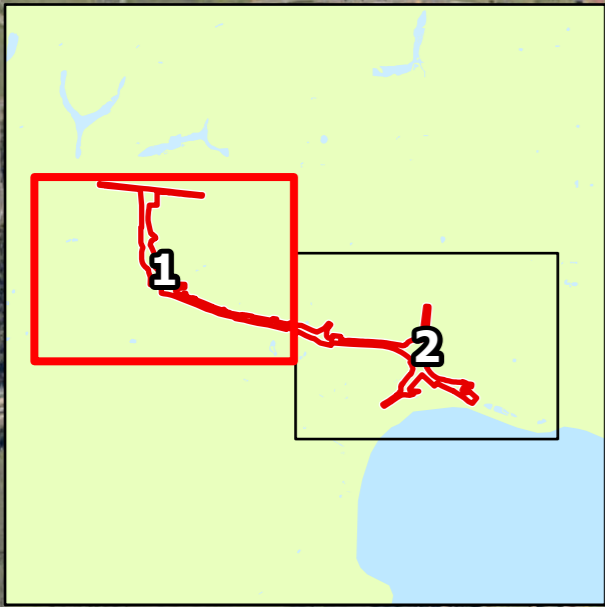
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Legend

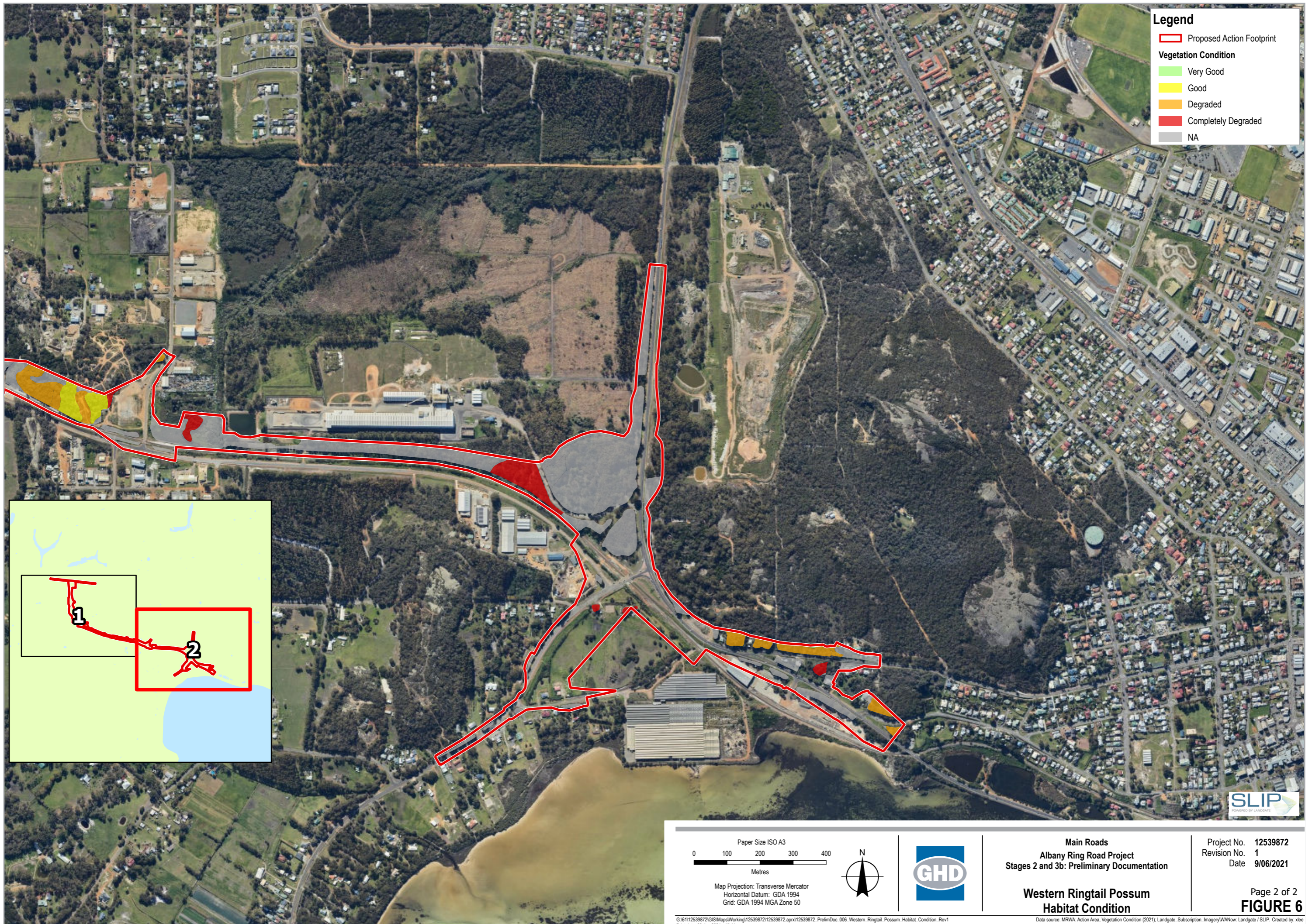
- Proposed Action Footprint
- Vegetation Condition**
- Excellent
- Very Good
- Degraded
- Completely Degraded
- NA



<p>Paper Size ISO A3</p> <p>0 100 200 300 400</p> <p style="text-align: center;">Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>Main Roads Albany Ring Road Project Stages 2 and 3b: Preliminary Documentation</p> <p>Western Ringtail Possum Habitat Condition</p>	<p>Project No. 12539872 Revision No. 1 Date 9/06/2021</p> <p style="text-align: right;">Page 1 of 2 FIGURE 6</p>
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G:\61112539872\GIS\Map\Working\12539872.aprx\12539872_PrelimDoc_006_Western_Ringtail_Possum_Habitat_Condition_Rev1
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Data source: MRWA: Action Area, Vegetation Condition (2021); Landgate_Subscription_Imagery\WAnow: Landgate / SLIP. Created by: xie

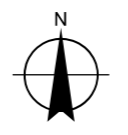
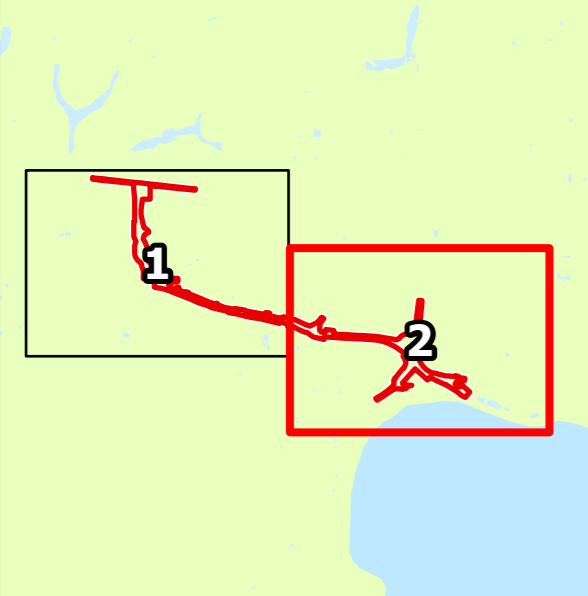


Legend

- Proposed Action Footprint

Vegetation Condition

- Very Good
- Good
- Degraded
- Completely Degraded
- NA



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Project No. **12539872**
 Revision No. **1**
 Date **9/06/2021**

Western Ringtail Possum
Habitat Condition

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 Print date: 09 Jun 2021 - 15:41

Data source: MRWA: Action Area, Vegetation Condition (2021); Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: xite

Habitat and presence within the surrounding area

There is approximately 5,128 ha of Core and Supporting habitat available within a 5 km radius of the Proposed Action Area (Southern Ecology 2020a). Proposed impacts to Core, Core (Urban) and Supporting habitat will have limited impacts on the overall WRP habitat in the local area as clearing represent less than 0.37% of these habitat types available within the 5 km radius. The 5 km radius was chosen as it represents the typical maximum distance a WRP will travel in any direction for foraging or breeding. WRP home ranges are typically no greater than 5 ha (DPaW 2017).

Primary Corridors within Core and Supporting Habitat

Possoms in the Proposed Action area are likely to move between Core and Supporting habitat via linkage habitat, which does not contain resident populations. Directional clearing will be undertaken as part of the Proposal to ensure possums are able to vacate the core and supporting habitat (see Section 5.2.2) and relocate into the surrounding suitable habitat for this species. Figure 7 identifies possum movement through core and supporting habitat corridors.

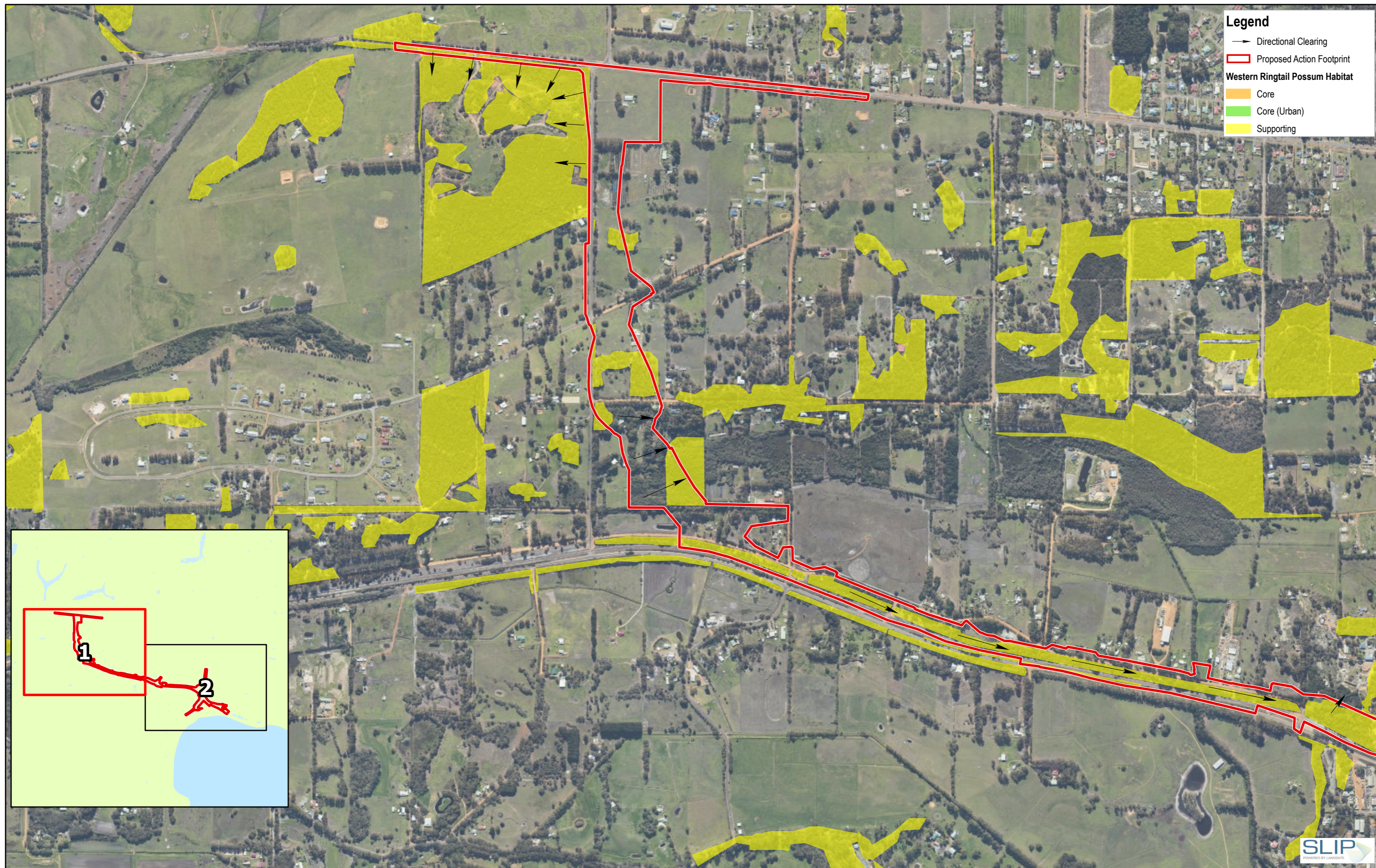
5.2.2 Avoidance, mitigation and management

Avoidance

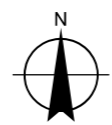
The design for the Proposed Action has continued to be developed, resulting in the avoidance of WRP habitat. The most significant changes have been the reduction of clearing associated with the removal of the loop ramp at South Coast Highway and George Street, the removal of the connection at Lower Denmark Road and the avoidance of the large area of bushland between Hanrahan Road and Princess Drive (Figure 8). The total reduction in WRP habitat through avoidance is detailed in Table 5-8.

Table 5-8 WRP habitat avoided through design

Aspect	Original proposal (ha)	Original Proposed Action (ha)	Revised proposal (ha)	Total Reduction in impact (ha)
WRP Total habitat area	41.20	35.55	19.18	22.02
WRP Core habitat area	4.50	4.50	0.88	3.62
WRP Core (Urban) habitat area	0.90	0.88	0.19	0.71
WRP Supporting habitat area	35.90	30.17	18.11	17.79



Paper Size ISO A3
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 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

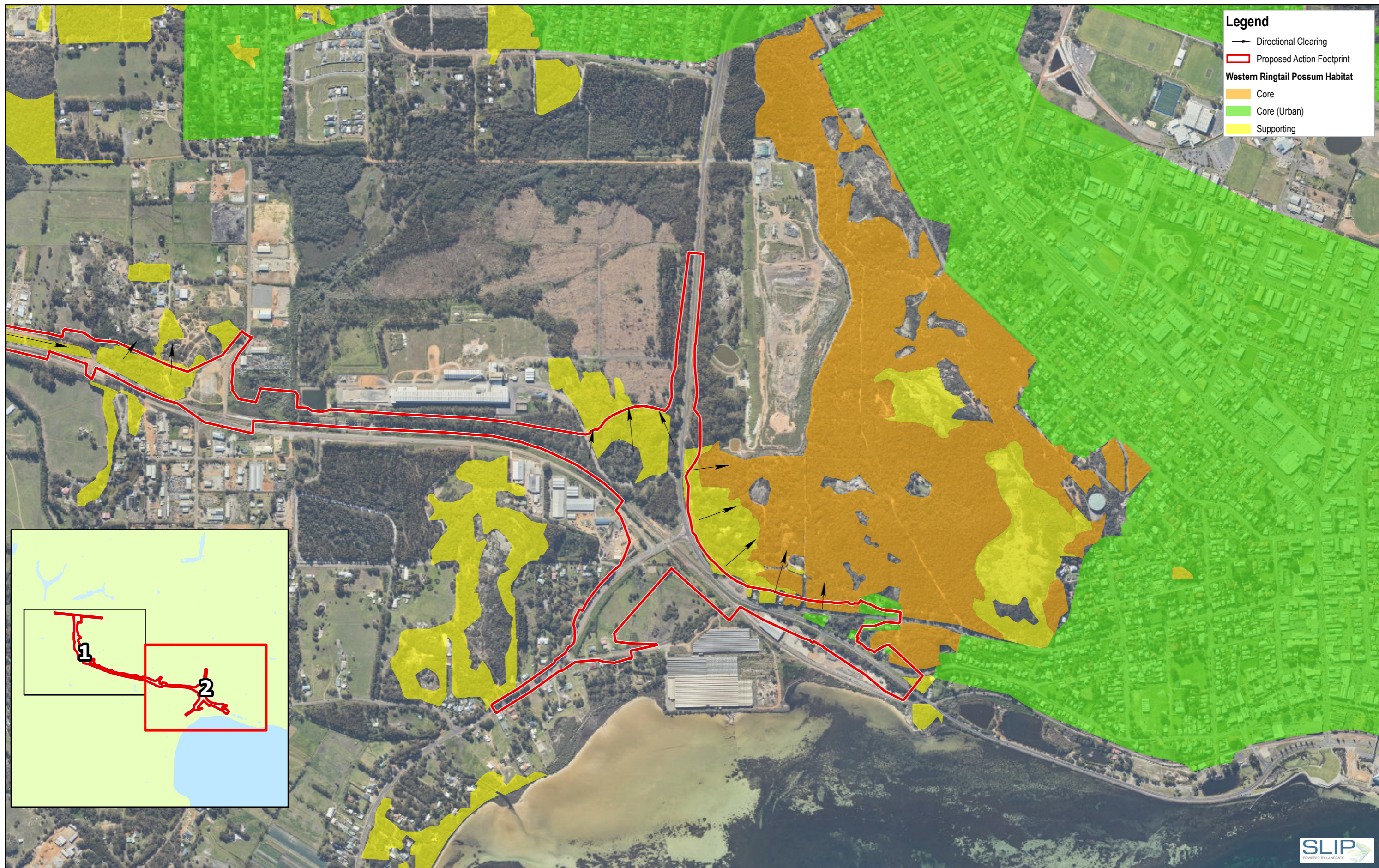
Project No. 12539872
 Revision No. 1
 Date 9/06/2021

Western Ringtail Possum Movement

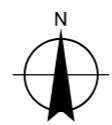
Page 1 of 2
FIGURE 7

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 Print date: 09 Jun 2021 - 15:46

Data source: MRWA: Action Area, Western Ringtail Possum Habitat (2021); GHD: Directional Clearing (2021); Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: xlee



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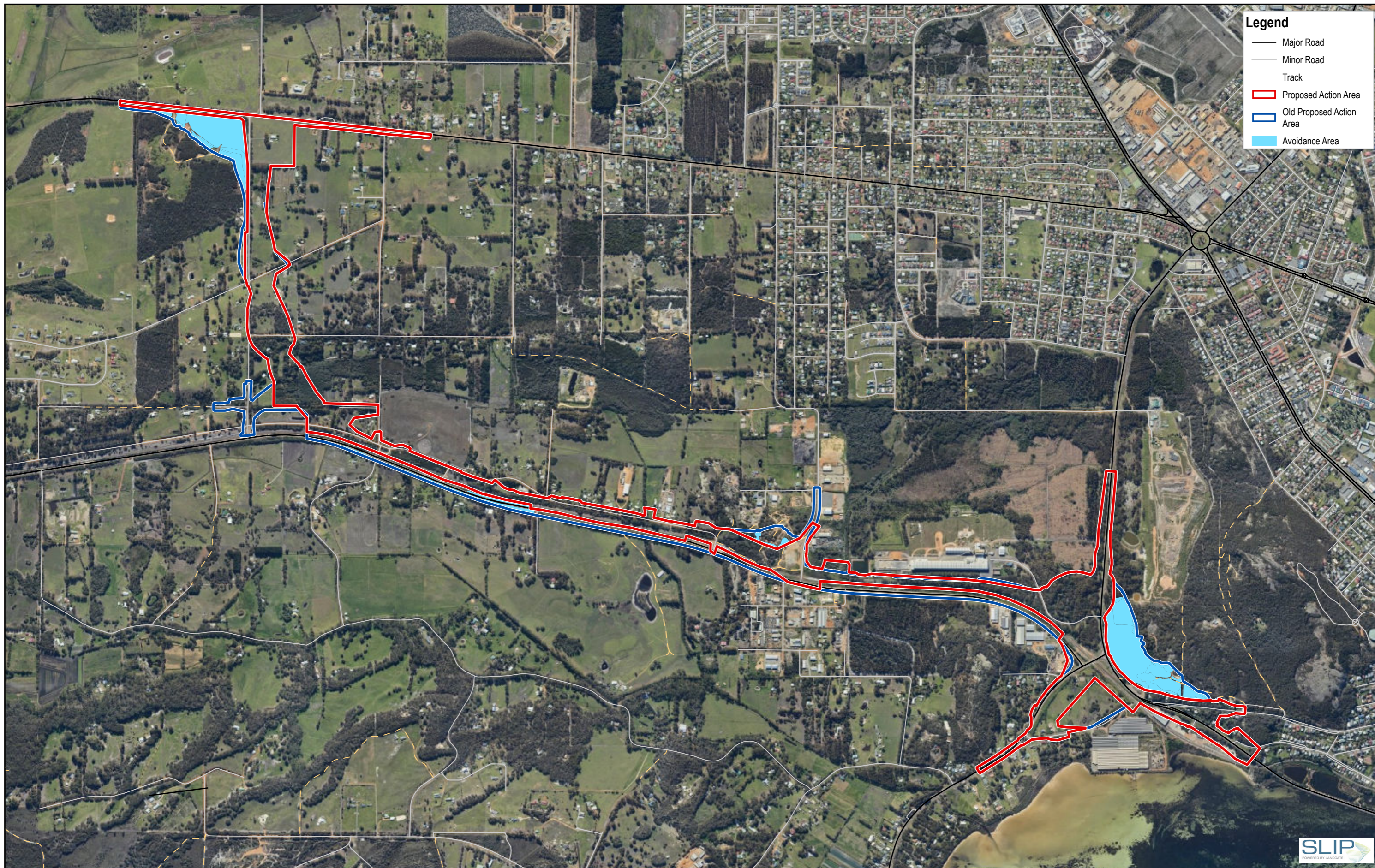
Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Project No. 12539872
 Revision No. 1
 Date 9/06/2021

Western Ringtail Possum Movement

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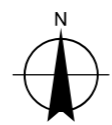


- Legend**
- Major Road
 - Minor Road
 - Track
 - ▭ Proposed Action Area
 - ▭ Old Proposed Action Area
 - ▭ Avoidance Area



Paper Size ISO A3
 0 100 200 300 400
 Metres

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Impact Avoidance to
Western Ringtail Possum Habitat

Project No. 12539872
 Revision No. 1
 Date 9/06/2021

FIGURE 8

G:\6112539872\GIS\Maps\Working\12539872\12539872.aprx\12539872_PrelimDoc_008_Impact_Avoidance_to_Western_Ringtail_Possum_Habitat_Rev1
 Print date: 09 Jun 2021 - 15:50

Data source: GHD: Avoidance Area (2021); MRWA: Action Area (2021); Landgate_Subscription_Imagery\WAnow: Landgate / SLIP. Created by: xiee

Mitigation and Management Measures

The following management targets have been identified for WRPs:

- Avoid direct impacts to WRP individuals
- Avoid clearing outside the approved footprint
- Maintaining connectivity between known WRP habitat areas.

To achieve these management actions, Main Roads has prepared SMART performance standards directly related to the measurable impacts of the Proposal on WRP (see Table 5-9). These SMART performance standards are aligned to the key management actions Main Roads will implement to manage the potential impacts of the Proposed Action to WRP individuals and habitat during construction and revegetation (see Table 5-10 and Appendix A).

Table 5-9 SMART Performance Standards for WRP

Threshold Criteria	Performance Indicator	Completion Indicator
WRP death suspected to be a consequence of construction activity	Number WRP injured or killed	<ul style="list-style-type: none"> • Stop works (temporary) within 50 m of the individual • Engage a suitably experienced fauna handling specialist to remove individuals and transport the individual to a native fauna care facility • Record environmental incident • Modify pre-clearing fauna survey methodology (if appropriate)
Clearing of up to 19.18 ha of WRP habitat	Amount of WRP habitat cleared	<ul style="list-style-type: none"> • Stop works (temporary) • Record environmental incident • Investigate cause • Update environmental training of personnel (if appropriate) • Report incident to DAWE and DWER • Undertake remediation works (if appropriate, following consultation with DAWE and DWER).
Installation of engineered movement structures as per specification	Number and design of installed structures	<ul style="list-style-type: none"> • Monitor usage of structures and presence of WRPs within habitat areas.

Table 5-10 Western Ringtail Possum Management Actions

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
Detailed design phase	To avoid unauthorised impacts and minimise authorised impacts to WRP habita	<ul style="list-style-type: none"> Clearing of native vegetation will be avoided through consideration of potential impacts during the detailed design phase The disturbance area will be minimised by using retaining walls and steepening batters where appropriate. 	Detailed design does not increase the clearing extent of native vegetation
	To avoid injury or mortality to WRP species	A fauna underpass (ARR) and rope bridge (Hanrahan Road) is included in the designed to minimise impact of fauna habitat clearing on landscape connectivity for the WRP. The fauna underpass and rope bridge will also minimise likelihood of fauna strike by providing alternative linkages between patches of remnant vegetation	Detailed design includes a fauna underpass and rope bridge
Prior to clearing/construction	To avoid unauthorised impacts and minimise authorised impacts to WRP habitat	<ul style="list-style-type: none"> Pre-clearing fauna assessment and spotlighting will be undertaken by a suitably qualified person over two nights within the five nights prior to clearing. Assessment is to include hollows, dreys, ground debris, dense ground-level vegetation, timber and logs WRP habitat within the construction site boundary that is not required to be cleared will be marked and identified as no-go areas and demarcated on relevant drawings A ground disturbance permit process will be developed by the Contractor and signed off by the Main Roads Superintendent or delegate 	<ul style="list-style-type: none"> Reduce clearing of WRP habitat to the extent practicable in final design No direct impacts to WRP. Drawings showing environmental no-go areas developed Project ground disturbance permit process developed and approved by Main Roads Dieback areas clearly marked on site

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
		<ul style="list-style-type: none"> Dieback protectable areas will be identified and established within the Proposed Action area and adjacent land to guide dieback hygiene practices including restrictions on equipment and vehicle movement, soil movement, and CoE Prior to clearing, the final road design will be assessed against the proposed clearing area to ensure the required clearing area is no more than the approved area Clearing areas will be clearly demarcated and marked with flagging and checked prior to clearing commencing. 	<ul style="list-style-type: none"> Inductions include dieback hygiene Reduce clearing of WRP habitat to the extent practicable in final design Environmental no-go areas clearly marked with flagging on site.
During clearing/construction	To avoid unauthorised impacts and minimise authorised impacts to WRP.	<ul style="list-style-type: none"> Fire danger ratings and Shire vehicle movement bans will be observed and the requirements of these implemented Hot work will be undertaken in accordance with Contractor's hot work procedure Vehicles, plant and equipment to be fitted with fire extinguishers and restricted to designated cleared areas unless involved in clearing operations 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 WRP habitat 	<ul style="list-style-type: none"> Fire danger ratings applied to works No fires started as a result of hot works All vehicles fitted appropriately All vehicles in designated cleared areas Areas for ancillary services located in cleared areas or areas that do not contain WRP habitat.

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
	To avoid injury or mortality to WRP.	<ul style="list-style-type: none"> • Clearing will be avoided for any temporary construction activities. • Directional clearing will occur to allow fauna to relocate to areas of existing vegetation • No night-time clearing of vegetation will occur • A suitably experienced zoologist/environmental scientist will be on-site at all times during clearing of breeding habitat for WRP and must maintain radio communication with machinery operators • Vacant dreys will be removed prior to clearing where they are accessible, in accordance with the DBCA <i>Procedures to minimise the risk to Western Ringtail Possums during vegetation clearing and building demolition</i> (DPaW 2015) • Vacant tree hollows suitable for possums will be removed or blocked prior to clearing where they are accessible. Blocking may include wood nailed over the hollow, non-toxic expanding foam or similar • Temporary traffic management measures including management of vehicle speeds, and the use of variable message boards to alert road users to the possible presence of WRP on the roadway, will be implemented during construction/road works activities 	<ul style="list-style-type: none"> • No direct impacts to WRP • WRP habitat retained within 10 m of the edge of the seal of the road will be risk assessed and wildlife hazard signage installed as required • No incidents of speeding within the construction site boundary • A list of local wildlife rescue organisations and carers is on site at all times.

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
		<ul style="list-style-type: none"> • Cleared vegetation will be chipped immediately or transported at least 100 m from WRP habitat before further processing • Movement/disturbance of clearing stockpiles will be confined to the period between one hour after sunrise and one hour prior to sunset • Habitat clearing is to commence from existing edge lines/roads and progress towards habitat that will be retained, where possible • If WRPs are observed during clearing operations, the tree containing the animal shall be left for up to 48 hours to allow for the animal to vacate, while clearing continues in adjacent vegetation. If the tree continues to be occupied after 48 hours, the animal will be coerced/moved to a safe area outside of the clearing footprint by the appointed zoologist/environmental scientist/fauna spotter in accordance with <i>Procedures to minimise the risk to Western Ringtail Possums during vegetation clearing and building demolition</i> (DPaW 2015). This may include removal using an elevated platform or gently pushing over the tree as detailed below • Trees, as noted above, that are observed to support WRP after 48 hours will be ‘bumped gently’ with a machine prior to felling. The operator and spotter will wait and observe the tree for a short time. If the animal remains in the tree, the tree shall be pushed over 	

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
		<p>slowly onto vegetation within the clearing area that is yet to be cleared. The 'soft felling' of habitat trees will provide a 'cushion' for the vegetation being felled, minimising the risk of injury to the animal and allowing any WRP present with the opportunity to safely vacate</p> <ul style="list-style-type: none"> • Felled trees with hollows will be checked immediately for WRPs after felling and prior to further processing. If it is not possible to fully inspect the hollow the tree will be left on the ground overnight to allow time for any undetected fauna to vacate • Any WRP showing signs of injury or illness will be recorded and taken by a qualified fauna handler to a veterinarian or qualified wildlife carer • Where trees that are known to be WRP habitat are retained but are located within 10 m of the edge of the road seal the risk of vehicle strike will be assessed to determine if wildlife hazard signage is required • Speed limits between 40-80km /hr will be applied throughout the construction site for safety purposes which will consequently reduce the risk of fauna vehicle 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 	
Post-construction	To avoid unauthorised impacts and minimise	Revegetation within the road reserve will use local native species. Species chosen will be selected based on habitat	Revegetation of roadside with suitable native species

Timeframe	Management Objective/Desired Outcome	Management Action	Performance Target
	authorised impacts to WRP habitat	suitability for WRP and potential to be resistant to drought. Key components to the revegetation will include: <ul style="list-style-type: none"> • Species selection will be determined by a suitably qualified expert with experience in rehabilitation and/or landscaping. • Revegetation will involve a combination of tube stock and/or direct seeding • Weed control will occur during the establishment period of the revegetation within the first two years of establishment. 	
	To avoid injury or mortality to WRP.	<ul style="list-style-type: none"> • A post-clearing survey shall be undertaken to ensure no injured WRP individuals are present • Revegetation designs shall not include foraging or breeding plant species within 10 m of the road. 	<ul style="list-style-type: none"> • No direct impacts to WRP • Revegetation designs exclude foraging or breeding plant species within 10 m of the road.

5.2.3 Fauna connectivity and movement

A fauna underpass will be constructed along George Street, between Frederick Street and Cuming Road and a rope bridge will be constructed along Hanrahan Road, north of the Frenchman Bay Road intersection. Design of these structures will be undertaken as described below, with the location of the rope bridge and underpass provided in Figure 9.

Rope Bridge

There is no standard design for a rope bridge, however, the design will be consistent with other successful rope bridges constructed in the south west. The rope bridge will consist of a canopy bridge, which is a rope netting suspended above the traffic from vertical poles, to provide connectivity (see Plate 1, Plate 2 and Plate 3 for representative design). The rope bridge for the Proposed Action will be much shorter than that shown in Plate 1, as the bridge will be located over a single carriageway. Furthermore, evidence has been obtained of use of these structures following construction, as shown in Plate 2.



Plate 1 Rope bridge layout and components



Plate 2 Evidence of rope bridge use (image by Yokochi and Bencini [2015])

At a minimum the design will consist of the following:

- Support poles constructed either side of the carriageway
- Minimum of seven metres clearance from the road (to allow for traffic to pass underneath as well as sufficient height above traffic noise). Some have been constructed 12 metres above the road
- Connected to adjacent vegetation via ropes
- Comply with safety requirements when structural supports are placed in the road edge
- Construction technique proposed:
 - Rope bridge constructed to resemble a ladder (Plate 3)
 - The Rope length between poles will be approximately 26 m in length
 - Screw eyelets into the pole and attach rope and attach 12-14 gauge marine grade silver (high UV rating) rope and stainless steel cables and frames (for rope ladder)
 - Appropriately tension canopy bridge
- Final heights, lengths and tie off locations will be decided by a WRP specialist onsite following the final design of the road.

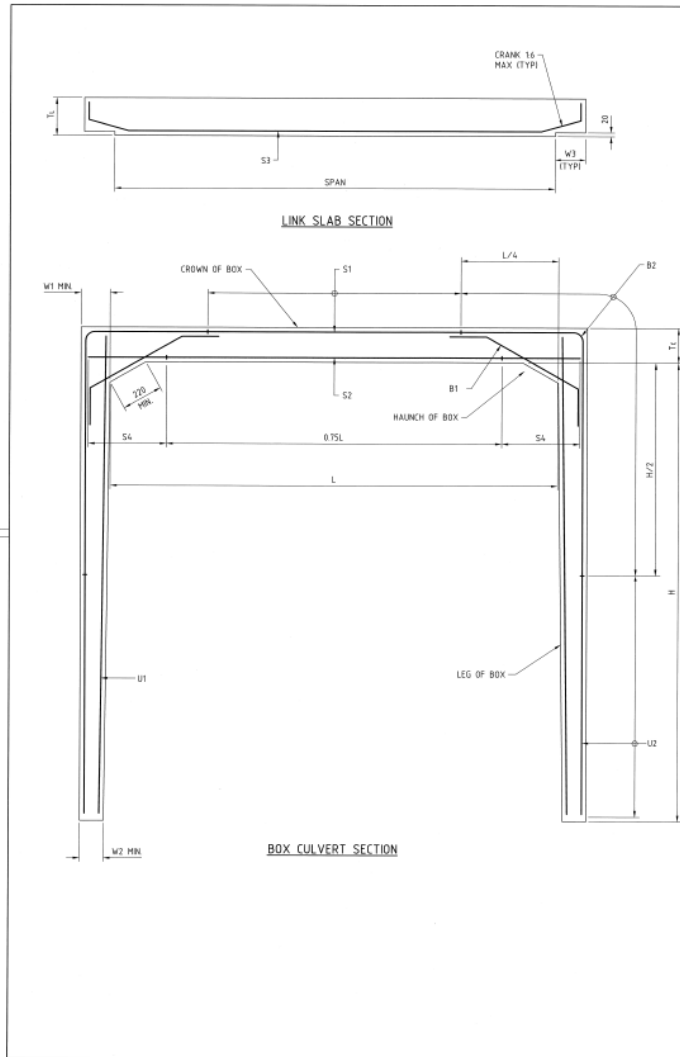


Plate 3 Rope bridge layout

Fauna underpass

The fauna underpass will consist of an underground culvert box culvert. Plate 4 and Plate 5 outline the design of the underpass. The design of the fauna underpass will also consider:

- The use of rocks and concrete structures, inside and in the cleared areas leading up to the underpasses, to allow for cover for smaller mammals
- Revegetation to areas approaching the underpass on either side to provide cover for mammals
- Topography and avoiding extensive earthworks, visual impact and clearing required for underpasses
- Groundwater table and placement of underpasses above the groundwater table
- A skylight in the centre of the underpass to enable visibility and encourage use by small mammals.



PRECAST BOX SECTION NOM. (m)	CONCRETE DIMENSIONS						MINIMUM MAIN REINFORCEMENT					
	H (mm)	L (mm)	Tc MIN (mm)	W1 MIN (mm)	W2 MIN (mm)	W3 (mm)	CROWN (mm)		HAUNCH (mm ²)		LEG (mm ² / LEG)	
	S1	S2	S3	S4	B1	B2	U1	U2				
15 x 8.9 x 12	900	1500	180	145	130	700	1630	890	700	870	600	600
15 x 12 x 12	1200	1500	180	145	130	700	1700	930	700	900	600	600
15 x 15 x 12	1500	1500	180	145	130	700	1760	960	700	1040	600	600
18 x 8.9 x 12	900	1800	190	150	130	740	1750	950	740	1155	600	600
18 x 12 x 12	1200	1800	190	150	130	740	1820	1000	740	1240	600	600
18 x 15 x 12	1500	1800	190	150	130	740	1890	1030	740	1360	600	600
18 x 18 x 12	1800	1800	190	150	130	740	1970	1080	740	1530	700	700
21 x 12 x 12	1200	2100	205	155	130	800	1890	1030	800	1440	600	700
21 x 15 x 12	1500	2100	205	155	130	800	1990	1090	800	1550	600	700
21 x 18 x 12	1800	2100	205	155	130	800	2070	1130	800	1700	700	700
21 x 21 x 12	2100	2100	205	155	130	800	2150	1180	800	1890	800	800
24 x 12 x 12	1200	2400	210	165	130	880	2130	1170	880	1760	600	1060
24 x 15 x 12	1500	2400	210	165	130	880	2240	1230	880	1830	600	990
24 x 18 x 12	1800	2400	210	165	130	880	2340	1290	880	1940	700	920
24 x 21 x 12	2100	2400	210	165	130	880	2430	1330	880	1940	800	830
24 x 24 x 12	2400	2400	210	170	130	880	2490	1360	880	2140	960	920
27 x 15 x 12	1500	2700	230	170	130	1000	2490	1360	1000	2140	600	1260
27 x 18 x 12	1800	2700	230	170	130	1000	2600	1430	1000	2230	700	1180
27 x 21 x 12	2100	2700	230	180	130	1000	2700	1480	1000	2190	800	1060
27 x 24 x 12	2400	2700	230	180	130	1000	2700	1480	1000	2350	960	1000
27 x 27 x 12	2700	2700	230	190	130	1000	2770	1520	1000	2440	1150	920
3.0 x 18 x 12	1800	3000	245	140	1100	2860	3190	1720	1100	2230	750	1290
3.0 x 21 x 12	2100	3000	245	140	1100	2860	3190	1720	1100	2330	800	1270
3.0 x 24 x 12	2400	3000	245	140	1100	3050	3050	1670	1100	2400	960	1140
3.0 x 27 x 12	2700	3000	245	140	1100	3050	3050	1670	1100	2500	1100	1040
3.0 x 30 x 12	3000	3000	245	140	1100	3190	3190	1720	1100	2730	1440	980
3.3 x 18 x 12	1800	3300	270	200	150	1200	3190	1720	1200	2400	700	1520
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3.3 x 24 x 12	2400	3300	270	200	150	1200	3350	1840	1200	2690	900	1360
3.3 x 27 x 12	2700	3300	270	220	150	1200	3350	1840	1200	2690	1100	1240
3.3 x 30 x 12	3000	3300	270	220	150	1200	3430	1890	1200	2890	1440	1180
3.3 x 33 x 12	3300	3300	270	220	150	1200	3500	1920	1200	2970	1650	1080
3.6 x 18 x 12	1800	3600	305	220	160	1350	3370	1950	1350	2700	700	1740
3.6 x 21 x 12	2100	3600	305	220	160	1350	3490	1910	1350	2770	800	1640
3.6 x 24 x 12	2400	3600	305	220	160	1350	3600	1980	1350	2880	960	1550
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3.6 x 30 x 12	3000	3600	305	230	160	1350	3700	2030	1350	3040	1440	1340
3.6 x 33 x 12	3300	3600	305	240	160	1350	3790	2070	1350	3040	1650	1190
3.6 x 36 x 12	3600	3600	305	240	160	1350	3850	2110	1350	3280	1980	1140

BOX CULVERT SECTIONS

LINK SLAB NOM. (m)	SPAN (mm)	MIN. THICKNESS Tc (mm)	MIN. MAIN REINF. S3 (mm ²)	W3 MIN. (mm)
15 x 122	1500	175	2600	130
18 x 122	1800	185	2260	130
21 x 122	2100	200	2400	140
24 x 122	2400	220	2940	150
27 x 122	2700	240	3205	160
3.0 x 122	3000	260	3630	180
3.3 x 122	3300	280	3970	190
3.6 x 122	3600	300	4310	200

LINK SLABS
CONCRETE AND REINFORCEMENT DETAILS

NOTES

- MINIMUM REQUIREMENTS HAVE BEEN BASED ON DESIGN TO SM1360 LOADING AS PER AS 5100.
- MINIMUM DEPTH OF FILL OR PAVEMENT REQUIRED OVER BOX CULVERTS SHALL BE 350 mm.
- FOR FILL OR PAVEMENT THICKNESS LESS THAN 350 mm, MINIMUM CROWN THICKNESS (Tc) AND REINFORCEMENT SHALL BE DESIGNED BY A PRACTISING STRUCTURAL ENGINEER.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE MRWA CULVERT SPECIFICATION.
- CONCRETE SHALL BE CLASS S50. SEE MRWA SPECIFICATION FOR MIX DESIGN REQUIREMENTS.
- MINIMUM COVER TO REINFORCEMENT SHALL BE 40.
- THE TOLERANCE ON COVER SHALL BE ± 10 mm TO ± 5 mm.
- IF LEGS OF CULVERT ARE PARALLEL, THEN THE DIMENSION W2 SHALL BE THE SAME AS DIMENSION W1.
- REINFORCEMENT SHALL BE HARD DRAWN STEEL WIRE OR GRADE 500 HOT ROLLED DEFORMED STEEL BARS CONFORMING TO AS/NZS 4474.
- MINIMUM MAIN REINFORCEMENT GIVEN IN TABLE IS FOR 1220 LENGTH OF UNIT. REFER TO MRWA SPECIFICATION FOR DISTRIBUTION STEEL REQUIREMENTS.
- SEE MRWA SPECIFICATION FOR BENDING AND FIXING TOLERANCES.
- CONTRACTOR SHALL SUBMIT PROPOSED REINFORCEMENT DETAILS WITH THE TENDER DOCUMENT.

THIS DRAWING SUPERSEDES DRG N° 9630-0506

SCALE: 1:100

NO.	DATE	DESCRIPTION	APPROVED
AMENDMENTS			
TECHNOLOGY AND ENVIRONMENT DIRECTORATE			
PAVEMENT AND STRUCTURES ENGINEERING			
Telephone 180 000 4747		Fax 080 000 4708	
FILE No. DL/7045	JOB No.		
DRAWN: M. GILES	DESIGNED: P. WINDSBURY		
CHECKED: T. SLATTERY	APPROVED: [Signature]		
STRUCTURES ENGINEERING			
STANDARD DRAWING			
MINIMUM DESIGN REQUIREMENTS FOR PRECAST BOX CULVERT UNITS			
FOR SPANS 1500mm AND LARGER AND FOR FILL HEIGHTS UP TO 4.5m			
LOCAL AUTHORITY:	DRAWING NUMBER:	PAGE:	
	0530-1470		

Plate 4 Fauna underpass culvert design

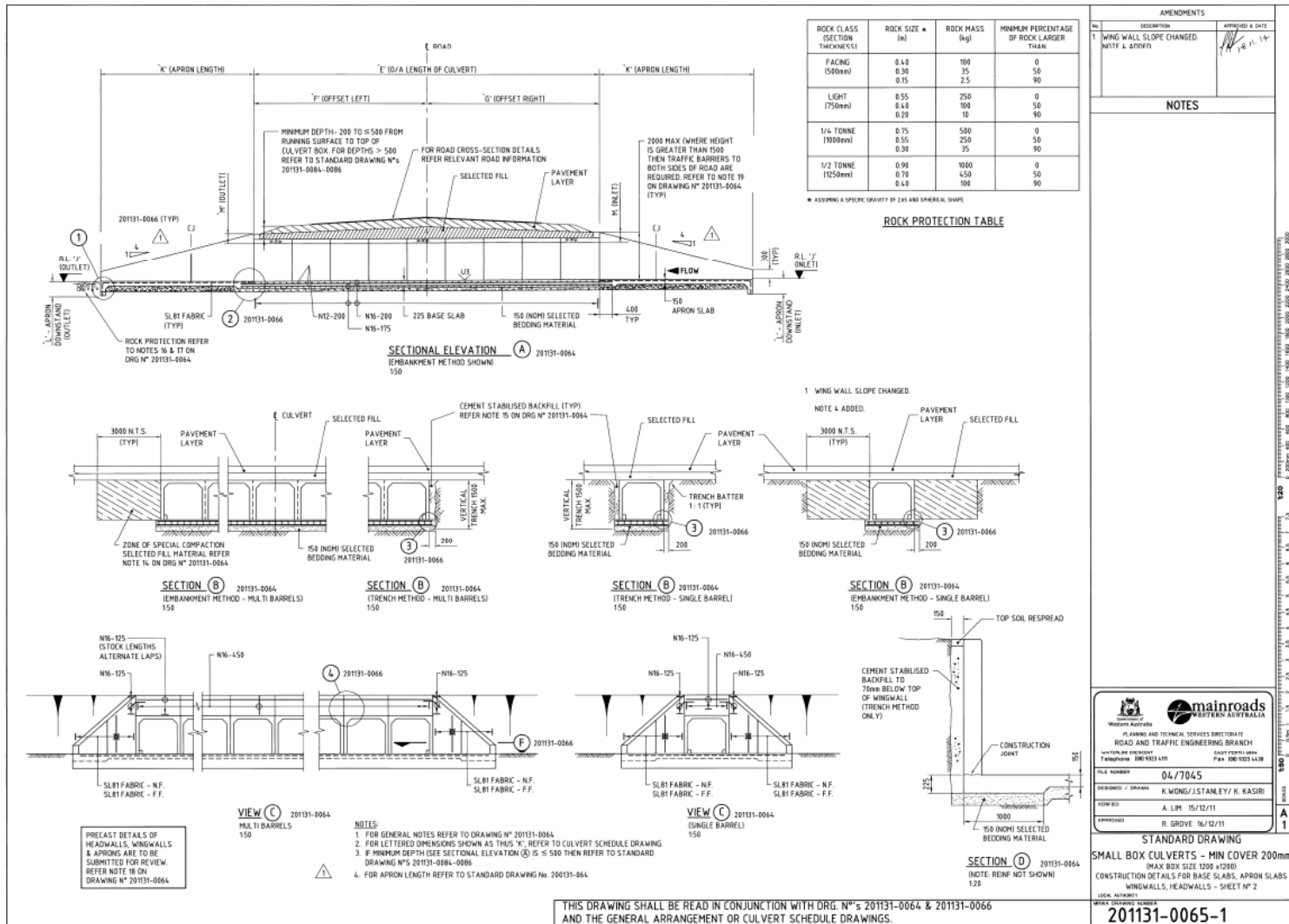


Plate 5 Fauna underpass culvert design

Effectiveness of proposed connectivity structures

A study conducted by Yokochi and Bencini (2015) looked at the use of a rope bridge by WRPs that was installed near Busselton in the south west of WA. The rope bridge comprised two stay wires 300 mm apart with marine grade netting rope extending 26.5 m from vegetation on one side of the road to the other. The rope bridge was supported by a 8.5 m tall wooden pole. The rope bridge was monitored for 270 days post installation. The first possum crossing was recorded 36 days after installation, which is comparatively sooner than arboreal species studied in other parts of Australia. The possums crossed the bridge increasingly over the monitoring period and at a higher rate than expected (8.87 complete crossings per night). Possums crossed the rope bridge less on windy, warm and bright nights. This is thought to be due to increased risk of falling, heat stroke and predation, respectively. Breeding season did not appear to influence crossing frequency (Yokochi and Bencini 2015).

A 2-year study conducted for fauna underpasses for Mitchell Freeway Extension (Main Roads 2021) from Burns Beach Road to Hester Avenue assessed the successful usage of the underpasses installed at Neerabup Road, Wanneroo Road and Hester Avenue between bushland remnants adjoining the roads. This study assessed a number of underpass types including trapezoidal shared pedestrian/fauna underpasses, box culverts with and without sky lights, and 1200 mm diameter round pipes with and without skylights. Monitoring identified that the underpasses were successfully used by a range of fauna including large and small mammals, lizards and birds.

Three years of seasonal camera monitoring will be undertaken to verify use of the rope bridge and fauna underpass.

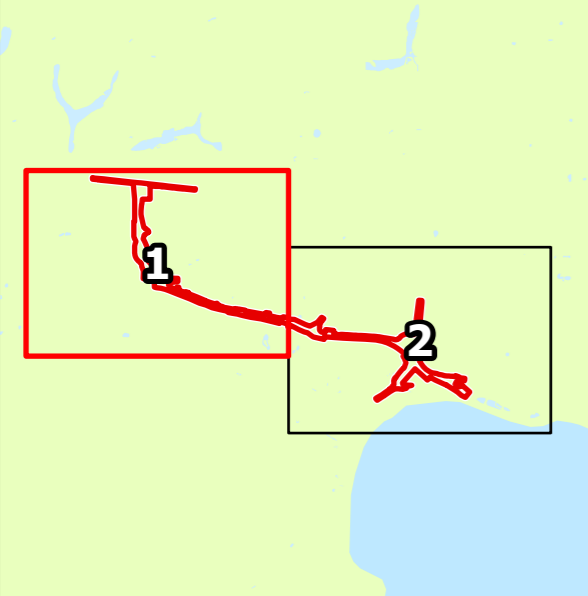
Location and components

Figure 9 identifies the locations for the fauna underpass and rope bridge. The design will be in accordance with that described in the above sections. The Main Roads project manager will be responsible for the successful implementation of both structures.

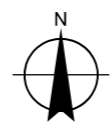


Legend

- Proposed Action Footprint
- Fauna Underpass



Paper Size ISO A3
 0 100 200 300 400
 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Project No. **12539872**
 Revision No. **2**
 Date **8/31/2021**

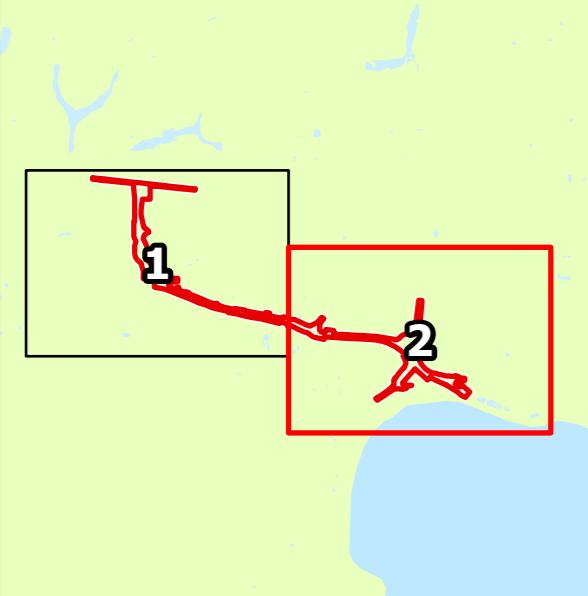
**Fauna Rope Bridge
 and Underpass Locations**

N:\AU\Perth\Projects\6112539872\GIS\Map\Working\12539872\12539872.aprx\12539872_PrelimDoc_009_Fauna_Rope_Bridge_Underpass_Rev2
 Print date: 31 Aug 2021 - 14:19

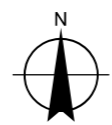
Data source: MRWA: Action Area (2021); GHD: Fauna Crossing (2021); Landgate_Subscription_Imagery\WAnow: Landgate / SLIP. Created by: xie



Legend
 [Red Outline] Proposed Action Footprint
 [Yellow Line] Fauna Rope Bridge



Paper Size ISO A3
 0 100 200 300 400
 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Main Roads
Albany Ring Road Project
 Stages 2 and 3b: Preliminary Documentation

Fauna Rope Bridge
and Underpass Locations

Project No. 12539872
 Revision No. 2
 Date 8/31/2021

Page 2 of 2
FIGURE 9



6. Offsets

6.1 Background

Environmental offsets are conservation actions that provide environmental benefits intended to counterbalance the significant residual environmental impacts associated with a Proposed Action. Main Roads intend to counterbalance the residual impact of the Proposed Action through implementation of an environmental Offset Strategy (Appendix B). The strategy was prepared in accordance with the Australian Government's *EPBC Act Environmental Offset Policy* (DSEWPaC 2012b) and *Environmental Offset Assessment Guide* (DSEWPaC 2012c). The offset is proportionate to the level of impact and significance of the environmental impact, using the offset calculator which is based on the level of protection given to a MNES.

Main Roads environmental assessment and compliance procedures operate on a hierarchy of avoid, minimise, reduce, rehabilitate and offset for environmental impacts. This hierarchy is achieved primarily through changes in scope and design, development and implementation of relevant management plans (Appendix A) and an Offset Strategy (Appendix B). Application of the management hierarchy has been documented throughout this document.

Where practicable during detailed design and construction planning, opportunities to reduce residual environmental impacts will be investigated. Further reduction and avoidance is limited by the requirement for the Proposed Action to meet road safety standards. Lane widths, road vertical and horizontal geometry, steepness of roadside batters and road pavement construction are dictated by a series of Australian Standards and Austroads guidelines (Austroads 2012).

The footprint and residual impact presented represents the minimum impact area possible in order to allow the Proposed Action to safely proceed. Offsets are required to counterbalance the residual impacts of the Proposed Action.

6.2 EPBC Act Environmental Offsets Policy

The EPBC Act Environmental Offsets Policy (DSEWPaC 2012b) requires the following Principles are met by an offset:

- Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter
- Suitable offsets must be built around direct offsets but may include other compensatory measures
- Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter
- Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter
- Suitable offsets must effectively account for and manage the risks of the offset not succeeding
- Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs
- Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable
- Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

Application of Commonwealth criteria for research for Black Cockatoo are summarised in Appendix B.

6.3 Residual impacts

Residual impacts associated with the Proposal have been determined through application of the Australian Government's *EPBC Act Environmental Offset Policy* (DSEWPC 2012b).

The below predicted residual impact estimates are conservative, representing the full extent of MNES values within the Proposed Action Area disturbance footprint. The actual clearing footprint is expected to be less and will be refined through the detailed design and construction planning process.

Residual impacts for which Main Roads proposes environmental offsets are detailed in Table 6-1.

Table 6-1 Residual environmental impacts requiring offsets

Environmental attribute	Residual impacts
Carnaby's Cockatoo Baudin's Cockatoo FRTBC	37.89 ha of habitat (total), including: <ul style="list-style-type: none"> 7.02 ha of foraging habitat 37.75 ha of potential roosting habitat 5.80 ha of potential breeding habitat 236 Suitable DBH Trees for potential breeding 10 trees with 14 potentially suitable hollows for Black Cockatoo nesting
WRP	19.18 ha of core, core (urban) and supporting habitat

6.3.1 Direct impacts to Black Cockatoos

Up to 7.02 ha of Black cockatoo foraging habitat will be cleared by the Proposed Action, of which 5.8 ha is also breeding habitat. On a regional scale, native foraging habitat within the Proposed Action Area, represents 0.07 % of the recorded 8,756 ha of locally available native foraging habitat within a 12 km radius (Biota 2019a). Although foraging habitat in the Proposed Action Area represents a small proportion of the surrounding extent, Main Roads proposed to offset the loss of this Black Cockatoo habitat.

The Proposed Action will not result in impacts to known nesting hollows or roosting sites for Carnaby's Cockatoo, Baudin's Cockatoo or FRTBC (GoWA 2019c, 2019d). No hollows showed signs of being used in the past. The Proposed Action Area includes 37.75 ha of potential roosting habitat and 5.80 ha of potential breeding habitat, which will also be offset. As Black Cockatoo habitat types overlap in the Proposed Action Area, a total of 37.89 ha will be offset.

The Proposed Action will also remove 10 trees with 14 potentially suitable hollows for Black Cockatoo nesting.

6.3.2 Direct impacts to WRP

Critical habitat as defined by the Recovery Plan (DPaW 2017) includes any remnant habitat where WRPs occur naturally. The Proposed Action may result in the loss of up to 0.88 ha of Core habitat, 0.19 ha of Core (Urban) habitat, 18.11 ha of Supporting habitat and five dreys. There is approximately 5,128 ha of Core and Supporting habitat available within a 5 km radius of the Proposed Action Area (Southern Ecology 2020). Although proposed impacts to Core,

Core (Urban) and Supporting habitat will have limited impacts on the overall WRP habitat in the local area as clearing represent less than 0.37% of these habitat types available within the 5 km radius, Main Roads propose to offset the residual impact.

It is important to note the Linkage and Likely Linage habitat for WRP does not contain resident individuals and considered to facilitate their movement across the landscape only. For this reason, Linkage and Likely Linkage habitat is not associated with a significant residual impact or proposed to be offset.

6.3.3 Indirect impacts to Black Cockatoo and WRP

The Proposed Action has potential to cause indirect impacts to Black Cockatoo and WRP including:

- The introduction and/or spread of introduced flora species leading to decline habitat health that lies adjacent to the Proposed Action Area
- The introduction and/or spread of dieback leading to decline in habitat health that lies adjacent to the Proposed Action Area
- Increased risk of vehicle strike
- Traffic noise and light spill impacting Black Cockatoo and WRP species.

However, with the implementation of the management measures committed in the CSFEMP (Appendix A), the residual risk rating for indirect impacts are Low. No offset is proposed for indirect impacts.

6.4 Description of offsets

Table 6-2 provides an overview of the offset package under consideration.

6.4.1 Confidential property acquisition

Main Roads are investigating the purchase of several private land parcels to develop an offset to counterbalance the significant residual impacts of the Proposed Action to Black Cockatoo and WRP.

The direct offsets involve acquisition of land by the Crown and vesting of the land management to DBCA as the lead agency in WA responsible for conservation management. DBCA will maintain the offset ecological values in perpetuity. Main Roads intends to have the required offsets in place within 12 months of commencement of construction taking into account the time required to identify appropriate parcels of land, survey the parcel for the environmental attributes to be offset, negotiate with the landowner and then transfer the parcel/s into DBCA reserve.

Properties are currently under investigation by DBCA in collaboration with Main Roads, but have yet to be negotiated with landowners and will also be subject to surveys. Based on consultation with DBCA, the location and vegetation anticipated to be present will comprise habitat suitable for Carnaby's cockatoo, Baudin's cockatoo, FRTBC and WRP. Main Roads propose to acquire property that will comprise the following:

- 38 ha of Black Cockatoo foraging and breeding habitat suitable for all three species
- 145 ha of Black Cockatoo roosting habitat suitable for all three species, which may comprise part or all of the 38 ha of Black Cockatoo breeding and foraging habitat suitable for all three species
- Approximately 135 ha of habitat for WRP.

Main Roads is consulting with DBCA to confirm the availability and commercial terms to acquire the properties. Should the properties be suitable for acquisition, Main Roads will arrange for surveys to confirm the ecological values present, including extent and condition of Black Cockatoo and WRP habitat.

6.4.2 Black Cockatoo artificial hollows

Main Roads proposed to install 42 artificial hollows to offset the loss of 10 trees (with 14 hollows) potentially suitable for Black Cockatoo nesting. Installation will be in accordance with the DBCA *Fauna notes on how to design and place artificial hollows* (DPAW 2015b).

6.4.3 Research proposal

A research proposal for Black Cockatoos is also being proposed to account for 10% of the offset as detailed in Appendix B.

Table 6-2 overview of proposed offset package

Offset type	Offset summary	Property Location	Existing tenure
Direct (90-100%)	Land transfer to DBCA: <ul style="list-style-type: none"> • 38 ha of Black Cockatoo foraging and breeding habitat suitable for all three species • 145 ha of Black Cockatoo roosting habitat suitable for all three species, which may comprise part or all of the 38 ha of Black Cockatoo breeding and foraging habitat suitable for all three species • 135 ha of WRP habitat 	Confidential pending survey and negotiation with property owners	Freehold owned by third parties
Black Cockatoo compensatory offset measures	Installation of 42 artificial hollows to offset the loss of 10 suitable hollows for Black Cockatoo nesting.		
Indirect – Research proposal (10%) for Black Cockatoos	Main Roads is currently providing a funding contribution to Murdoch University to finance Black Cockatoo research. Funding for research is intended to comprise 10% of the total Carnaby’s Cockatoo, Baudin’s Cockatoo and FRTBC offset requirement for this project.		

6.5 Offset monitoring and corrective action plan

The Offset Strategy will be based on a Memorandum of Understanding between Main Roads and DBCA, including requirements for land management and monitoring.

7. Relevant policies and publications

Relevant recovery plans and threat abatement plans have been considered during the preparation of the Proposed Action. A discussion of how the Proposed Action conforms to the Advice or Plan requirements is included in Table 7-1

Table 7-1 Relevant recovery plans, threat abatement plans and conservation advice for MNES

Plan/conservation advice and threats	Response
Black Cockatoos	
DPAW (2013), Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>) Recovery Plan	
Loss of breeding habitat	<p>The Proposed Action may exacerbate this threat; however, the Proposed Action is designed to maximise use of existing disturbed areas to minimise the loss of breeding habitat.</p> <p>A total of 236 Black Cockatoo Suitable DBH Trees will be removed for the Proposed Action including 24 trees with hollows, of which 10 trees have 14 potentially suitable nest hollows for Carnaby's Cockatoo. Up to 5.80 ha of breeding habitat will be removed for the Proposed Action. No known nesting trees are present within the Proposed Action Area, with there being no records of Black Cockatoos breeding in the local area.</p>
Loss of non-breeding foraging and night roosting habitat	<p>The Proposed Action may exacerbate this threat; however, the Proposed Action is designed to maximise the use of existing disturbed areas to minimise the loss of habitat. Foraging habitat loss has been reduced from 16.43 ha to 7.02 ha. Roosting habitat loss has been reduced from 54.67 ha to 37.75 ha.</p>
Decline in tree health	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>Dieback mapping and a Dieback Management Plan exist for the Proposed Action Area (Southern Ecology 2020b). CoE measures will be implemented during construction activities to ensure the risk of dieback spread to uninfested areas is minimised. Note that most of the Black Cockatoo habitat consists of trees that are resistant to dieback.</p> <p>The CSFEMP (Appendix A) also addresses dieback management for the Proposed Action.</p>
Mining and extraction activities	<p>The Proposed Action will not exacerbate this threat as the Proposed Action is not related to mining or extraction activities.</p>
Illegal shooting	<p>The Proposed Action will not exacerbate this threat, as no firearms will be permitted on the construction site.</p>
Illegal taking	<p>The Proposed Action will not exacerbate this threat.</p>

Plan/conservation advice and threats	Response
Climate change	The Proposed Action is not expected to adversely alter the predicted impacts of climate change or exacerbate this threat.
Collision with motor vehicles	The Proposed Action may exacerbate this threat. Speed limits between 40-80 km/h will be adhered to during construction as per the CSFEMP to minimise likelihood of vehicle strike (Appendix A). Revegetation designs shall not include foraging or breeding plant species within 10 m of the road to reduce the risk of vehicle collision.
Disease	The Proposed Action does not involve any activities that would exacerbate this threat.
Chapman (2008), Forest Black Cockatoo (Baudin's Cockatoo <i>Calyptorhynchus baudinii</i> and Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>) Recovery Plan	
Killing by illegal shooting	The Proposed Action will not exacerbate this threat, as no firearms will be permitted on the construction site.
Feral honeybees	<p>The Proposed Action is unlikely to exacerbate this threat.</p> <p>The Proposed Action will result in the clearing of 24 DBH trees with hollows, of which 10 trees are potentially suitable nesting trees for Baudin's Cockatoo and FRTBC. A general reduction in the amount of tree hollows may increase competition between fauna using the hollows and the European Honeybee. However, it is unlikely this will affect FRTBC as there is no known nesting in the Proposed Action Area.</p>
Habitat loss	<p>The Proposed Action may exacerbate this threat; however, the Proposed Action is designed to maximise the use of existing disturbed areas to minimise the loss of habitat.</p> <p>Up to an estimated 37.89 ha of vegetation that has been assessed as potential Black Cockatoo (breeding, roosting and foraging) habitat will be removed for the Proposed Action. This has been reduced from 62.68.</p>
Nest hollow shortage	The Proposed Action may exacerbate this threat; however, the Proposed Action is designed to maximise use of existing disturbed areas to minimise the loss of breeding habitat.

Plan/conservation advice and threats	Response
	A total of up to 236 Suitable DBH Trees will be removed for the Proposed Action including 24 DBH trees, of which 10 trees have 14 potentially suitable nest hollows. No known nesting trees are present within the Proposed Action Area.
Nest hollow competition	<p>The Proposed Action is unlikely to exacerbate this threat.</p> <p>The Proposed Action will result in clearing of up to 10 trees with 14 potentially suitable nest hollows for Black Cockatoo. Although a general reduction in the amount of tree hollows may increase competition between fauna using hollows, Black Cockatoos are not known to breed in the local area.</p>
TSSC (2018), Conservation Advice <i>Calyptorhynchus baudinii</i> Baudin's Cockatoo	
Destruction of nesting and foraging trees from fire events	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>The threat of increased fire occurrence during construction will be managed as per the CSFEMP (Appendix A).</p>
Loss of hollows from European honeybees (<i>Apis mellifera</i>)	<p>The Proposed Action is unlikely to exacerbate this threat.</p> <p>The Proposed Action will result in the clearing up to 10 trees with 14 potentially suitable nest hollows for Black Cockatoo. A general reduction in the amount of tree hollows may increase competition between fauna using the hollows and the European Honeybee. There are no plans to control European Honeybee populations. However, it is unlikely this will affect Baudin's Cockatoos as there is no known nesting in the Proposed Action Area.</p>
Nest hollow shortage due to competition with native bird species	<p>The Proposed Action may exacerbate this threat however, the Proposed Action is designed to maximise use of existing disturbed areas to minimise the loss of breeding habitat.</p> <p>The Proposed Action will clear up to 24 trees with hollows, of which 10 trees have 14 potentially suitable nest hollows for Black Cockatoos. No known nesting trees are present within the Proposed Action Area.</p> <p>Various other bird species (e.g. other Black Cockatoo species and Galahs) and other fauna (e.g. WRP) may compete for hollows with Baudin's Cockatoo are known to occur within the Proposal Area; the general reduction in available hollows may increase competition between bird species.</p>

Plan/conservation advice and threats	Response
	However, it is unlikely this will affect Baudin's Cockatoos as there is no known nesting in the Proposed Action Area, nor breeding records within the local area (within 12 km of Proposed Action Area).
Illegal shooting	The Proposed Action will not exacerbate this threat, as no firearms will be permitted on the construction site.
Phytopathogens (Dieback)	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>Dieback mapping and a Dieback Management Plan exist for the Proposed Action Area (Southern Ecology 2020b). CoE measures will be implemented during construction activities to ensure the risk of dieback spread to Uninfested areas is minimised.</p> <p>Note that the most important habitat tree for Baudin's Cockatoo is Marri, which is not susceptible to dieback.</p> <p>The CSFEMP (Appendix A) also addresses dieback management for the Proposed Action.</p>
DEWHA (2009b), Approved Conservation Advice for <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo)	
Illegal shooting	The Proposed Action will not exacerbate this threat, as no firearms will be permitted on the construction site.
Habitat loss	<p>The Proposed Action may exacerbate this threat; however, the Proposed Action is designed to maximise the use of existing disturbed areas to minimise the loss of habitat.</p> <p>Up to an estimated 37.89 ha of native vegetation that has been assessed as potential Black Cockatoo (breeding, nesting and foraging) habitat will be removed for the Proposed Action. This has been reduced from 62.68.</p>
Nest hollow shortage	<p>The Proposed Action may exacerbate this threat however, the Proposed Action is designed to maximise use of existing disturbed areas to minimise the loss of breeding habitat.</p> <p>A total of up to 236 Suitable DBH Trees will be removed for the Proposed Action including 24 DBH trees, of which 10 trees have 14 potentially suitable nest hollows. No known nesting trees are present within the Proposed Action Area, nor breeding records within the local area (within 12 kms of Proposed Action Area).</p>
Competition from other species	The Proposed Action is unlikely to exacerbate this threat.

Plan/conservation advice and threats	Response
	Various other bird species (e.g., other Black Cockatoo species) and other fauna (e.g., WRP) that may compete for hollows with the Black Cockatoos are known to occur within the Proposed Action Area. No known nesting trees are present within the Proposed Action Area, nor breeding records within the local area (within 12 kms of Proposed Action Area).
Injury or death from <i>Apis mellifera</i> (European Honeybees)	<p>The Proposed Action is unlikely to exacerbate this threat.</p> <p>The Proposed Action will result in the clearing of 10 Suitable DBH Trees with 14 potentially suitable nest hollow for Black Cockatoos. A general reduction in the amount of tree hollows may increase competition between fauna using the hollows and the European Honeybee. There are no plans to control European Honeybee populations.</p>
Western Ringtail Possum	
DPaW (2017), WRP (<i>Pseudocheirus occidentalis</i>) Recovery Plan. Wildlife Management Program No. 58.	
Habitat loss and fragmentation	<p>The Proposed Action may exacerbate this threat.</p> <p>Clearing of up to an estimated 19.18 ha (reduced from 41.2 ha) of potential habitat and impact to the home ranges (to varying degrees) of up to nine individuals estimated to utilise this habitat (up to 0.30 % of the estimated regional population) could result in a minor residual impact associated with the Proposed Action.</p>
Timber harvesting	The Proposed Action is not related to timber harvesting and is not expected to exacerbate this threat.
Fire	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>There is considered to be a low risk of accidental fire as a result of construction activities. The threat of increased fire occurrence during construction will be managed as per the CSFEMP (Appendix A).</p>
Competition for tree hollows	<p>The Proposed Action may exacerbate this threat due to clearing of suitable WRP habitat thereby potentially increasing competition for tree hollows within habitat immediately surrounding the Proposed Action Area.</p> <p>There is approximately 5,128 ha of Core and Supporting habitat available within a 5 km radius of the Proposed Action Area. The Proposed Action will impact 0.37% of Core and Supporting habitat.</p>

Plan/conservation advice and threats	Response
Habitat tree decline	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>Dieback mapping and a Dieback Management Plan exist for the Proposed Action Area (Southern Ecology 2020b). CoE measures will be implemented during construction activities to ensure the risk of dieback spread to uninfested areas is minimised.</p> <p>The CSFEMP (Appendix A) also addresses dieback management for the Proposed Action.</p>
Unregulated relocation of orphaned, injured and rehabilitated WRP	<p>The Proposed Action will not exacerbate this threat.</p> <p>The CSFEMP (Appendix A), specifies an appropriately qualified fauna handler will be on site during clearing of WRP habitat.</p>
Disease	<p>The proposed Action is not expected to exacerbate this threat.</p> <p>Dieback mapping and a Dieback Management Plan exist for the Proposed Action Area (Southern Ecology 2020b). CoE measures will be implemented during construction activities to ensure the risk of dieback spread to uninfested areas is minimised.</p> <p>The CSFEMP (Appendix A) also addresses dieback management for the Proposed Action.</p>
Gaps in knowledge	<p>The Proposed Action will not exacerbate this threat, but rather has minimised this threat, Numerous studies and investigations have been conducted for the Proposed Action (within and surrounding the Proposed Action Area) for the purpose of addressing knowledge gaps.</p>
TSSC (2013), Conservation Advice <i>Pseudocheirus occidentalis</i> Western Ringtail Possum	
Groundwater depletion and altered hydrology	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>A Drainage Strategy will be developed with the main objectives of maintaining the water cycle balance within the Proposed Action Area whilst maintaining surface and groundwater quality. Drainage design will be undertaken during detailed design to ensure pre-development flows are maintained within the Proposed Action Area.</p>

Plan/conservation advice and threats	Response
Land clearing and habitat fragmentation caused by urbanisation	<p>The Proposed Action may exacerbate this threat.</p> <p>Clearing of up to an estimated 19.18 ha potential habitat for an estimated nine WRP individuals (up to 0.30% of the estimated regional population) could result in a minor residual impact associated with the Proposed Action.</p>
Fire	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>There is considered to be a low risk of accidental fire as a result of construction activities. The threat of increased fire occurrence will be managed as per the CSFEMP (Appendix A).</p>
Tree decline and insect outbreaks	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>Dieback mapping and a Dieback Management Plan exist for the Proposed Action Area (Southern Ecology 2020b).</p> <p>The CSFEMP (Appendix A) also addresses hygiene management for the Proposed Action. CoE measures will be implemented during construction activities to ensure the risk of dieback and insect outbreaks are minimised.</p>
Competition for tree hollows	<p>The Proposed Action may exacerbate this threat due to clearing of suitable WRP habitat thereby potentially increasing competition for tree hollows within habitat immediately surrounding the Proposed Action Area.</p> <p>There is approximately 5,128 ha of Core and Supporting habitat available within a 5 km radius of the Proposed Action Area. The Proposed Action will impact 0.37% of Core and Supporting habitat.</p>
Logging	<p>The Proposed Action is not related to logging so will not exacerbate this threat.</p>
Myrtle rust	<p>The Proposed Action is not expected to exacerbate this threat.</p> <p>The CSFEMP will implement hygiene management for construction of the Proposed Action to minimise risk of the impact of disease</p>
Injury and mortality due to vehicle strike	<p>The Proposed Action may exacerbate this threat. Speed limits between 40-80 km/h will be adhered to during construction as per the CSFEMP to minimise likelihood of vehicle strike (Appendix A).</p> <p>Revegetation designs shall not include WRP habitat within 10 m of the road to reduce the risk of vehicle collision</p>

8. Economic and Social Matters

8.1 Regional Context

The City of Albany is the oldest European settlement in the State and provides significant economic and social benefits to the Great Southern region of WA through trade, tourism, health and education services. Albany is one of two key South West Regional Centres (along with Bunbury). Albany is a major economic, retail and administrative centre, servicing around 60,000 people in the region. Albany's Gross Regional Product is estimated at \$2.2 billion, which represents 0.9% of WA's Gross State Product.

The Port of Albany is the seventh busiest port in WA by volume, and is WA's largest regional importer of agricultural fertiliser. The Port of Albany is the largest regional exporter by volume of grain, woodchips, and timber products, and hosts the second largest number of cruise ships in regional WA after Broome.

The City of Albany is a major contributor and facilitator of local tourism. Albany hosts over 455,000 visitors annually, with almost 46,000 international visitors. Nearly 90% of those international visitors are visiting for holiday or leisure reasons. Cruise ship visits in 2018 in Albany accounted for over half of all total cruise ship visits to southern ports in WA and Albany was the second busiest regional port behind Broome. Tourism WA figures estimate that cruise shipping injects \$9.1 million to the South West, Great Southern, and Goldfields-Esperance regions of WA. Cruise ships in 2017-18 brought almost 17,000 visitors to Albany.

Albany is the Southern gateway to the wine region of WA, as international travellers enter through the port, and domestic tourists drive in from the east.

The current mix of tourist, local, and freight traffic in Albany, with no separation of traffic streams, is having an adverse impact on public safety, amenity, tourism and urban development. Future infrastructure construction within the Port of Albany and the wider region is reliant on heavy vehicle traffic, and the ability for increased heavy vehicle traffic to not burden the City of Albany will have a significantly wider benefit.

8.2 Key Proposal Benefits

The current access to the Port of Albany through the Albany Central Business District is inefficient for transport due to the major intersections present and local traffic conditions. It also represents a potential safety concern, due to passing through residential areas, commercial and light industrial zones. The ARR alignment will provide an alternative route for heavy vehicles accessing the Port of Albany and facilitate future growth in agricultural production and mining across the Great Southern Region by improving freight productivity and access to freight gateways. In addition to improving connectivity between major freight infrastructure, airports, commercial and industrial areas, the construction of the ARR will also reduce the number of heavy vehicles sharing roads with local residents and tourists.

The key benefits expected through development of the Proposal for the City of Albany and Great Southern Region are summarised below.

Improve freight capacity, efficiency and productivity

While the proposed Albany Ring Road creates a longer freight route for this key freight movement, this longer route is safer and more efficient for loaded and unloaded heavy vehicles.

Supply chain, freight productivity and reliability will be improved through increased average speed of freight along the new route. The region's competitiveness and development

opportunities will improve through efficiencies in freight movement, particularly the types of cargo that support existing and emerging projects in the Great Southern Region of WA. The improved connectivity will contribute to efficiencies in the supply and demand of goods thereby improving the region's global competitive advantage.

Reduce urban congestion now and into the future

Current access to the port, particularly from the eastern approach to Albany is significantly compromised by haulage vehicles needing to traverse through the Albany township to reach the port. This creates safety, efficiency, traffic and air quality issues within Albany.

The ARR will reduce travel time, fuel consumption and general traffic congestion. It will also be of benefit by providing an alternative route in and out of Albany in the event of an emergency situation or incident.

Improve road safety in line with the State "Towards Zero" policy

Improvements in traffic safety are achievable through the diversion of regional traffic, including heavy freight vehicles, onto a fit for purpose ring road around the City.

Maximise sustainability through economic, social and environmental responsibility

Developing detailed mitigation and management measures during the planning and development of the Proposal will ensure that opportunities for environmental, social and economic enhancement within and outside of the Proposal corridor are maximised. The Proposal supports economic development through the provision of more efficient freight infrastructure in Great Southern Region of WA.

Improve amenity for the community, tourists and road users

Improving the general traffic congestion, in particular in the Albany metropolitan area, will enhance residential values and opportunities for tourism. Impacts from noise and pollution in the inner City will also be reduced.

By removing the volume of traffic from the city core (in particularly the large roundabout on Albany Highway) the route provides significant strategic land use planning, road safety and urban amenity benefits.

Create value through affordable infrastructure

This Proposal represents a significant investment and it is critical that primary benefits for road safety, freight capacity and urban congestion are realised in an affordable and socially and environmentally responsible way.

Regional Employment

The ARR is the largest road infrastructure project ever delivered in the Great Southern Region. An estimated 1000 employment opportunities will be generated across the entire project lifecycle, with a Local Industry Participation Plan tailored to give local businesses opportunities to get involved in the project, generating employment and building their skill base.

8.3 Financial costs and benefits

A rapid appraisal was completed to quantify the costs and benefits of the project. The cost of the project is estimated at \$175 million. This rapid appraisal identified total benefits of the project ranging between \$61.8 and \$159.5 million.

8.3.1 Basis for estimation

To calculate the cost benefit analysis, the rapid appraisal took into account both user and non-user benefits by measuring the change in costs between the current scenario without ARR and the project case (the Proposed Action), with ARR. Model benefits were calculated using the outputs of the Albany Transport Model by comparing traffic movements in no-project and project scenarios.

The costs were quantified based on capital expenditure and operating expenditure (for a 30-year lifecycle).

Benefits were based on the following:

- Travel time saved – key inputs included:
 - The vehicle hours travelled including travel link type and number of trips per vehicle class
 - Value of time for each vehicle class, taken from Austroads data indexed to Q2 2017 prices using ABS average weekly earnings for drivers and passengers with a consumer price index included for freight
 - Average vehicle occupancy rates based on the Transport and Infrastructure Council (2016) data.
- Vehicle operating costs by vehicle type
- Reduction in costs associated with accidents - utilising local crash rates for different road types and crash cost valuation parameters from the Transport and Infrastructure Council (2016)
- Reduction in environmental costs – air pollution, greenhouse gas emissions, noise, water, natural and landscape, urban separation and upstream and downstream impacts. These calculations were based on network wide changes in vehicle kilometres travelled, environmental valuations from Austroads (2012) and number of tonnes carried by trucks
- Residual value of the asset.

8.4 Stakeholder consultation

Stakeholder consultation was done in association with the planning and design works, starting in 2006 when the alignment definition works began. Discussions were initially limited to government agencies and heritage groups.

Stakeholder consultation was reinitiated in 2019 when the Proposed Action was identified as an option for funding and construction and the Construction and Stakeholder Engagement Plan was actioned. Stakeholder and community engagement is continuing with landowners and local residents, local community, environmental groups, local government authorities and State Government agencies. A summary of the recent stakeholder consultation is provided in Table 8-1, including engagement with indigenous stakeholders. Key concerns raised by consultation are detailed in Table 8-2.

8.4.1 Aboriginal heritage consultation

The project has had both ethnographic and archaeological surveys conducted (Brad Goode and Associates, 2006). Consultation with aboriginal groups is detailed in Table 8-1.

Table 8-1 Recent stakeholder consultation

Stakeholder	Date	Consultation type	Outcome
Formally Department of Environment and Energy (Cwlth) (now DAWE)	8 February 2019	Proposed Action briefing/presentation.	Status update.
City of Albany.	16 April 2019	Proposed Action briefing to Council following inclusion of Proposed Action funding in both State and Federal Budgets.	Status update.
General Community.	May 2019	Minister announces funding Proposed Action update on Main Roads website.	General awareness.
Great Southern Development Commission.	24 May 2019	Briefing to Board on Main Roads Proposed Actions including ARR.	Status update.
City of Albany Department of Planning, Lands and Heritage Great Southern Development Commission.	19 June 2019	Key Stakeholder Project Development Update.	Status update.
Department of Planning, Lands and Heritage Department of Housing.	19 July 2019	Meeting.	Discuss accesses to/ from ARR. Seek advice on current and future planning around ARR.

Stakeholder	Date	Consultation type	Outcome
Great Southern Major Projects Planning Group.	3 September 2019	Briefing or presentation.	Present the latest concept design developments.
Letters to Landowners.	September 2019	Letter.	Seek approval to enter properties for geotechnical investigations.
City of Albany Council.	September 2019	Briefing to Council (prior to Elections) on current status of Proposed Action.	Status update.
Albany Chamber of Commerce and Industry.	16 September 2019	Presentation on ARR and contractor opportunities.	Database of local contractors for future communication.
City of Albany (including airport) Department of Planning, Lands and Heritage Public Transport Authority Southern Ports Department of Transport Freight Industry Timber Roads Operations Group Plantagenet Shire President / Southern Haulage Australian Bluegum Plantations PF Olsen Australia Albany Plantation Export Company Great Southern Development Commission	23 September 2019	Stakeholder workshop.	Determine any changes required to the design. Collate opportunities for investigation. Seek early involvement in informing the decision making in the planning and development process. Review issues raised in previous engagement. Identify new issues and opportunities, including

Stakeholder	Date	Consultation type	Outcome
<p>DBCA</p> <p>Department of Fire and Emergency Services Forest Industries Federation WA</p> <p>WA Police (Great Southern) CBH</p> <p>Albany Chamber of Commerce Shire of Denmark</p> <p>Regional Development Australia Albany Chamber of Commerce Timber Resources Operations Group The Amazing South Coast (tourism)</p> <p>Indigenous representation</p>			<p>sustainability and legacy.</p> <p>Discussing input timelines (milestones). Manage expectations.</p> <p>Seek input into wider stakeholder and community engagement program.</p>
EPA	October 2019	Proposed Action briefing/presentation, update on anticipated approval pathway, and intention to refer sections to EPA for transparency and Proposed Action certainty for Stage 2 and Stage 3.	Main Roads to refer proposal to EPA under the <i>Environmental Protection Act 1986</i> (EP Act).
DBCA	October 2019	Proposed Action briefing/presentation.	No concerns noted. DBCA advised Main Roads that consultation in relation to the Bibbulum track will need to be considered and preserving any WRP corridors should be considered in planning.

Stakeholder	Date	Consultation type	Outcome
DWER	October 2019	Proposed Action briefing/presentation and discussions on submitted bed and banks permit application and need for further applications.	No concerns noted. DWER advised that locations where bed and banks permits would be required would be communicated to Main Roads.
Landowners	October 2019	Letters and meetings.	Provide latest design. Seek early advice regarding potential issues.
Torbay Catchment Group Wildflower Society WA DBCA South Coast Region NRM South Coast NRM	6 November 2019	Proposed Action briefing/presentation including background and history, ARR stages, construction elements and design, Proposed Action timeline and environmental aspects. Specific information on clearing, WRP and Black Cockatoos.	Main Roads noted concerns, requested and received additional information on potential WRP management and conservation opportunities. Opportunities for supporting local environmental groups revegetation work will be explored.
Albany Agricultural Show	8-9 November 2019	Stand in exhibition pavilion.	General community support for the Proposed Action.

Stakeholder	Date	Consultation type	Outcome
			Feedback forms and comments documented.
<p>South Coast NRM</p> <p>Torbay Catchment Group</p>	19 December 2019	<p>Email correspondence to inform the groups of the submission of the EPA Referral Document.</p> <p>The inclusion of structures to maintain fauna movement in engineering designs, opportunities for interested parties in future to engage in monitoring and maintenance of structures and in revegetation works.</p> <p>A commitment by Main Roads and contractors to maintain contact for local input and involvement in the Proposed Action.</p>	Arrangement to meet with Torbay Catchment Group.
Denmark Environmental Group and Albany Environmental Group	21 January 2020	Discussed Stages 2, 3a and 3b.	<p>Confirmation that fauna underpasses have been considered and included in the Proposed Actions.</p> <p>Acid Sulphate Soils (ASS) have been</p>

Stakeholder	Date	Consultation type	Outcome
			considered, particularly for the Stage 2 section of the Proposed Action, a risk assessment and management has been completed to ensure the effective management
Minister's briefing in Albany	24 February 2020	Radio, television, social media, email and joint Ministerial Media Statement.	Widespread support for the Proposed Action with some concerns raised about Lancaster Road.
Torbay Catchment Group	21 April 2020	Proposed Action overview, contract model, reporting structure, proposed environmental reference group	Discussed rope bridges and potential suitable locations. Agreed that discussion and relationship was mutually beneficial, the group look forward to receiving more information about the Proposed Action as it evolves. Main Roads look forward to continued relationship with the group.

Stakeholder	Date	Consultation type	Outcome
Torbay Catchment Group Oyster Harbour Catchment Group Denmark Community Environmental Centre Albany Environmental Centre DBCA Albany District Wildflower Society South Coast NRM	29 April 2020	Invitation to the Environmental Reference Group	Personal invitation sent to contacts within each group.
Landowners	April 2020	Meetings.	Discuss land acquisition
Landowners	May 2020	Telephone calls and meetings	Discuss land acquisition
Albany Chamber of Commerce and Industry	8 May 2020	Webinar presentation	Provide update on scope and opportunities for local industry participation
Businesses on Lower Denmark Road	11 May 2020	Letter	Provide update and seek feedback on proposed access changes
Great Southern Development Commission	11 May 2020	Briefing	Proposed Action update and advice re. local industry participation opportunities

Stakeholder	Date	Consultation type	Outcome
General community	25 May 2020	Proposed Action Update Newsletter	General awareness of Proposed Action status and delivery timings
General community	25 May 2020	Construction Reference Group	Open nomination process for Construction Reference Group (to comprise of approx. 15 residents from along alignment)

Stakeholder	Date	Consultation type	Outcome
City of Albany (including airport) Department of Planning, Lands and Heritage Public Transport Authority Southern Ports Department of Transport Freight Industry Timber Roads Operations Group Plantagenet Shire President / Southern Haulage Australian Bluegum Plantations PF Olsen Australia Albany Plantation Export Company Great Southern Development Commission DBCA Department of Fire and Emergency Services Forest Industries Federation WA WA Police (Great Southern) CBH Albany Chamber of Commerce Shire of Denmark	25 May 2020	Email update (meetings restricted due to COVID 19)	Provide update on the status of procurement and Proposed Action delivery
Regional Development Australia Albany Chamber of Commerce Timber Resources Operations Group The Amazing South Coast (tourism) Indigenous representation Public Utilities Network Group	8 June 2020	Presentation	Provide update on the status of procurement and Proposed Action delivery
Albany Ring Road Environmental Reference Group Torbay Catchment Group	24 June 2020	Proposed Action briefing/presentation, update	Main Roads to advise reference group members when the

Stakeholder	Date	Consultation type	Outcome
<p>Oyster Harbour Catchment Group</p> <p>Denmark Community Environmental Centre Albany Environmental Centre</p> <p>DBCA Albany District Wildflower Society</p> <p>South Coast NRM</p>		on anticipated approval pathway for Stages 2 and 3b	<p>Proposed Action is referred to DAWE.</p> <p>Main Roads to consult further with members regarding potential fauna crossing points and monitoring opportunities.</p>
General Community	15 July 2020	Media statement e-shot	Update on Proposed Action status and preferred proponent announcement
<p>City of Albany (including airport)</p> <p>Department of Planning, Lands and Heritage Public Transport Authority</p> <p>Southern Ports Department of Transport Freight Industry</p> <p>Timber Roads Operations Group</p> <p>Plantagenet Shire President / Southern Haulage Australian Bluegum Plantations</p> <p>PF Olsen Australia</p> <p>Albany Plantation Export Company</p> <p>Great Southern Development Commission</p> <p>DBCA</p> <p>Department of Fire and Emergency Services Forest Industries Federation WA</p>	15 July 2020	Email update	Preferred proponent update

Stakeholder	Date	Consultation type	Outcome
WA Police (Great Southern) CBH Albany Chamber of Commerce Shire of Denmark Regional Development Australia Albany Chamber of Commerce Timber Resources Operations Group The Amazing South Coast (tourism) Indigenous representation			
Albany Ring Road Environmental Reference Group Torbay Catchment Group Oyster Harbour Catchment Group Denmark Community Environmental Centre Albany Environmental Centre DBCA Albany District Wildflower Society South Coast NRM	27 July 2020	Email update	Main Roads advised that EPA will not assess the ARR Proposed Action
General community	24 August 2020	Media statement / coverage e-shot Social media updates	Contract award and formal commencement of works
City of Albany	30 September 2020	Meeting	In principle support for Phase 1 design enhancements

Stakeholder	Date	Consultation type	Outcome
			Understand the heritage value of the World
Department of Planning, Lands and Heritage (DPLH)	14 October 2020	Meeting	War Two oil storage tanks adjacent to alignment
Albany RSL	20 October 2020	Meeting	Discuss opportunities to enhance the area around the World War Two oil storage tanks to create a Proposed Action legacy

Table 8-2 Key concerns raised during consultation

Stakeholder	Forum	Concern raised	Main Roads response
Albany Community Environment Centre Inc Denmark Environmental Centre Inc	Meeting, email and written correspondence	Wildlife crossings, offsets, ASS.	Presentation on fauna habitat assessments and opportunities for fauna linkage, discussion on offsets, discussion on approach to ASS, geotechnical studies and acid sulfate soil investigations and corresponding compliance frameworks of the Proposed Action.
Department of Biodiversity, Conservation & Attractions	Proposed Action briefing/presentation	Interactions with Bibbulmun track. WRP corridors.	Main Roads advised that the Bibbulmun track would be maintained and consultation and communication is ongoing. Maintenance of any vegetated corridors will be considered during design stage. Management measures will be implemented and structures (e.g., rope bridges) will be assessed as management options.
Torbay Catchment Group	Proposed Action briefing/presentation Meeting	The creation of a Genetic Barrier and what measures would be taken to maintain corridors and linkages. The construction of a wide road would make an existing barrier even larger. Impacts to WRPs via habitat loss and vehicle strikes.	Main Roads noted these concerns and advised that management actions would be devised and implemented where appropriate to minimise impacts. Information obtained via flora, vegetation and fauna surveys had been sent to design engineers to identify areas where structures may be effective. Ongoing consultation planned to discuss optimal crossing locations. Main Roads requested additional (anecdotal) information on roadkill sites from the Torbay Catchment Group that may be useful when deciding on mitigation measures (i.e. structure locations). Opportunities to work with the Torbay Catchment Group on their WRP habitat revegetation works would be explored.
Wildflower Society of WA	Proposed Action briefing/presentation	Cumulative impacts of current and future projects on flora species and creation of genetic barrier.	Main Roads explained results of flora surveys and requested suggested management options to maintain transfer of genetic material via email.

Stakeholder	Forum	Concern raised	Main Roads response
South Coast Natural Resource Management	Proposed Action briefing/presentation	Dieback.	Main Roads advised of dieback assessment results and management measures to be implemented.
Local resident	Stand in exhibition pavilion	Will local school bus route be impacted?	Resident advised that the Public Transport Authority is a key stakeholder and has provided input into the Proposed Action. Any changes that may impact bus routes will be communicated by the Public Transport Authority (PTA).
Local resident	Stand in exhibition pavilion	Impacts to local wildlife.	Environmental survey finding and impacts explained. Area of concern is not within alignment. Main Roads to provide additional fact sheet information following submission of EPA referral documentation.
Landowner within alignment	Stand in exhibition pavilion	Access to properties on either side of Lower Denmark road has been severed.	Road design, alignment and access arrangements discussed. Landowner provided with additional information on land acquisition process.
Local residents	Tel / email contact	Access to Ring Road and South Coast Highway from Lowanna Drive / George Street	Road design, alignment and access arrangements discussed. Concerns noted and will be examined during detailed design.
Local residents	Tel / email contact	Access from Lancaster Road to Albany Ring Road	Road design, alignment and access arrangements discussed. Concerns noted however, connection cannot be included for safety reasons. Alternative access points have been discussed.
Environmental Reference Group	Briefing session – 24 June	Request for possum habitat study	Main Roads determined a desktop study would be most appropriate at this time – update to be provided.

Stakeholder	Forum	Concern raised	Main Roads response
Albany RSL	Meeting – 20 October	Impact of the Proposed Action on the World War Two oil storage tanks	The Proposed Action will have negligible impact. There is also a unique opportunity to enhance the area around the tanks to improve access and create a lasting Proposed Action legacy.

9. References

- Austrroads (2012). *Guide to Project Evaluation: Part 4 – Project evaluation data*. Sydney: Austrroads
- Biota (2018). *Albany Ring Road Project: Western Ringtail Possum Assessment*. Biota Environmental Sciences Pty Ltd. Unpublished report for Main Roads Western Australia. November 2018.
- Biota (2019a). *Albany Ring Road Black-Cockatoo Habitat Assessment*. Biota Environmental Sciences Pty. Ltd, Leederville, W.A. Draft report prepared for Main Roads Western Australia. October 2019.
- Biota (2019b). *Albany Heritage Park Trail: Western Ringtail Possum Impact Assessment*. Unpublished report prepared for City of Albany. Leederville, Western Australia, Biota Environmental Sciences Pty Ltd.
- Biota (2020). *Albany Ring Road Western Ringtail Possum Assessment*. Unpublished report prepared for Main Roads Western Australia, May 2020.
- Brad Goode and Associates (2006). *An Aboriginal Heritage Survey for the Albany Ring Road, Stages 2 & 3*. Western Australia, Brad Goode and Associates, Dunsborough, W.A. Report prepared for Main Roads Western Australia, 2006.
- Burbidge, A.A. & Zichy-Woinarski, J. (2017). *Pseudocheirus occidentalis*. The IUCN Red List of Threatened Species 2017: e.T18492A21963100. [3.RLTS.T18492A21963100.en](https://www.iucnredlist.org/species/18492/21963100).
- CALM (2003). *Phytophthora cinnamomi and disease caused by it*. Volume 1-Management Guidelines. Department of Conservation and Land Management, Government of Western Australia. http://www.calm.wa.gov.au/projects/pdf_files/DBmanual2003.pdf
- Chapman, T. (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, Western Australia.
- DEWHA (2009a). *Approved Conservation Advice for Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)*. Canberra: Department of the Environment, Water, Heritage and the Arts.
- DEWHA (2009b). *Significant impact guidelines for the vulnerable western ringtail possum (Pseudocheirus occidentalis) in the southern Swan Coastal Plain, WA*.
- DPaW (2013). *Carnaby's Cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia.
- Department of Parks and Wildlife (DPaW) (2015a). *Procedures to minimise the risk to Western Ringtail Possums during vegetation clearing and building demolition*, Perth, Western Australia.
- Department of Parks and Wildlife (DPaW). (2015b). *How to design and place artificial hollows for Carnaby's cockatoo*. Perth Department of Parks and Wildlife
- DPaW (2017). *Western Ringtail Possum (Pseudocheirus occidentalis) Recovery Plan*, Wildlife Management Program No. 58. Perth: Department of Parks and Wildlife.
- DSEWPaC (2012a). *EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species: Carnaby's Cockatoo Calyptorhynchus latirostris; Baudin's Cockatoo Calyptorhynchus baudinii; Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso*. Department of Sustainability, Environment, Water, Population and Communities.

- DSEWPaC (2012b). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Retrieved from [2d7862bf87e7/files/offsets-policy_2.pdf](https://catalogue.data.wa.gov.au/dataset/2d7862bf87e7/files/offsets-policy_2.pdf)
- DSEWPaC (2012c). *Offsets Assessment Guide Excel Spreadsheet*. Canberra, Australian Capital Territory: Department of Sustainability, Environment, Water, Population and Communities.
- GoWA (2019a). *Black Cockatoo Breeding Sites – Buffered*. Retrieved November 2020 from <https://catalogue.data.wa.gov.au/dataset/black-cockatoo-breeding-sites-buffered>
- GoWA (2019b). *Black Cockatoo Roosting Sites – Buffered*. Retrieved November 2020 from <https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered>
- GoWA (2019c). *Soil Landscape Mapping – Best Available*. Retrieved November 2020 from <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-best-available>
- GoWA (2019d). *DBCA Statewide Vegetation Statistics*. Retrieved January 2021 from <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>
- Main Roads (2020). *Albany Ring Road Stage 2 and 3b: Western Ringtail Possum Management Plan*. Unpublished report, March 2020.
- Main Roads (2021) *Mitchell Freeway Extension – Hester Avenue to Romeo Road, Wanneroo Road Duplication – Dunstan Road to Trian Road, Vegetation and Fauna management Plan*. Unpublished report prepared for Main Roads Western Australia, April 2021.
- Southern Ecology (2018). *Biological Survey, Albany Ring Road*. Report prepared for Main Roads Western Australia, February 2018.
- Southern Ecology (2019). *Memorandum to Main Roads Western Australia, Defining habitat categories for Western Ringtail Possum in the South Coast population*. Unpublished memorandum prepared for Main Roads Western Australia, October 2019
- Southern Ecology (2020a). *Biological Survey: Albany Ring Road*. Unpublished report prepared for Main Roads Western Australia, January 2020.
- Southern Ecology (2020b). *Phytophthora Dieback Management Plan: Albany Ring Road*. Unpublished report prepared for Main Roads Western Australia, April 2020.
- TSSC (2013). *Conservation Advice Pseudocheirus occidentalis Western Ringtail Possum, advice.pdf*, accessed 12 January 2021
- TSSC (2018), *Conservation Advice Calyptorhynchus baudinii Baudin's cockatoo*. Canberra: Department of the Environment and Energy.
- Van Helden B. E., Speldewinde P. C., Close P. G. & Comer S. J. (2018) *Use of urban bushland remnants by the western ringtail possum (Pseudocheirus occidentalis): short term home-range size and habitat use in Albany, Western Australia*. *Aust. Mammal.* **40**, 563 173-80.
- Yokochi, K. and Bencini, R. (2015). *A remarkably quick habituation and high use of a rope bridge by an endangered marsupial, the western ringtail possum*. *Nature Conservation*, 11:79-94.