



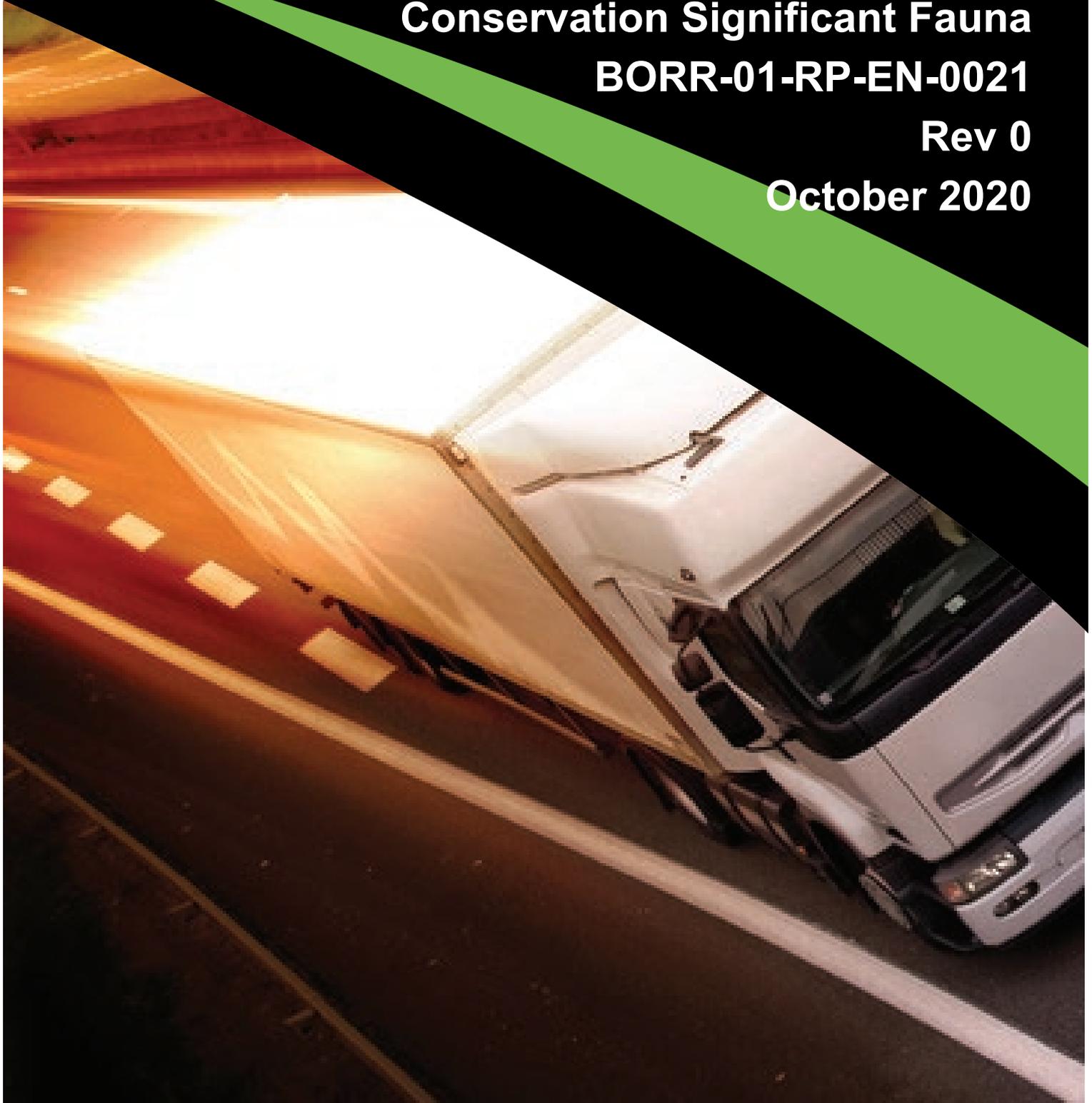
**Bunbury Outer Ring Road
Northern and Central Sections
(EPBC 2019/8471)**

**Action Management Plan -
Conservation Significant Fauna**

BORR-01-RP-EN-0021

Rev 0

October 2020



<i>Document Control</i>					
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A	08/2020	Draft for Main Roads Review	BORR Team	FH	FH
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EXECUTIVE SUMMARY

Bunbury Outer Ring Road Project

Main Roads Western Australia (Main Roads) is proposing to construct and operate the Northern and Central sections of the Bunbury Outer Ring Road (BORR) Project. The BORR Project is a planned Controlled Access Highway linking the Forrest Highway and Bussell Highway. The completed project will provide a high standard route for access to the Bunbury Port, improve road user safety and facilitate proposed development to the east of the City of Bunbury. The BORR Project provides an effective bypass of Bunbury for inter-regional traffic. The proposed BORR Project comprises three sections:

- 'BORR Northern Section' – Forrest Highway to Boyanup-Picton Road
- 'BORR Central Section' – Boyanup-Picton Road to South Western Highway (an existing four km section which was completed in May 2013, along with a three km extension of Willinge Drive southwards to South Western Highway)
- 'BORR Southern Section' – South Western Highway (near Bunbury Airport) to Bussell Highway.

The proposed BORR Project occurs within the City of Bunbury and Shires of Capel, Dardanup and Harvey. Construction of the BORR Project is anticipated to commence in year 2021 and continue for a period of up to approximately three years.

Bunbury Outer Ring Road Northern and Central Sections Proposal

This document refers to BORR Northern and Central Sections only (the Proposal). The Proposal includes the construction and operation of 19 km of new freeway standard dual carriageway and associated bridges, interchanges and other road infrastructure. The Proposal is located approximately 200 km south of Perth and, at its closest point, approximately six km south-east of Bunbury.

The 625 ha Proposal Area occurs within the City of Bunbury and Shires of Capel, Dardanup and Harvey. Approximately 87 % of land within the Proposal Area is cleared for agriculture. Pockets of native vegetation occur within the Proposal Area in road reserves, along sections of the Collie, Ferguson and Preston Rivers, or as isolated patches on private properties. The Proposal Area excludes areas within BORR Central Section which was constructed in 2013.

The Proposal was formally referred to the then Commonwealth Department of the Environment and Energy (DoEE) on 25 June 2019 (EPBC Act referral 2019/8471) as a potential Controlled Action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to impacts on Matters of National Environmental Significance (MNES). The DoEE provided advice on 18 October 2019 that the Proposal is considered a Controlled Action and that it would be assessed by Preliminary Documentation (DoEE, 2019).

Under Commonwealth government reforms announced in December 2019, DoEE was consolidated with the Department of Agriculture to form the new Department of Agriculture, Water and Environment (DAWE), effective 1 February 2020. The Additional Information Request for Preliminary Document (BORR IPT, 2020a) and this Action Management Plan will therefore be submitted to DAWE for assessment.

Purpose of this AMP

This Action Management Plan (AMP) has been prepared to support the documentation prepared to address the DAWE request of 18 October 2019 for further information for assessment of the Proposal.

This document sets out the environmental management actions to manage, monitor and mitigate the direct and potential indirect impacts of the Proposal on the following fauna taxa listed as 'Threatened' MNES:

- Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) (Critically endangered)
- Carter's Freshwater Mussel (*Westralunio carteri*) (CFM) (Vulnerable)
- Black-stripe Minnow (*Galaxiella nigrostriata*) (BSM) (Endangered)

Also included in this plan is the State-listed South-western Brush-tailed Phascogale (*Phascogale tapoatafa*) (BTP) (listed as Conservation Dependent (Schedule 6) under the Western Australian *Biodiversity Conservation Act 2016*).

This AMP has been prepared consistent with the following guidance documentation:

- Department of the Environment (DotE) (2014) *Environmental Management Plan Guidelines*
- Department of the Environment and Energy (DoEE) (2019) *Action Management Plan Criteria*.

The AMP structure and content has been prepared to align to DotE (2014). The content has been extended to incorporate the additional criteria as outlined by DoEE (2019).

A summary of the management approach for each conservation significant species is presented in Table E 1 to E 3.

Table E 1 Summary of approach for WRP and BTP

ENVIRONMENTAL OBJECTIVE	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise impacts to WRP and BTP	Management during construction for risk of impact WRP and BTP individuals	Proposal-specific monitoring: <ul style="list-style-type: none"> • To verify efficacy of management controls • For impacts to WRP and BTP individuals
Minimise area of WRP and BTP habitat cleared during construction	Standard construction management to control construction clearing	Standard construction monitoring to verify construction clearing
No significant indirect impacts to WRP or BTP habitat adjacent to the Proposal attributable to Proposal implementation	Proposal-specific management to: <ul style="list-style-type: none"> • Control construction clearing which may introduce or spread WoNS • Undertake weed control where WoNS are identified • Control construction clearing which may introduce or spread <i>Phytophthora</i> Dieback Standard construction management to: <ul style="list-style-type: none"> • Control potential bushfire ignition sources construction clearing • Control construction clearing • Control groundwater water abstraction consistent with WA Government water supply approvals 	Proposal-specific monitoring to verify: <ul style="list-style-type: none"> • Quality of adjacent retained habitat • Construction clearing which may introduce or spread WoNS • Efficacy of applied controls • Construction clearing which may introduce or spread <i>Phytophthora</i> Dieback Standard construction monitoring to verify: <ul style="list-style-type: none"> • Management of potential ignition sources and fire response during construction clearing • Construction clearing • Groundwater water abstraction consistent with WA Government water supply approvals

Table E 2 Summary of approach for CFM

ENVIRONMENTAL OBJECTIVE	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise impacts to CFM	Proposal-specific management potentially required prior to and / or during construction	Proposal-specific monitoring to verify CFM presence / absence
No significant indirect impacts to CFM or habitat adjacent to the Proposal attributable to Proposal implementation	Proposal-specific management: <ul style="list-style-type: none"> • To control sedimentation and erosion during construction • Of hydrocarbon storage during construction Standard construction management to: <ul style="list-style-type: none"> • Control potential bushfire ignition sources construction clearing 	Proposal-specific monitoring to assess: <ul style="list-style-type: none"> • Water quality Standard construction monitoring to verify: <ul style="list-style-type: none"> • Management of potential ignition sources and fire response during construction clearing

Table E 3 Summary of approach for BSM

ENVIRONMENTAL OBJECTIVE	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise area of BSM habitat cleared during construction	Standard construction management to control construction clearing	Standard construction monitoring to verify construction clearing
No significant indirect impacts to BSM habitat adjacent to the Proposal attributable to Proposal implementation	Proposal-specific management: <ul style="list-style-type: none"> • To control sedimentation and erosion during construction • Of hydrocarbon storage during construction Standard construction management to: <ul style="list-style-type: none"> • Control groundwater water abstraction consistent with WA Government water supply approvals • Maintain habitat connectivity for BSM • Control potential ignition sources construction clearing 	Proposal-specific monitoring to assess: <ul style="list-style-type: none"> • Water quality • Water levels Standard construction monitoring to: <ul style="list-style-type: none"> • Verify groundwater water abstraction consistent with WA Government water supply approvals • Assess habitat connectivity • Manage potential ignition sources and fire response during construction clearing

GLOSSARY OF TERMS

DEFINED TERMS	
TERM	DEFINITIONS
BORR Sections	<p>The BORR Project includes three sections (North, Central and South), which are referred to as:</p> <p>The ‘BORR Northern Section’ – section between Forrest Highway (north) and Boyanup-Picton Road (south)</p> <p>The ‘BORR Central Section’ – section that has already been constructed, between Boyanup-Picton Road (north) and South Western Highway (south)</p> <p>The ‘BORR Southern Section’ – section between South Western Highway (north) and Bussell Highway (south).</p>
Main Roads	Main Roads Western Australia
Proposal	Main Roads proposes to construct the Bunbury Outer Ring Road (BORR) Northern and Central Sections from Forrest Highway (north) to South West Highway (south), at its closest point approximately six km from East Bunbury, in the South West Region of Western Australia (WA) (referred to as the Proposal).
Proposal Area	<p>The Proposal Area is located within the City of Bunbury and Shires of Dardanup and Harvey, at its closest point approximately six km from East Bunbury and 200 km south of Perth.</p> <p>The Proposal Area extends 19 km between Forrest Highway and South Western Highway.</p> <p>The Proposal Area covers 625 hectares (ha) and includes existing road reserves, agricultural land and native vegetation.</p>
Site	As per the Proposal Area.
Survey Area	The Survey Area includes all sites of significance that occur both within the Proposal Area and wherever relevant, outside the Proposal Area, in order to determine both direct and indirect impacts.
ACRONYMS	
ANZECC	Australian and New Zealand Environment and Conservation Council
BC Act	<i>Biodiversity Conservation Act 2016</i>
BORR	Bunbury Outer Ring Road
BORR IPT	Bunbury Outer Ring Road Integrated Project Team
BSM	Black-stripe Minnow
BTP	South-western Brush-tailed Phascogale
CEMP	Construction environmental management plan

CFM	Carter's Freshwater Mussel
DAWE	Department of Agriculture, Water and the Environment
DBH	Diameter Breast Height
DoEE	Department of the Environment and Energy
DPaW	Department of Parks and Wildlife
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
MNES	Matters of National Environmental Significance
WA	Western Australia
WoNS	Weeds of National Significance
WRP	Western Ringtail Possum

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COVER PAGE AND DECLARATION OF ACCURACY

- **EPBC number:** 2019/8471
- **Project name:** Bunbury Outer Ring Road Northern and Central Sections
- **Action management plan title:** Bunbury Outer Ring Road Northern and Central Sections (EPBC 2019/8471) Action Management Plan - Conservation Significant Fauna BORR-01-RP-EN-0021 REV 0 October 2020
- **Proponent /approval holder and ACN or ABN:** Main Roads Western Australia, ABN 50860676021
- **Proposed/approved action:** Construction and operation of the Northern and Central sections of the Bunbury Outer Ring Road (BORR) Project
- **Location of the action:** Forrest Highway to South Western Highway, within the City of Bunbury and Shires of Capel, Dardanup and Harvey
- **Date of preparation of the action management plan:** August 2020
- **Person accepting responsibility for the action management plan:** Martine Scheltema, Manager Environment, Main Roads Western Australia

Declaration of accuracy

I declare that to the best of my knowledge, all the information contained in, or accompanying this document is complete, current and correct. I am duly authorised to sign this declaration on behalf of the proponent/approval holder. I am aware that:

- a) giving false or misleading information is a serious offence under section 137. 1 of the *Criminal Code Act 1995* (Cth)
- b) section 137.2 of the *Criminal Code Act 1995* (Cth) makes it an offence for a person to produce a document to another person in compliance or purported compliance with a law of the Commonwealth where the person knows that the document is false or misleading;
- c) section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading; and
- d) section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) (EPBC Regulations) where the person knows the information or document is false or misleading.

Signed: _____

Full name: Martine Scheltema, Manager Environment

Organisation: Main Roads Western Australia (ABN 50 860 676 021)

Date _____/_____/_____

Election to have an action management plan approved

Note: Pursuant to section 132B of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this election must be given to the Minister before the Minister grants an approval of the proposed action under section 133 of the EPBC Act.

Person Proposing to Take Action

Name and Title: Martine Scheltema, Manager Environment

Organisation: Main Roads Western Australia

EPBC Referral Number: EPBC 2019/8471

ACN/ABN: ABN 50860676021

Postal Address: PO Box 6202 EAST PERTH WA 6002

Telephone: 138 138

Email: enquiries@mainroads.wa.gov.au

- I elect to submit an action management plan(s) for approval in accordance with section 132B of the *Environment Protection and Biodiversity Conservation Act 1999*. I understand that a fee of \$2,690.00 may apply under the cost recovery arrangements.

Declaration:

- I declare that to the best of my knowledge the information I have given on this form is complete, current and correct.
- I understand that giving false or misleading information is a serious offence.

Signed: _____

Full name: Martine Scheltema, Manager Environment

Organisation: Main Roads Western Australia (ABN 50 860 676 021)

Date _____/_____/_____

1 PROPOSAL DESCRIPTION

1.1 Bunbury Outer Ring Road project

Main Roads Western Australia (Main Roads) is proposing to construct and operate the Northern and Central sections of the Bunbury Outer Ring Road (BORR) Project (Figure 1, Appendix A). The BORR Project is a planned Controlled Access Highway linking the Forrest Highway and Bussell Highway. The completed project will provide a high standard route for access to the Bunbury Port, improve road user safety and facilitate proposed development to the east of the City of Bunbury. The BORR Project provides an effective bypass of Bunbury for inter-regional traffic. The proposed BORR Project comprises three sections:

- 'BORR Northern Section' – Forrest Highway to Boyanup-Picton Road
- 'BORR Central Section' – Boyanup-Picton Road to South Western Highway, an existing four km section which was completed in May 2013, along with a three km extension of Willinge Drive southwards to South Western Highway
- 'BORR Southern Section' – South Western Highway (near Bunbury Airport) to Bussell Highway.

1.2 Bunbury Outer Ring Road Northern and Central Sections proposal

This document refers to BORR Northern and Central Sections only (the Proposal). The Proposal includes the construction and operation of 19 km of new freeway standard dual carriageway and associated bridges, interchanges and other road infrastructure. The Proposal is located approximately 200 km south of Perth and, at its closest point, approximately six km south-east of Bunbury (Figure 1, Appendix A).

The 625 ha Proposal Area occurs within the City of Bunbury and Shires of Capel, Dardanup and Harvey. Approximately 87 % of land within the Proposal Area is cleared for agriculture. Pockets of native vegetation occur within the Proposal Area in road reserves, along sections of the Collie, Ferguson and Preston Rivers, or as isolated patches on properties. The Proposal Area excludes areas within BORR Central Section, which was constructed in 2013.

Construction of the Proposal is expected to start in quarter 1, 2021 and continue until quarter 4, 2023.

Once the BORR Northern and Central Sections are constructed and open for public use, operation of the BORR Project will be ongoing.

1.3 Environmental assessment

1.3.1 Commonwealth assessment

The Proposal was formally referred to the then Commonwealth Department of the Environment and Energy (DoEE) on 25 June 2019 (EPBC Act referral 2019/8471) as a potential Controlled Action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to impacts on Matters of National Environmental Significance (MNES). In October 2019, DoEE advised that the Proposal would be assessed as a Controlled Action under the assessment approach of Preliminary Documentation, with a request for further information to assist in the assessment of the Proposal (DoEE, 2019).

Under Commonwealth government reforms announced in December 2019, DoEE was consolidated with Department of Agriculture to form the new Department of Agriculture, Water and Environment (DAWE), effective 1 February 2020. The Additional Information Request for Preliminary Document (BORR IPT, 2020a) and this Action Management Plan will therefore be submitted to DAWE for assessment.

1.3.2 State assessment

In June 2019, Main Roads referred the Proposal to the Environmental Protection Authority (EPA) for assessment under Section 38 of the *Environmental Protection Act 1986* (EP Act). The referral included an Environmental Referral Supporting Document (BORR IPT, 2019) which describes the receiving environments, potential impacts and mitigation strategies to address the identified impacts. The Proposal was advertised for a seven day public comment period on 14 June 2019. The EPA determined that the Proposal would be assessed on Referral Information with additional information required under Section 40(2)(a) of the EP Act on 3 July 2019. On 13 February 2020, the EPA consented under Section 43A of the EP Act to a change in the Proposal that will result in an overall reduction of 26 ha from the Proposal Area from 651 ha to 625 ha. The change to the Proposal also resulted in an overall reduction of remnant native vegetation being cleared from 91 ha to 73 ha.

This Action Management Plan (AMP) has been prepared to support the documentation prepared to address both the DoEE and the EPA requests for further information. The EPA request identified a requirement for Main Roads to detail the proposed management measures to achieve the environmental outcomes, including performance indicators, periodic milestones, proposed monitoring and adaptive management, and record keeping, publication and reporting processes.

1.4 Relevant conservation significant fauna

This AMP has been prepared to manage, monitor and mitigate direct and indirect impacts to the following Threatened fauna MNES:

- Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) (Critically endangered)
- Black-stripe Minnow (*Galaxiella nigrostriata*) (BSM) (Endangered)
- Carter's Freshwater Mussel (*Westralunio carteri*) (CFM) (Vulnerable)

Also included in this plan is the State-listed South-western Brush-tailed Phascogale (*Phascogale tapoatafa*) (BTP) (listed as Conservation Dependent (Schedule 6) under the Western Australian *Biodiversity Conservation Act 2016*).

A separate AMP has been prepared to manage potential impacts of the Proposal to Carnaby's Cockatoo *Calyptorhynchus latirostris* ('Endangered'), Baudin's Cockatoo *Calyptorhynchus baudinii* ('Endangered') and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* ('Vulnerable') (BORR IPT, 2020b).

The species recovery plans, conservation advice and referral guidelines which have been used to inform the development of this AMP are listed below:

- Department of Parks and Wildlife (2017). Western Ringtail Possum *Pseudocheirus occidentalis* Recovery Plan. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA.
- Threatened Species Scientific Committee (2018). Conservation Advice *Pseudocheirus occidentalis* Western Ringtail Possum. Canberra: Department of the Environment and Energy.
- Threatened Species Scientific Community (TSSC) (2018a). Conservation Advice *Galaxiella nigrostriata* Black-stripe Minnow
- Threatened Species Scientific Community (TSSC) (2018b). Conservation Advice *Westralunio carteri* Carter's Freshwater Mussel
- Department of Conservation and Land Management (2002). Brush-tailed Phascogale *Phascogale tapoatafa* (Meyer, 1793) Species Profile.

1.5 Conservation significant fauna descriptions

1.5.1 Western Ringtail Possum

1.5.1.1 Species description

The Western Ringtail Possum (WRP) is a medium sized arboreal marsupial, endemic to the south-west of Western Australia. WRP were once widely distributed across the south and south-west of the state (from north of Perth to east of Albany) but are now restricted to three key management zones: the Swan Coastal Plain (SCP), the Southern Forests and the South Coast.

Although primarily arboreal, WRPs are known to move on the ground.

1.5.1.2 Habitat within and adjacent to Proposal Area

WRP have been recorded throughout and adjacent to the Proposal Area as shown in Figure 2 (Appendix A). The Proposal Area contains approximately 43.9 ha of WRP habitat (Biota, 2020).

Shedley and Williams (2014) devised a habitat quality classification for WRP habitat. The area of habitat in each habitat quality class within the Proposal Area as mapped by Shedley and Williams (2014) is shown in Table 1-1. No 'A' class (Very High Quality) habitat was present.

Table 1-1 Proposal Area WRP habitat extent by quality class

HABITAT QUALITY CLASS	EXTENT WITHIN PROPOSAL AREA IN HA (Percent of total)	
A ('Very High' quality)	0	
B ('High' quality)	2.85	(6%)
C ('Medium' quality)	25.44	(58%)
D ('Low' quality)	6.58	(15%)
Not Assessed	9.03	(21%)

1.5.1.3 Information to guide the management approach

The approach to WRP management during clearing operations is focused on:

- Pre-clearing surveys
- WRP monitoring during clearing works
- Timing of clearing (when WRP are at/near their expected seasonal low)
- Sensitive clearing practises
- Staged clearing operations to encourage WRP to move into adjacent habitat beyond the clearing area.

The approach of allowing WRP to self-relocate to adjacent habitat has been selected over the more traditional approach of animal translocation as it is considered to provide the best outcome in terms of animal welfare. The success rates of documented WRP translocation projects is poor, and as yet no successful methodology has been developed or implemented (Clarke, 2011) (De Tores, 2004). Allowing WRP to self relocate to adjacent habitat of their own accord avoids the need for translocation and handling animals, substantially reducing the likelihood of WRP being put under undue stress. Their mobile nature also makes their familiarity with adjacent habitat, which is likely to be part of their existing home range likely.

Given the linear nature of the majority of clearing and the size of individual home ranges, it is anticipated that WRPs will initially relocate into other parts of their home range.

Sensitive clearing protocols

WRP habitat clearing protocols have been developed based on WRP site surveys and observations, and the potential for WRP use. Habitat clearing categories within the Proposal Area have been developed in consultation with Barbara Jones¹, based on her WRP knowledge and the results of recent targeted WRP surveys within the Proposal Area completed to date (August 2019, October 2019, December 2019, February 2020, April 2020, June 2020 and August 2020).

Habitat clearing categories are shown in Figure 2 (Appendix A) and clearing protocols for each are detailed in Table 1-2. The habitat clearing category mapping may be updated based on the results of additional on-going WRP surveys of the Proposal Area to be conducted during 2020. Based on the habitat clearing categories, WRP surveys and habitat extent, proposed clearing operations and staging have been defined and are shown in Figure 3 (Appendix A).

Table 1-2 WRP habitat clearing categories

HABITAT CLEARING CATEGORY AND DESCRIPTION	CLEARING MANAGEMENT
<p>Category 1</p> <p>Resident WRP regularly observed</p> <p>Resident and transient WRP expected to be encountered during clearing</p>	<p>Clearing to be conducted during the period of February to August</p> <p>Temporary supplementary watering points (a minimum of two per hectare) will be installed and maintained in potential WRP / BTP to be retained at least six weeks prior to clearing commencing</p> <p>Temporary dreys (a minimum of two per hectare) will be installed and maintained in potential WRP / BTP habitat to be retained at least six weeks prior to clearing commencing</p> <p>One clearing operation per Habitat Clearing Category 1 patch at a time</p> <p>Maximum clearing area of one ha per day per Habitat Clearing Category 1 patches with a total of five ha per week</p> <p>Habitat Clearing Category 2 and 3 areas within 500 m of Habitat Clearing Category 1 areas shall be cleared prior to clearing Habitat Clearing Category 1 areas</p> <p>Temporary possum exclusion fencing to be installed during staging to exclude WRP from re-entering the work area</p> <p>Two fauna spotters per machine conducting clearing operations</p> <p>Clearing to be conducted as per the Proposed Clearing and Clearing Staging Plans</p> <p>(Note: Main Roads preliminary surveys suggest that for the Bunbury area, most mature females have pouch young or young at heel between</p>

¹ Barbara Jones has been studying the WRP population for more than 30 years and is recognised by the Commonwealth as one of the pre-eminent experts regarding WRP populations and ecology (TSSC, 2018a).

HABITAT CLEARING CATEGORY AND DESCRIPTION	CLEARING MANAGEMENT
	August and December. This will be confirmed by on-going WRP monitoring to be conducted during 2020.)
Category 2 Monitored habitat patches that were not often utilised Not considered suitable for resident WRP breeding females but may be used by a transient animal for the short term High probability no WRP encountered during clearing	Habitat Clearing Category 2 areas to be cleared prior to clearing Habitat Clearing Category 1 areas One fauna spotter per machine conducting clearing
Category 3 Other WRP habitat - small areas of isolated remnant vegetation and paddock trees Unsuitable for resident WRP but may be used by a transient animal for the short term. Very high probability no WRP encountered during clearing	Habitat Clearing Category 3 areas to be cleared prior to clearing Habitat Clearing Category 1 and 2 areas One fauna spotter per machine conducting clearing

Habitat connectivity

WRP habitat connectivity will be retained / re-established in the longer term through the installation of underpasses / rope bridges (engineered movement structures) connected to adjacent habitat. Multiple structures at several locations have been proposed, as shown in Figure 4 (Appendix A). Four designs are proposed to be used for WRP underpasses, as shown in Figure 5 (Appendix A). This includes one design that has been successfully utilised for a nearby Main Roads project, where an underpass connects the riparian zones along the Collie River in Australind. The proposed monitoring detailed below, will assess the effectiveness / use of the different designs by WRP.

Fauna fencing

Possum fencing will be installed adjacent to known habitat areas to exclude WRP moving onto the road. The fencing will be 1.5 m high and constructed to prevent possums being able to climb or dig under it. Possum fencing is proposed to be a combination of permanent and temporary fencing. Temporary fencing, which will remain in place for a minimum of five years, will be installed between Clifton Road and Raymond Road. All other possum fencing will be permanent. Possum fencing has been located based on the Habitat Clearing Categories, targeted WRP surveys and adjacent habitat patches as shown in Figure 4 and Figure 6

(Appendix A). The possum fence will be constructed in addition to noise and screen walls to exclude possum movement from adjacent habitat onto the road carriageway.

1.5.2 Carter's Freshwater Mussel

1.5.2.1 Species description

The CFM is restricted to freshwater waterways (streams, rivers, reservoirs and lakes) within 50-100 km of the coast from Moore River, north of Perth, to west of Esperance (WRM, 2020). It has brown to red and sometimes black shells, and is mostly sessile but can move through sediments with a muscular foot (TSSC, 2018b).

1.5.2.2 Habitat within and adjacent to Proposal Area

Within the Proposal Area, CFM is restricted to major creeklines with shallow sandy banks (Biota, 2020). During surveys undertaken in 2018 and 2019 by WRM (2019), CFM were recorded from one site within the Proposal Area (Figure 7, Appendix A). Potential habitat for CFM includes the Collie (tributary), Ferguson and Preston Rivers and has been mapped as a maximum of 1.4 ha within the Proposal Area.

Baseline water levels and water quality data have been collected at potential impact sites (within the Proposal Area) and will be collected from the identified reference site (in the Preston River) within 60 days of the commencement of construction. Baseline assessments of other relevant habitat parameters such as riparian vegetation condition will also be collected prior to construction.

1.5.2.3 Information to guide the management approach

CFM were recorded on the Ferguson and Preston rivers at locations within, upstream and downstream of the northern and central investigation area. CFM have also been recorded in other creeks intersected by the Proposal, i.e. outside of the Proposal Area (WRM, 2020).

CFM are likely to be common within each of the rivers crossing the Proposal Area where suitable habitat occurs. The exception is the lower Collie River, where the species was not recorded within or adjacent to the Proposal Area. Elevated salinity is considered to be the primary reason for the absence of the species in the lower Collie River (WRM, 2020).

The species' conservation advice notes some level of tolerance to changing water quality and the presence of CFM in less impacted smaller tributaries of the Collie River and also in the Preston/Ferguson rivers is supported by this evidence (TSSC, 2018a).

1.5.3 Black-stripe Minnow

1.5.3.1 Species description

The BSM is a small (up to 48 mm) freshwater fish species endemic to south-western Australia. It most commonly occurs in shallow ephemeral waterbodies of peat flats (WRM, 2020).

It is short lived (one year) and able to survive dry summer conditions by aestivating (burrowing) into moist soils. Dispersal is understood to be linked to climatic conditions with the species emerging from aestivation following rainfall (WRM, 2020).

1.5.3.2 Habitat within and adjacent to Proposal Area

During field surveys conducted for the Proposal, BSM were recorded from one sampling site within the Proposal Area and four sites outside of the Proposal Area (Figure 8, Appendix A).

Within the Proposal Area, the area of habitat likely to be suitable for BSM is approximately 0.55 ha.

Baseline habitat quality information is being collected at potential BSM habitat sites adjacent to the Proposal Area and at one identified reference area (Manea Park). This includes an assessment of water quality parameters, hydrological connectivity and the presence of erosion and or sedimentation.

1.5.3.3 Information to guide the management approach

Sites where the minnow was recorded were relatively unaltered wetlands, with intact fringing vegetation.

Due to the high mobility of the species and connectivity between wetlands in wetter years, it is possible that BSM migrate between wetlands within the local area. Maintaining connectivity between wetlands that provide suitable habitat is an important consideration in drainage design for the Proposal.

1.5.4 South-western Brush-tailed Phascogale

1.5.4.1 Species description

The BTP is a small (100 – 300 g), strongly arboreal marsupial species. They are carnivorous, short-lived and nocturnal. BTPs are found in dry sclerophyll forests and open woodlands between Perth and Albany. They feed predominantly on arthropods and other invertebrates and forage in tree canopies.

They are listed as Conservation Dependent (Schedule 6) under the BC Act.

1.5.4.2 Habitat within and adjacent to Proposal Area

The Proposal Area contains 17.7 ha of suitable habitat for BTP comprising 4.9 ha of the 'Riparian Woodland' and 12.8 ha of 'Marri/ Eucalyptus Woodland' habitat types as mapped by Biota (2020) (Figure 9, Appendix A).

Baseline habitat quality and / or condition data for known BTP habitat areas adjacent to the Proposal Area will be collected prior to construction.

1.5.4.3 Information to guide the management approach

BTP habitat is closely correlated with both WRP habitat and Black Cockatoo habitat.

Connectivity of habitat areas is important to enable dispersal of BTP to find habitat and mates, and maintain the exchange of genetic material between populations. Good connectivity is also important to enable BTPs to access additional food resources and water as required.

In addition to WRP and Black Cockatoos, the timing of clearing activities will need to take into consideration BTP breeding cycles and *Phytophthora* dieback management. The BTP breeding season is short, usually running for three weeks in winter, from mid-May to early July. Where possible, clearing of BTP habitat will be conducted outside of the species' breeding season.

Sensitive clearing protocols, as outlined in Section 1.5.1.3 for WRP, are required and will also apply for BTP.

Threats, potential impacts and responsive management measures proposed for WRP will also apply for BTP as both species are primarily arboreal and share similar habitat types. As such, within this AMP, after the detailing of species-specific threats in Section 5.1.4, potential impacts, management measures and monitoring activities will be presented for BTP together with WRP.

2 PURPOSE AND OBJECTIVES

2.1 Purpose

This AMP has been developed to support documentation prepared to address the DoEE request of 18 October 2019 for further information for assessment of the Proposal (DoEE, 2019).

The purpose of this AMP is to ensure that Main Roads can manage the Proposal so that impacts to the Protected Matters listed in Section 1.4 are acceptable.

This AMP sets out the environmental management actions proposed to manage, monitor and mitigate the direct and potential indirect impacts of the Proposal on the Protected Matters listed in Section 1.4. It includes the environmental management of activities to be undertaken by Main Roads, its employees and contractors.

Relevant guidelines such as recovery plans, interim recovery plans, conservation advice and threat abatement plans have been taken into consideration during the preparation of this AMP. The AMP has been prepared consistent with the following guidance documentation:

- Department of the Environment (DotE) (2014) *Environmental Management Plan Guidelines*
- Department of the Environment and Energy (DoEE) (2019) *Action Management Plan Criteria*.

The AMP structure and content has been prepared to align to DotE (2014), with the content then incorporating the additional criteria outlined by DotEE (2019).

A Construction Environmental Management Plan (CEMP) will be prepared by the Construction Contractor and include the management actions detailed in this AMP and Main Roads 'business as usual' environmental management measures. The CEMP will be prepared prior to, and implemented to minimise and manage impacts to the above-listed Protected Matters.

2.2 Objective

The objective of this AMP is to ensure the impacts of the Proposal to conservation significant fauna taxa listed in Section 1.4 are acceptable, minimised and managed.

This is a 'management-based' AMP to document management actions required during Proposal implementation and operation. Management measures within this AMP are specific to the Proposal, and include management actions that are 'over and above' standard environmental management practises.

3 ROLES AND RESPONSIBILITY

This AMP identifies the environmental management of activities to be undertaken by Main Roads in implementation of the Proposal. Main Roads acknowledges that the environmental management actions contained within this AMP are legal requirements to be met by Main Roads.

The Manager Environment at Main Roads will maintain responsibility for implementation of the management actions outlined within this AMP, on behalf of Main Roads' Managing Director. Management actions may be undertaken by employees and / or contractors of Main Roads on behalf of Managing Director.

Where management actions are undertaken by employees and / or contractors of Main Roads, these will be communicated and documented to the relevant personnel through relevant environmental training (refer to Section 4.2).

4 REPORTING AND ACCOUNTABILITY

4.1 Reporting

Main Roads will report to DAWE and DWER on the implementation of this AMP as part of annual compliance reporting under the conditions of approval for the Proposal.

Where compliance audits undertaken by Main Roads identify that the environmental management actions and / or the environmental objectives are not being achieved (i.e. non-compliance or an environmental incident), Main Roads will notify DAWE and DWER as soon as reasonably practicable within seven days. Consistent with standard document control procedures, Main Roads will maintain copies of all reports submitted to DAWE and DWER.

The reporting requirements for this AMP are identified in Table 4-1. A template for the annual compliance report is included in Appendix B.

Table 4-1 Reporting requirements

ASPECT	REPORT FROM	REPORT TO	REPORTING FREQUENCY
Implementation of AMP	Manager Environment	DAWE / DWER	Annually (as part of annual compliance reporting)
Non-compliance with AMP or Environmental Incident	Manager Environment	DAWE / DWER	As soon as reasonably practicable but not more than seven days

The format and content of annual reporting will be in accordance with the requirements of the annual reporting conditions. The format and content of reporting of a non-compliance event or an environmental incident will be subject to the nature of the non-compliance/incident and will include all requested information from DAWE. In consideration of this, specific templates for reporting these are not provided as part of this AMP.

4.2 Environmental training

Main Roads will ensure that all personnel undertaking works for the Proposal, including visitors, have undertaken a site induction training program, or are escorted to the site. Main Roads will evaluate all personnel undertaking the site induction training program through a written test to ensure that all personnel have an understanding of the environmental requirements for the Proposal.

Where it is identified that personnel have not undertaken the works in accordance with the environmental requirements for the Proposal, Main Roads will require such personnel to repeat the site induction training program.

The general content of the site induction training program for the Proposal is outlined in Table 4-2.

Table 4-2 Site induction training program content

ASPECT	SITE INDUCTION TRAINING PROGRAM CONTENT
Site induction training program	Awareness of Main Roads' Environmental Policy
	Identification of the environmental values in the area of the Proposal
	Identification of key environmental risks associated with the Proposal, and the identification of management requirements to control such risks
	Roles and responsibilities of all personnel in the protection and management of the environment, including identification of key personnel that have specific roles or responsibilities
	Awareness of importance of compliance with the environmental requirements (including penalties for non-conformance with the environmental requirements)
	Pegging of the area of works, and other pegging types (for example, trees to be retained)
	Clearing of native vegetation and management of topsoil
	Hygiene procedures for <i>Phytophthora</i> Dieback management and weed management
	Appropriate disposal of wastes
	Environmental incidents, including the requirements for management and reporting
	The environmental benefits of improved personal performance

4.3 Emergency contacts and procedures

Emergency contact details will be signposted at appropriate locations within the area of the Proposal, to enable immediate contact and response in the event of an emergency / environmental incident observed by Main Roads' personnel, contractors or the public.

Emergency response procedures will be followed in the event of an emergency / environmental incident.

Main Roads' general and emergency contacts for the Proposal are provided in Table 4-3.

Table 4-3 Emergency contact details

ASPECT	CONTACT DETAILS
General contact	<ul style="list-style-type: none"> Main Roads Head Office Address: Don Aitken Centre, Waterloo Crescent, EAST PERTH WA 6004 Mail: PO Box 6202, EAST PERTH WA 6002 Email: enquiries@mainroads.wa.gov.au Phone: 138 138 Main Roads South West Region Address: Robertson Drive, BUNBURY WA 6231 Mail: PO Box 5010, EAST PERTH WA 6231 Email: enquiries@mainroads.wa.gov.au Phone: 138 138 / (08) 9724 5600

ASPECT	CONTACT DETAILS
Emergency contact	<ul style="list-style-type: none">• Manager Environment, Main Roads Email: Martine.Scheltema@mainroads.wa.gov.au Phone: (08) 9323 4614• Regional Manager, Main Roads South West Region Email: robert.barnsley@mainroads.wa.gov.au Phone: (08) 9724 5600

5 POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

5.1 Threats to Protected Matters

A summary of key threats to each conservation significant fauna taxa included in this AMP is provided below. More detailed information is contained within *BORR Northern and Central Sections Additional Information for Preliminary Documentation* (BORR IPT, 2020a).

5.1.1 Western Ringtail Possum

The major threats to the species include habitat loss and fragmentation. Other threats include predation by introduced carnivores, climate change, logging, fire, competition for nest hollows and habitat tree decline (DPaW, 2017). In addition to these threats, the Commonwealth Conservation Advice also lists groundwater depletion and altered hydrology, increasing temperature, tree decline and insect outbreaks, domestic dogs, ravens, and (potentially in future) Myrtle rust (TSSC, 2018a).

5.1.2 Carter's Freshwater Mussel

CFM is acutely sensitive to salinity, >1.6 g/L, and its distribution has been reduced as a result of secondary salinisation of waterways in the south western of Western Australia (Klunzinger, M W; Beatty, S J; Morgan, D L; Lymbery, A J; Pinder, A M; Cale, D J, 2012a). Reduced rainfall, resulting from a drying climate and dewatering of reservoirs and reduced flows in regulated rivers are also key threats. Secondary threats include habitat destruction, associated sedimentation and erosion, trampling by stock, predation by feral pigs, and loss of suitable host fishes for parasitic stages. Sedimentation to the point of burying mussels has been reported to cause mortality in CFM (IUCN, 2019).

5.1.3 Black-stripe Minnow

Habitat destruction through continued urban development and other clearing is a key threatening process for the BSM (TSSC, 2018b; WRM, 2020). Other threats include climate change resulting in reduced rainfall and loss of habitat (drying of wetlands and lowering of groundwater levels), and predation and competition by invasive fish species (including *Gambusia holbrooki*).

5.1.4 South-western Brush-tailed Phascogale

CALM (2002) lists threats to the BTP as habitat clearing and fragmentation, and habitat alteration by logging and mining, with the greatest being reduced availability of trees with hollows, and predation by cats. Predation by foxes is also listed, as is the fragmentation of residual habitat which can isolate populations and impede genetic exchange.

5.2 Key assumptions and uncertainties

This AMP has been prepared on the basis of information provided in the environmental surveys for the Proposal (Table 5-1), and based upon knowledge of Main Roads' construction and operation of similar linear infrastructure works. The key assumptions and uncertainties relevant to the Proposal are:

- The relevant studies and surveys have accurately recorded the presence of all conservation significant fauna species within the Proposal Area
- Environmental survey reports have not been independently verified. These surveys were undertaken by suitably qualified individuals experienced in fauna ecology and habitat identification and are therefore assumed to have accurately recorded the presence and locations of habitat (including breeding habitat such as nest hollows, where relevant). It is acknowledged that fauna survey results may change over time, for example, not all suitable hollows are actively used in all years.

- The Proposal may have the potential for an indirect impact to conservation significant fauna individuals and habitat
- All significant direct and indirect impacts to conservation significant fauna that may result from the Proposal have been identified
- Direct impacts to fauna during construction are limited to habitat loss and mortality during construction activities (clearing and plant movement)
- Mobile fauna will disperse in front of clearing activities
- Road reserve boundary fencing will exclude fauna from the road during construction and operations limiting the potential for mortality of these species.
- Fauna underpasses and fauna bridges are effective in maintaining ecological linkages
- Possum fencing (combined with noise and screen walls) will exclude WRP from the road during construction and operations limiting the potential for mortality of these species
- Existing cleared areas within the Proposal Area do not contain habitat for or known records of conservation significant species
- Conservation significant fauna are not expected to occur within areas cleared of native vegetation, therefore these areas do not require management during the construction of the Proposal to meet the environmental objectives
- If any conservation significant species assumed not to occur in the Proposal Area are subsequently recorded, the proposed management actions would ensure there are no additional impacts

More information on the key assumptions and uncertainties are provided in the appendices of the *Bunbury Outer Ring Road Northern and Central Environmental Referral Supporting Document* (BORR IPT, 2019), the *Bunbury Outer Ring Road Northern and Central Sections Response to EPA Notice of Decision to Assess: Additional Information Requirement* (BORR IPT, 2020b), and the *BORR Northern and Central Sections Additional Information for Preliminary Documentation* (EPBC 2019/8471) (BORR IPT, 2020a).

5.3 Potential impacts

A summary of potential impacts of the Proposal to each conservation significant fauna taxa included in this AMP is provided below. A complete assessment for each taxa, and impacts to other matters protected under Part 3 of the EPBC Act, is contained within *Bunbury Outer Ring Road Northern and Central Sections Additional Information for Preliminary Documentation* (BORR IPT, 2020a).

Potential direct and indirect impacts of the proposal on conservation significant fauna have been informed through targeted environmental surveys undertaken for the Proposal. These are outlined in Table 5-1. Targeted fauna surveys and the aquatic fauna survey were (and where relevant, continue to be) undertaken in accordance with relevant guidelines.

Table 5-1 Environmental surveys relevant to this AMP

SURVEY / REPORT NAME	LOCATION / EXTENT IN SURVEY AREA	METHODOLOGY
<i>Bunbury Outer Ring Road Northern and Central Section Targeted Fauna Assessment (Biota, 2020)</i>	Surveyed of entire 625 ha Proposal Area	Day and night targeted field surveys conducted over the surveyed area (plus four WRP reference sites within an 18 km radius) in late winter and spring 2018. Methodology consistent with EPA Technical Guidance (EPA, 2016).
<i>Bunbury Outer Ring Road Northern and Central Investigation Area: Targeted Conservation Significant Aquatic Fauna Survey (WRM, 2020)</i>	12 assessment sites	Sampling of five creek/river sites and seven wetlands undertaken over four consecutive days in November 2018. Methodology was consistent with that used by others in similar surveys across Australia.
<i>Bunbury Outer Ring Road Northern and Central Section Targeted Fauna Assessment (Biota, 2020)</i>	Targeted habitat survey encompassing the 625 ha Proposal Area and an additional 444 ha context area (total field survey area > 1,000 ha)	Targeted field surveys carried out between August - December 2019 to identify the presence of foraging, breeding and roosting habitats for Black Cockatoos
<i>Bunbury Outer Ring Road (Northern and Central) WRP Surveys 2019 – ongoing (unpublished survey results)</i>	BORR Northern and Central sections alignment and two reference sites	Targeted field surveys conducted over the surveyed area in August 2019, October 2019, December 2019, February 2020, April 2020 and June 2020, consistent with EPA Technical Guidance (EPA, 2016). These surveys will be on-going during 2020.
<i>Bunbury Outer Ring Road Northern and Central Sections Vegetation and Flora Study (BORR IPT, 2020c)</i>	Flora and vegetation survey to identify vegetation types and vegetation condition for the Proposal	Field surveys in accordance with relevant State survey guidelines
<i>Bunbury Outer Ring Road Northern and Central Investigation Area: Targeted Conservation Significant Aquatic Fauna Survey (WRM, 2020)</i>	12 assessment sites	Sampling of five creek/river sites and seven wetlands undertaken over four consecutive days in November 2018. Methodology was consistent with that used by others in similar surveys across Australia.
<i>Phytophthora Dieback Occurrence Survey (Great Southern Bio Logic, 2018)</i>	BORR Northern and Central Sections alignment	Visual diagnosis of disease supported by laboratory assessment of soil and tissue samples within areas of assessable remnant vegetation

SURVEY / REPORT NAME	LOCATION / EXTENT IN SURVEY AREA	METHODOLOGY
<i>BORR Northern and Central Sections Drainage Strategy (BORR IPT, 2018)</i>	BORR Northern and Central sections alignment	Outlines broad strategies for management of surface water throughout the Proposal Area, including flood mitigation and maintaining surface water flows to wetlands and agricultural land

5.3.1 Western Ringtail Possum and South-western Brush-tailed Phascogale

As outlined in BORR IPT (2020a; 2020b) and summarised in Table 5-2, implementation of the Proposal will result in clearing of up to 43.9 ha of WRP habitat within the 625 ha Proposal Area. The habitat to be cleared is currently fragmented, dissected by existing roads, easements and cleared agricultural land as shown in Figure 2 (Appendix A). The area to be cleared represents up to 0.70 % of habitat in the Bunbury management zone of Shedley and Williams (2014)². It is estimated that between 15 and 25 WRPs within the Proposal Area will potentially have their home ranges disturbed by the Proposal. This indicates that up to 0.11 % to 0.26 % respectively of the 2019 estimated WRP population within the Southern SCP Management Zone as identified by Biota (2019) (of up to 9,270 individuals) could potentially be impacted. No WRP mortalities are likely to result directly from the Proposal.

Implementation of the Proposal will result in clearing of up to 17.7 ha of suitable BTP habitat. No BTP mortalities are expected to result from Proposal implementation.

Table 5-2 Environmental impacts of the Proposal to WRP and BTP

TAXON	PROPOSAL ACTIVITIES	DIRECT IMPACT
WRP	Clearing of native vegetation	Clearing of up to: <ul style="list-style-type: none"> 43.9 ha of WRP habitat, comprising 15 to 25 WRP individuals home ranges
BTP		Clearing of up to: <ul style="list-style-type: none"> 17.7 ha of BTP habitat

Potential indirect impacts to WRP and BTP are listed below. These are detailed in BORR IPT (2020a; 2020b):

- Incremental loss of WRP habitat resulting from reduced connectivity, barrier effects and edge effects
- Displacement of WRP due to traffic noise exposure
- Displacement of WRP due to light spill from street lighting and traffic.

Historical clearing combined with incremental reduction in habitat has restricted the distribution of WRP and BTP within the Proposal Area. As habitat is cleared, patch sizes decrease and the impact of ‘edge effect’ increases with likely introduction of weeds and dieback, ultimately changing the species composition of the vegetation community and reducing suitability of habitat for local fauna species, including WRP and BTP.

The Proposal Area has been largely cleared for agriculture, urban and industrial developments. Clearing for these landuses has resulted in fragmentation of both terrestrial and riparian / wetland vegetation and ecological linkages, thereby reducing connectivity of WRP and BTP habitat. Connectivity of habitat areas is

² The majority of Proposal Area WRP habitat was included in the mapping of Shedley and Williams (2014).

important to enable dispersal of WRP and BTP to find habitat and mates, and maintain the exchange of genetic material between populations. Good connectivity is also important to enable WRP and BTP resident in small patches to access additional food resources and water as required.

Although WRP may relocate to other habitat areas in order to move away very noisy and brightly lit areas (pers comm. Barbara Jones), WRP have adapted to urban and semi-urban area and are often found in high densities in these areas (Shedley & Williams, 2014). This indicates that they are able to adjust to and even thrive in developed areas with light and noise levels higher than would be found in undeveloped areas.

BTP have large home ranges of up to 20 ha (Biota, 2020). If severe enough, traffic noise and light exposure may potentially result in BTP relocating to other habitat areas in order to move away from the noise and / or light sources.

5.3.2 Carter's Freshwater Mussel

As detailed in BORR IPT (2020a; 2020b), no direct loss of habitat for or of individual CFM is expected as a consequence of construction or operation of the Proposal.

Potential indirect impacts to CFM are associated with construction and operation and include:

- Erosion and sedimentation resulting from earthworks adjacent to watercourses during construction
- Contamination and / or water quality impacts during construction or operation
- Alteration of hydrological regimes resulting from bridge and / or road construction
- Indirect impacts to host fish populations.

The location and extent of CFM habitat within and near to the Proposal Area is shown in Figure 7 (Appendix A).

During project planning and development of the BORR Drainage Strategy (BORR IPT, 2018), consideration has been given to minimise potential impacts to waterways, and therefore CFM habitat, by maintaining existing surface water flows during and following construction. Changes to the Proposal design have removed the requirement for bridge piers or abutments in any water courses, thereby avoiding direct impacts on any known CFM habitat.

The Proposal is considered unlikely to exacerbate any of the threats listed in the species' conservation advice (TSSC, 2018b). The construction of new bridges across potential CFM habitat may provide positive outcomes for the species. Studies of habitat requirements for CFM indicate that bridges may create preferred habitat for the species (Hastie, Boon, & Young, 2000; Klunzinger, M W; Beatty, S J; Morgan, D L; Pinder, A M; Lymbery, A J, 2015), as the shade created by the bridge provides cooler conditions that are beneficial to the species.

Through the clearing controls and pre-clearing surveys, potential for impacts during construction will be carefully managed. The risk of other potential impacts, such as contamination through spills and sedimentation of waterways will be managed through implementation of appropriate procedures to be included in the CEMP.

5.3.3 Black-stripe Minnow

As detailed in BORR IPT (2020a; 2020b) and summarised in Table 5-3, implementation of the Proposal will result in clearing of up to 0.55 ha of potential BSM habitat. The location and extent of BSM habitat within and near to the Proposal Area is shown in Figure 8 (Appendix A).

Table 5-3 Environmental impacts of the Proposal to BSM

TAXON	PROPOSAL ACTIVITIES	DIRECT IMPACT
BSM	Clearing of native vegetation	Clearing of up to 0.55 ha of potential BSM habitat

The Proposal may impact local BSM populations by reducing the connectivity between sections of habitat and reducing the overall areas of seasonal wetlands.

To reduce the potential indirect impacts on BSM, the BORR Drainage Strategy has been prepared to minimise the potential for impacts to wetlands and waterways (including as habitat for BSM) during and following construction of the Proposal.

Clearing and disturbance of BSM habitat will be carefully managed throughout construction. The proposed drainage related monitoring that will be undertaken for BSM is detailed below.

Impacts to existing hydrology will be mitigated through the implementation of the Drainage Strategy which aims to maintain hydrological conditions as far as possible, and connectivity between habitats through use of suitable drainage design e.g. culvert design and construction to allow movement of fish.

The risk of other potential impacts, such as contamination of waterways through spills, will also be managed through implementation of appropriate procedures to be included in the CEMP.

5.4 Risk assessment

The DotE (2014) and DoEE (2019) identify a requirement for a risk assessment to assess the likelihood and consequence of each potential impact in order to ensure that risks are translated into controls, mitigation and management actions.

Main Roads applies a standard risk assessment matrix to its operations, whereby the ‘likelihood’ and ‘consequence’ of events is considered, with monitoring and management actions identified to control the level of risk.

Main Roads completed a risk assessment for each of the relevant conservation significant fauna taxa in preparation of this AMP. The likelihood and consequence assessment, with the resulting ‘risk outcome’, have been based upon the residual risk levels after management and monitoring activities are implemented. The assessments have applied the definitions for both likelihood and consequence as prescribed within DoEE (2019), and are presented in Table 5-4, Table 5-5 and Table 5-6.

Related management actions and monitoring activities can be found in Section 6.

Table 5-4 WRP and BTP risk assessment

Objective: To ensure that impacts to WRP and BTP are avoided and minimised as far as practicable during construction and operation of the Proposal.				
Key environmental values: WRP / BTP individuals and habitat				
ENVIRONMENTAL OBJECTIVE	RISK	RISK ASSESSMENT	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise impacts to WRP and BTP	Injury or death of WRP and BTP individuals during Proposal implementation	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Management during construction for risk of impact to WRP or BTP individuals	Pre-construction, construction and post-construction monitoring
Minimise area of WRP and BTP habitat cleared during construction	Clearing of WRP and BTP habitat outside of the approved clearing area	Likelihood: Unlikely Consequence: Moderate Risk outcome: Low	Standard construction management to control construction clearing (not specific to AMP)	Standard construction monitoring to verify construction clearing (not specific to AMP)
No significant indirect impacts to WRP or BTP habitat adjacent to the Proposal attributable to Proposal implementation	Reduction in WRP and BTP habitat quality adjacent to the Proposal	Likelihood: Possible Consequence: Minor Risk outcome: Low	Management not required (monitoring requirement only)	Pre-construction, construction and post-construction monitoring to assess habitat quality
	New infestations or spread of existing infestations of Weeds of National Significance (WoNS) in WRP and BTP habitat adjacent to the Proposal	Likelihood: Possible Consequence: Minor Risk outcome: Low	Management to control construction clearing which may introduce or spread WoNS Management to undertake weed control where WoNS are identified	Monitoring to verify construction clearing which may introduce or spread WoNS Monitoring to verify efficacy of applied control
	New infestations or spread of existing infestations of <i>Phytophthora Dieback</i> in WRP and BTP habitat adjacent to the Proposal	Likelihood: Possible Consequence: Minor Risk outcome: Low	Management to control construction clearing which may introduce or spread <i>Phytophthora Dieback</i>	Monitoring to verify construction clearing which may introduce or spread <i>Phytophthora Dieback</i>

Objective: To ensure that impacts to WRP and BTP are avoided and minimised as far as practicable during construction and operation of the Proposal.

Key environmental values: WRP / BTP individuals and habitat

ENVIRONMENTAL OBJECTIVE	RISK	RISK ASSESSMENT	MANAGEMENT APPROACH	MONITORING APPROACH
	Bushfires generated as a result of Proposal construction	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Standard construction management to control potential ignition sources construction clearing (not specific to AMP)	Standard construction monitoring to verify management of potential ignition sources and fire response during construction clearing (not specific to AMP)
	Localised and / or unanticipated erosion impacting WRP and BTP habitat adjacent to the Proposal that requires remediation	Likelihood: Possible Consequence: Minor Risk outcome: Low	Standard construction management to control construction clearing (not specific to AMP)	Standard construction monitoring to verify construction clearing (not specific to AMP)
	Groundwater drawdown impacts on or changes in hydrology of WRP and BTP habitat adjacent to the Proposal	Likelihood: Unlikely Consequence: Moderate Risk outcome: Low	Standard construction management to control groundwater water abstraction consistent with WA Government water supply approvals (not specific to AMP)	Standard construction monitoring to verify groundwater water abstraction consistent with WA Government water supply approvals (not specific to AMP)

Table 5-5 CFM risk assessment

Objective: To ensure that impacts to CFM are avoided and minimised as far as practicable during construction and operation of the Proposal.				
Key environmental values: CFM individuals and habitat				
ENVIRONMENTAL OBJECTIVE	RISK	RISK ASSESSMENT	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise impacts to CFM	Injury or death of CFM during Proposal implementation	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Management potentially required prior to and / or during construction	Pre-construction monitoring for CFM required
No significant indirect impacts to CFM or habitat adjacent to the Proposal attributable to Proposal implementation	Impact to water quality in CFM habitat adjacent to the Proposal	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Management to control sedimentation and erosion during construction Management of hydrocarbon storage during construction	Pre-construction, construction and post-construction monitoring to assess water quality
	Bushfires generated as a result of the Proposal construction impacting riparian vegetation	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Standard construction management to control potential ignition sources construction clearing (not specific to AMP)	Standard construction monitoring to verify management of potential ignition sources and fire response during construction clearing (not specific to AMP)

Table 5-6 BSM risk assessment

Objective: To ensure that impacts to BSM are avoided and minimised as far as practicable during construction and operation of the Proposal.				
Key environmental values: BSM individuals and habitat				
ENVIRONMENTAL OBJECTIVE	RISK	RISK ASSESSMENT	MANAGEMENT APPROACH	MONITORING APPROACH
Minimise area of BSM habitat cleared during construction	Clearing of BSM habitat outside of the approved clearing area	Likelihood: Unlikely Consequence: Moderate Risk outcome: Low	Standard construction management to control construction clearing (not specific to AMP)	Standard construction monitoring to verify construction clearing (not specific to AMP)
No significant indirect impacts to BSM habitat adjacent to the Proposal attributable to Proposal implementation	Impact to water quality in BSM habitat adjacent to the Proposal	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Management to control sedimentation and erosion during construction Management of hydrocarbon storage during construction	Pre-construction, construction and post-construction monitoring to assess water quality
	Impact to water levels in BSM habitat adjacent to the Proposal	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Standard construction management to control groundwater water abstraction consistent with WA Government water supply approvals (not specific to AMP)	Pre-construction, construction and post-construction monitoring to assess water levels Standard construction monitoring to verify groundwater water abstraction consistent with WA Government water supply approvals (not specific to AMP)
	Disruption of habitat connectivity	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Management to maintain habitat connectivity for BSM	Pre-construction, construction and post-construction monitoring to assess habitat connectivity
	Bushfires generated as a result of Proposal construction	Likelihood: Possible Consequence: Moderate Risk outcome: Medium	Standard construction management to control potential ignition sources construction clearing (not specific to AMP)	Standard construction monitoring to verify management of potential ignition sources and fire response during construction clearing (not specific to AMP)

6 ENVIRONMENTAL MANAGEMENT MEASURES

In order to comply with relevant environmental legislation and manage impacts to the local environment, Main Roads has defined objectives, outcomes and management based provisions to ensure that impacts to conservation significant fauna are avoided and minimised as far as practicable during implementation of the Proposal.

6.1 Environmental management activities, controls and performance targets

Main Roads has taken a 'hierarchical approach' to the mitigation of potential impacts associated with the Proposal, and in the first instance, has sought to avoid areas of conservation significant fauna habitat through route selection and design refinement. Where impacts cannot be avoided, Main Roads has designed the Proposal to reduce the intensity and / or extent of impacts on conservation significant fauna individuals and habitat.

Risk-based management actions have been identified and prioritised to achieve the environmental objective detailed in Section 2.2. The management actions focus the greatest management effort on reducing habitat and ecological connectivity loss and impact to individual conservation significant fauna. These management actions were specifically developed to ensure that impacts are minimised as far as practicable during the final design, construction and operation of the Proposal. They have been informed by the results of field studies (Table 5-1), best practice and recent experience on similar road projects in Western Australia.

Based on the controls identified above and these management actions, Main Roads has developed performance targets for each conservation significant fauna taxa to identify the outcomes sought from the management actions. These, along with the proposed management actions, are identified in Table 6-1, Table 6-2 and Table 6-3.

All proposed management actions, monitoring, performance indicators, triggers, thresholds and corrective actions are aligned with the performance targets identified for each conservation significant fauna taxa.

Table 6-1 WRP and BTP management actions and performance targets

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
<p>Prior to construction</p>	<ul style="list-style-type: none"> • 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 • All WRP and BTP habitat that is to be retained within the development envelope will be surveyed and delineated with temporary fencing prior to site works to ensure it is conserved • No night time clearing of vegetation will occur • Cleared vegetation will be chipped immediately or transported at least 100 m from WRP and BTP habitat before further processing • Movement / disturbance of clearing stockpiles will be confined to the period one hour after sunrise and / or one hour prior to sunset • All buildings requiring demolition for the Proposal will be inspected for WRP and BTP for two days prior to demolition works • Where WRP or BTP are observed, or suspected, to be in any building to be demolished attempts shall be made to capture the animal prior to the demolition works commencing • An experienced zoologist / environmental scientist / fauna-spotter will be on-site at all times during the demolition of buildings suspected or observed to house WRP or BTP • Machinery operators will maintain radio communication with their spotter • Any pest animal baits used in buildings to be demolished will be in bait stations. 	<ul style="list-style-type: none"> • Avoid direct impacts to WRP and BTP individuals • Avoid clearing outside the approved footprint • Reduce clearing of WRP and BTP habitat to the extent practicable in final design • Preclude use of refuge sites within the Proposal Area prior to construction
<p>During construction</p>	<p>Sensitive clearing protocols</p> <ul style="list-style-type: none"> • Spotlighting of potential WRP and BTP habitat will be undertaken by a suitably experienced person for two nights immediately prior to clearing • Pre-clearing fauna searches shall be conducted immediately prior to and during clearing operations and will include hollows, dreys, ground debris, dense ground-level vegetation, fallen timber and logs • Clearing will be conducted congruent with the habitat clearing categories as detailed in Table 1-2 and shown in Figure 2 (Appendix A) • Vacant dreys will be removed prior to clearing where they are accessible 	<ul style="list-style-type: none"> • Avoid direct impacts to WRP and BTP • Avoid clearing outside the approved footprint • Avoid indirect impacts to WRP in adjacent habitat • Maintain connectivity between known WRP and BTP habitat areas

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
	<ul style="list-style-type: none"> • Vacant tree hollows suitable for WPR or BTP will be removed or blocked prior to clearing where they are accessible • If WRP or BTP 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. • Trees, as noted above, that are observed to support WRP and / or BTP 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 it shall be pushed over 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 and BTP present with the opportunity to safely vacate. • Felled trees with hollows will be checked immediately for fauna 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. • Habitat clearing is to be staged, commencing from existing edge lines / roads and progressing towards habitat that will be retained to direct WRP and BTP towards these areas as per the proposed clearing staging (Figure 3, Appendix A) • Vacant dreys within felled trees will be destroyed immediately to prevent animals re-entering them • A post-clearing survey shall be undertaken immediately following each day’s clearing operations and the following morning to identify the presence of any injured animals • Possum fencing (temporary and permanent) will be installed adjacent at known habitat areas to exclude WRP and BTP moving onto the road (Figure 4, Appendix A). The fencing will be 1.5 m high and be constructed to prevent possums being able to climb it or dig under it. <p>Terrestrial fauna handling</p> <ul style="list-style-type: none"> • Fauna handling will only be conducted by a suitably experienced persons i.e. zoologist / fauna spotter • Any WRP and BTP showing signs of injury or illness will be caught, bagged and taken to an experienced wildlife veterinarian or approved wildlife rehabilitation facility. 	

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
	<ul style="list-style-type: none"> • If an injured WRP and BTP has not already been captured, then the appointed fauna-spotter must attempt to capture the animal for the purposes of veterinary assessment and treatment • All treatment of injured fauna will be undertaken by a veterinarian • Where clearing operations abut existing roads, in addition to standard traffic management measures, visual message boards will be installed to warn drivers of the potential for fauna to cross the road during clearing operations. • Install permanent possum rope bridges / underpasses at key location(s) to enable fauna including WRP and BTP to move between retained habitat areas, see Figure 4 (Appendix A), including but not limited to: <ul style="list-style-type: none"> - Across the existing Forrest Highway to facilitate movement within existing habitat east and west of the highway - Across Clifton Road to facilitate movement north to the Brunswick River - Across the Proposal Area at the Paris Road interchange to facilitate movement to the Brunswick River - At the Picton Boyanup interchange to connect retained vegetation - At the Collie, Ferguson and Preston Rivers to facilitate movement along the riverine vegetation <p>The size and design of all movement devices will be based on MRWA Design of Fauna Underpasses (MRWA, 2010), topography at the site, expert advice (Barbara Jones, pers. comm.), information from relevant studies and reports (QDMR, 2000; Harper, M., Mccarthy, M. & van der Ree, R., 2008) and in line with the concept designs (Figure 5, Appendix A)</p> <p>Underpass dimensions will be based on the fauna recorded or expected to occur in the vicinity, Figure 2 (Appendix A)</p> <ul style="list-style-type: none"> • The final underpass designs will incorporate the following features known to encourage use by fauna and reduce the risk of predation: <ul style="list-style-type: none"> - Connection to nearby habitat via overhead rope hawsers and poles (minimum 2.5 m high) - Objects for fauna to shelter on, under or in (furniture) will be locally sourced and will include sand, mulch, logs and rocks - Revegetation using fast growing species at underpass entrances to provide cover for animals approaching, entering and leaving the underpasses - Natural flooring such as sand or gravel 	

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
	<ul style="list-style-type: none"> - Possum fencing to direct fauna towards the underpass entrance - Dual-use underpasses will have a concrete substrate and will not contain furniture (furniture would be washed away by drainage flows) • Install possum fence adjacent to known habitat areas to limit WRP and BTP access to the Proposal Area, see Figure 4 (Appendix A) • The possum fence will be 1.5 m high and constructed to prevent WRP being able to climb it or dig under it, congruent with Figure 6 (Appendix A) • Road construction activities (i.e. activities undertaken after clearing has been completed) adjacent to WRP and BTP habitat will only be undertaken during daylight hours • The Proposal Area boundary will be fenced according to the detailed design to restrict pedestrian and vehicular access to retained WRP and BTP habitat 	
Post construction	Not applicable (monitoring and as-needed corrective action activities only)	Not applicable

Table 6-2 CFM management actions and performance targets

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
Prior to construction	<ul style="list-style-type: none"> • Inspection of known CFM habitat for CFM individuals. Changes to the Proposal design mean that no direct impact to CFM habitat is anticipated as no bridge abutment piers are located in the water course. Translocation of CFM is therefore unlikely to be required and would only be triggered in response to sedimentation of water ways resulting from construction activities. If required, translocation procedures will be developed in consultation with DBCA or the Fisheries Branch of the Department of Primary Industries and Regional Development. 	<ul style="list-style-type: none"> • Avoid direct impacts to CFM
During construction	<ul style="list-style-type: none"> • Where possible, initial earthworks in CFM habitat will occur during summer months (Oct-April) when water levels are at their lowest • Install silt curtains up and downstream of the Collie, Ferguson and Preston River bridge construction areas • Long term hydrocarbon storage (i.e. hydrocarbons which shall not be used that day or not stored within equipment waiting to be used) or re-fuelling of equipment (with the exception of stationary plant) will not be permitted within 50 m of CFM habitat • The Construction Contractor will prepare a Spill Response Procedure for oil, chemical or hazardous material spill events to ensure any spill is contained effectively and cleaned up appropriately and efficiently with approved materials • Design and construction of drainage to maintain surface water flows and groundwater regimes consistent with the pre-disturbance condition (baseline) as far as practicable • Prior to any interruption of current surface water flows, culverts will be installed. 	<ul style="list-style-type: none"> • Avoid direct impacts to CFM • Maintain water quality levels within specified guidelines • Avoid changes in hydrology from baseline conditions • Avoid indirect impacts to CFM
Post construction	Not applicable (monitoring and as-needed corrective action activities only)	<ul style="list-style-type: none"> • Not applicable

Table 6-3 BSM management actions and performance targets

TIMING	MANAGEMENT ACTIONS	PERFORMANCE TARGETS
Prior to construction	<ul style="list-style-type: none"> • Not applicable (monitoring activities only) 	<ul style="list-style-type: none"> • Not applicable
During construction	<ul style="list-style-type: none"> • Where possible, initial earthworks in BSM habitat will occur during summer months (Oct-April) when wetlands are dry and water levels are at their lowest • Install a suitable culvert to maintain habitat connectivity for BSM (small watercourse) during construction at the drainage line where it has been located at the southern end of the Proposal. Culverts will be installed prior to any interruption of current surface water flows or fish pathways. • Install silt curtains or fences on the banks at bridge crossing point that have adjacent aquatic habitat • Long term hydrocarbon storage (i.e. hydrocarbons which shall not be used that day or not stored within equipment waiting to be used) or re-fuelling of equipment (with the exception of stationary plant) will not be permitted within 50 m of BSM habitat • The Construction Contractor will prepare a Spill Response Procedure for oil, chemical or hazardous material spill events to ensure any spill is contained effectively and cleaned up appropriately and efficiently with approved materials • Through detailed design, maintain hydrologic connections between BSM habitat areas to enable fish movement • Design and construction of drainage to maintain surface water flows and groundwater regimes consistent with the pre-disturbance condition (baseline) as far as practicable 	<ul style="list-style-type: none"> • Avoid clearing outside the approved footprint • Maintain connectivity between potential BSM habitat areas • Maintain water quality levels within specified guidelines • Avoid changes in hydrology from baseline conditions • Avoid indirect impacts to BSM in adjacent habitat
Post construction	Not applicable (monitoring and as-needed corrective action activities only)	<ul style="list-style-type: none"> • Not applicable

6.1.1 SMART performance standards

The DoEE (2019) *Action Management Plan Criteria* identifies the application of 'SMART' (Specific, Measurable, Achievable, Relevant and Time-bound) performance standards to be applied to AMPs, in addition to the management and monitoring actions identified within the DoE (2014) guideline.

SMART performance standards are intended to relate to measurable (numerical) values which can be applied to a Proposal (rather than qualitatively measured management / monitoring actions), and may include measurements such as 'threshold criteria', 'performance indicators', 'corrective actions' and 'completion criteria'.

In relation to conservation significant fauna, Main Roads has prepared SMART performance standards directly related to the measurable impacts of the Proposal on each taxa as identified in Table 5-2 for WRP and BTP and Table 5-3 for BSM, and potential indirect impacts as identified in Section 5.3. The proposed SMART performance standards for the Proposal are identified in Table 6-4 to Table 6-6.

These SMART performance standards are aligned to the management actions and performance targets identified in Table 6-1 to Table 6-3, the monitoring actions identified in Table 6-7 to Table 6-9 and the corrective actions identified in Table 6-10 to Table 6-12.

The 'threshold criteria' and 'completion criteria' are considered to be achievable, with the risk potential of not achieving the proposed SMART performance standards captured by the risk assessment presented in Table 5-4 to Table 5-6.

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

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

Table 6-4 SMART performance standards for WRP and BTP

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-10)	COMPLETION CRITERIA
<p>Avoid direct impacts to WRP and BTP individuals</p> <p>Preclude use of refuge sites within the Proposal Area prior to construction</p>	WRP or BTP death suspected to be a consequence of construction activity	Number WRP or BTP 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) 	No WRP or BTP mortalities as a consequence of construction activity
<p>Avoid clearing outside the approved footprint</p> <p>Reduce clearing of WRP and BTP habitat to the extent practicable in final design</p>	Clearing of up to 43.9 ha of WRP habitat and up to 17.7 ha of BTP habitat	Amount of WRP and BTP 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). 	Not more than 43.9 ha of WRP and 17.7 ha of BTP habitat cleared
<p>Avoid indirect impacts to WRP in adjacent habitat</p>	Loss of WRP in any monitoring period at potential impact sites but not in reference sites in three consecutive monitoring periods	WRP abundance trends at potential impact sites and comparative reference sites	<ul style="list-style-type: none"> • Investigate cause and consult with DBCA and / or DAWE • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevance of management measures - Repair / alter design of fencing to block vehicular access if required - Install additional signage - Better connecting populations. • Monitor outcomes. 	WRP abundance trends at potential impact sites commensurate with those at reference sites

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-10)	COMPLETION CRITERIA
	Reduction in habitat quality in adjacent habitat but not in reference site habitat over two consecutive periods	Quality / condition of known WRP and BTP habitat adjacent to the Proposal area	<ul style="list-style-type: none"> • Investigate cause and consult with DBCA and / or DAWE • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevance of management measures - Improve and implement increased protective measures/controls as necessary - Repair / alter design of fencing to block vehicular access if required - Install additional signage • Monitor outcomes. 	Quality / condition of WRP and BTP habitat adjacent to the Proposal Area is maintained at baseline or any change is commensurate with that at reference site habitat
Maintain connectivity between known WRP and BTP habitat areas	Installation of engineered movement structures as per specification	Number and design of installed structures	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevant of management measures - Improve training and education for all personnel - Improve and implement increased protective measures/controls as necessary - Review monitoring frequency and method • Monitor outcomes. 	Installation of engineered movement structures as per specification

Table 6-5 SMART performance standards for CFM

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-11)	COMPLETION CRITERIA
Avoid direct impacts to CFM	CFM found in potential impact area	Number of CFM present in potential impact areas	In consultation with DBCA, CFM relocated to identified recipient habitat by a suitably qualified environmental scientist	No CFM mortalities as a consequence of construction activity
Maintain water quality levels within specified guidelines	ANZECC guidelines Vol 1 standard triggers on two occasions and/or significant difference from baseline conditions in two monitoring periods	Water quality parameter levels	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. Monitor outcomes. 	Water quality levels are maintained within specified guidelines
	Erosion / sedimentation cause has not been remediated within eight days of detection	Number of days before erosion / sedimentation is remediated after detection	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary Remedial action controls will be undertaken immediately to repair damage if required Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. These may include: <ul style="list-style-type: none"> - Application of fill / mulch - Installation of gabion cages - Installation of jute matting to secure bank 	

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-11)	COMPLETION CRITERIA
			<ul style="list-style-type: none"> Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Monitor outcomes. 	
	Source of plume and / or damage to silt curtain / fence has not been remediated within five days of detection	Number of days before plume and / or damage to silt curtain / fence is remediated after detection	<ul style="list-style-type: none"> Investigate cause and raise an incident report Implement contingency actions which may include: <ul style="list-style-type: none"> Inspect and repair any damaged/ineffective silt curtain / fencing Review practicality and relevant of management measures Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Review monitoring frequency and method. Monitor outcomes. 	
	Riparian vegetation damage / loss cause has not been remediated within five days of detection	Number of days before riparian vegetation damage / loss is remediated after detection	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary Implement contingency actions which may include: <ul style="list-style-type: none"> Inspect and repair any habitat demarcation fencing Review practicality and relevant of management measures Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Review monitoring frequency and method. Monitor outcomes. 	
Avoid changes in hydrology from baseline conditions	Change in hydrology from baseline conditions (quantum to be	Surface water flows and groundwater levels	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion 	Hydrology baseline functions and values are maintained

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-11)	COMPLETION CRITERIA
	determined based on baseline monitoring)		<ul style="list-style-type: none"> • Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. • Monitor outcomes. 	
Avoid indirect impacts to CFM	CFM absent from known habitat areas within the Proposal Area but present at reference sites in two monitoring periods	CFM presence / absence	<ul style="list-style-type: none"> • Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion • Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. • Monitor outcomes. 	CFM presence in known habitat within the Proposal Area is maintained post construction

Table 6-6 SMART performance standards for BSM

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-12)	COMPLETION CRITERIA
Avoid clearing outside the approved footprint	Clearing of 0.55 ha of BSM habitat	Amount of BSM habitat cleared	<ul style="list-style-type: none"> 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). 	Not more than 0.55 ha of BSM habitat cleared
Maintain connectivity between potential BSM habitat areas	Culvert blocked or ineffective five days after initial detection	Presence /absence of damage or blockage	<ul style="list-style-type: none"> Investigate cause and raise an incident report Implement contingency actions which may include: <ul style="list-style-type: none"> Unblocking the culvert Review practicality and relevance of management measures Revision of maintenance and weed control program to ensure culvert remains free of debris and other matter Preventative actions such as modifications to infrastructure and additional engineering post-construction to prevent further non-compliance A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Review monitoring frequency and method Monitor outcomes. 	Connectivity between potential BSM habitat areas is maintained
Maintain water quality levels within specified guidelines	ANZECC guidelines Vol 1 standard triggers on two occasions and/or	Water quality levels	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion 	Water quality levels are maintained within

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-12)	COMPLETION CRITERIA
	significant difference from baseline conditions in two monitoring periods		<ul style="list-style-type: none"> A review will be conducted of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. Monitor outcomes. 	specified guidelines
	Erosion / sedimentation cause has not been remediated within 8 days of detection	Number of days before erosion / sedimentation is remediated after detection	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary Remedial action controls will be undertaken immediately to repair damage if required Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. These may include: <ul style="list-style-type: none"> - Application of fill / mulch - Installation of gabion cages - Installation of jute matting to secure bank A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Monitor outcomes. 	
Avoid changes in hydrology from baseline conditions	Change in hydrology from baseline conditions (quantum to be determined based on	Surface water flows and groundwater levels	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence 	Hydrology baseline functions and values are maintained

PERFORMANCE TARGET	THRESHOLD CRITERIA	PERFORMANCE INDICATORS	CORRECTIVE ACTIONS (REFER Table 6-12)	COMPLETION CRITERIA
	baseline monitoring)		<ul style="list-style-type: none"> Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance Monitor outcomes. 	
Avoid indirect impacts to BSM in adjacent habitat	BSM absent from known habitat areas adjacent to the Proposal Area	BSM presence / absence	<ul style="list-style-type: none"> Investigate cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. Monitor outcomes. 	BSM presence in habitat areas adjacent to the Proposal Area is maintained

6.2 Environmental maps and diagrams

- Figure 1 identifies the location of the Proposal
- Figure 2 identifies the locations of WRP observations and habitat clearing categories
- Figure 3 shows the clearing staging plan
- Figure 4 identifies fauna crossing provisions and exclusion fencing concept plans
- Figure 5 shows the fauna crossing typical details
- Figure 6 shows the Possum fence concept plan
- Figure 7 identifies CFM observations within and adjacent to the Proposal Area
- Figure 8 identifies BSM observations within and adjacent to the Proposal Area
- Figure 9 identifies BTP records within and adjacent to the Proposal Area

6.3 Environmental monitoring

Main Roads has identified key monitoring actions to monitor the potential impacts of the Proposal to conservation significant fauna individuals and habitat during and post construction. These encompass monitoring of both direct and indirect impacts of the Proposal.

Main Roads will liaise with DAWE, DWER and DBCA as required to refine proposed triggers, thresholds and corrective actions.

Monitoring will be undertaken by suitably qualified individuals for the methodology type specified. For example, the visual assessment of dreys and hollows will be undertaken by a zoologist / environmental scientist.

The proposed monitoring methodologies and programs for each conservation significant fauna taxa are presented below.

6.3.1 WRP and BTP monitoring program

The WRP and BTP monitoring program is presented in Table 6-7.

Objective

The objectives of the monitoring program are to

1. conduct WRP surveys in areas of retained habitat and compare the survey results with data collected from reference sites
2. obtain evidence of use by WRP of underpasses and possum rope bridges
3. obtain detected / undetected data for BTP and build a record of where BTP have been sighted.

Monitoring for impacts to WRP and BTP will be conducted at both reference sites and areas of retained habitat abutting the Proposal Area. The monitoring will comprise scat counts and nocturnal surveys to be conducted by a suitably experienced zoologist / environmental scientist.

Reference sites and potential impact sites

Main Roads has commenced monitoring of two reference sites outside of the Proposal Area. These are located abutting the existing BORR Stage 1 (Lot 2 Boyanup Picton Road) and Reserve (R23000) abutting Bussell Highway in Gelorup. Any reduction in WRP presence at potential impact sites will be compared with those in the reference sites. This will enable determination of the likelihood of impacts having resulted from the Proposal.

Data analysis

Field data will be collated and reviewed after each monitoring survey. Analysis will include comparison of data and trends between seasons and years, and also between reference sites and potential impact sites.

Table 6-7 Proposed WRP monitoring program

PERFORMANCE TARGET(S)	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
Avoid direct impacts to WRP and BTP individuals	Injury or death of WRP or BTP	Pre-clearing and post-clearing walkover inspection of cleared areas and fallen trees for conservation significant fauna species Pre-demolition visual assessments Pre-removal visual checks of vegetation stockpile areas	During construction: Daily prior to and after each clearing and demolition event and opportunistically during clearing Post construction: Not applicable	Injury or death of WRP or BTP recorded by construction contractor and reported to Manager Environment within 24 hours of incident occurring Main Roads to consult with DBCA of the WRP and BTP injury or mortality occurring Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Reduce clearing of WRP habitat to the extent practicable in final design Avoid clearing outside the approved footprint	Clearing area (ha) of WRP and BTP habitat within design specification	Pre-clearing: Assessment of final design against approved clearing area During construction: Construction area assessment to visually check / review clearing boundaries and assess vegetation clearing	During construction: Prior to clearing and daily Post construction: Not applicable	Area of WRP and BTP habitat cleared recorded by construction contractor and reported to Manager Environment monthly Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Preclude use of refuge sites within the Proposal Area	WRP and BTP access to potentially suitable refuge sites	Visual inspection	During construction: Pre-clearing	Number of potentially suitable refuge sites blocked prior to construction recorded by construction contractor and

PERFORMANCE TARGET(S)	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
prior to construction				reported to Manager Environment monthly
Maintain connectivity between known WRP and BTP habitat areas	Engineered movement structures included in design specification	Review of design reports and drawings at 50 % design and IFC (issued for construction) to ensure WRP and BTP bridges / underpasses are designed and incorporated into Proposal	Pre-construction	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
	Engineered movement structures installed within specification	Visual assessment of constructed / in construction WRP and BTP movement structures to confirm these are as per detailed design	During construction: Bi-annually	
	WRP / BTP scat presence / absence	Visual inspection for WRP / BTP scats beneath rope bridges and in underpasses	During construction: Bi-annually Post construction: Quarterly for five years	
	WRP or BTP filmed using rope bridge or underpass	Use motion sensor IR cameras to assess utilisation (visual assessment of footage)	Post construction: Intermittent lyfor five years	
Avoid indirect impacts to WRP in adjacent habitat	WRP and BTP presence/ absence, abundance and distribution	Nocturnal visual assessment for WRP and BTP in potential impact sites (retained habitat at the Paris Road / Clifton Road interchange and Boyanup Picton Road interchange) and current reference sites (Lot 2 Boyanup Picton Road and Reserve 23000 Bussell Highway)	During construction: Bi-annually Post construction: Bi-annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold

PERFORMANCE TARGET(S)	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
	Possum fence installation within specification Possum fence condition	Visual inspection of constructed / in construction possum fences Visual inspection of possum fence for damage	During construction: Bi-annually Post construction: Bi-annually for five years	
	Quality / condition of known WRP and BTP habitat adjacent to the Proposal area	Visual assessment of habitat quality	During construction: Bi-annually Post construction: Bi-annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold

6.3.2 CFM monitoring program

The CFM monitoring program is presented in Table 6-8.

Objective

The objective of the monitoring program is to conduct CFM surveys in areas of retained habitat and compare the survey results with data collected from reference sites

Reference sites and potential impact sites

Monitoring for impacts to CFM will be conducted at both reference sites and potential impact site (Ferguson River) within the Proposal Area. A reference site will be established at the Preston River for the purposes of providing comparative species and population trend data. Monitoring will comprise sampling and visual assessments, and include photo monitoring. Monitoring will be conducted by a suitably experienced zoologist / environmental scientist.

Baseline data collection at monitoring sites will commence early 2020. Any changes in conditions at potential impact sites will be compared with those in the reference site. Note: if relocation should be required, monitoring of CFM during construction will focus on monitoring of the relocation and reference sites and following completion of construction would include the impact site following the replacement of CFM (during operational phase). This will enable determination of the likelihood of impacts having resulted from Proposal.

Data analysis

Data analysis will consist of the following:

Water quality

Assessment of change against baseline conditions and comparison with ANZECC guideline values.

Presence / absence

Assessment of presence / absence data and trends between monitoring periods and between potential impact sites and reference sites.

Table 6-8 Proposed CFM monitoring program

PERFORMANCE TARGET(S)	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
Avoid direct impacts to CFM	CFM presence / absence	Visual inspection in known habitat areas within the Proposal Area (Ferguson River)	During construction: Pre-clearing Post each clearing event and opportunistically	Injury or death of CFM recorded by construction contractor and reported to Manager Environment within 24 hours of incident occurring Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Maintain water quality levels within specified guidelines	Surface water quality parameters critical to CFM survival (including TN, TP, temperature, pH, oxidation-reduction potential, conductivity and turbidity)	Sampling using appropriate water quality meters and / or laboratory analysis Location: Upstream and downstream of the Ferguson River bridge site	Prior to construction: Quarterly During construction: Quarterly Post construction: Bi-annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
	Condition / presence of riparian vegetation adjacent to CFM habitat	Visual inspection	During construction: Opportunistic and weekly Post construction: Bi-annually for three years	
	Bank stability including evidence of erosion or sedimentation of CFM habitat	Visual inspection	During construction: Opportunistic and weekly Post construction: Bi-annually for three years	

PERFORMANCE TARGET(S)	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
	Presence/ absence of offsite discharge	Visual inspection of condition and functioning of installed silt curtain / fence and for offsite discharges from the Proposal Area into CFM habitat	During construction: Opportunistic and weekly	
Avoid changes in hydrology from baseline conditions	Surface water and groundwater levels in known CFM habitat	Manual water level sampling and / or measurement of waterbody depth	During construction: Quarterly (where able e.g. winter /spring only for surface water) Post construction: Bi-annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Avoid indirect impacts to CFM	CFM presence / absence	Visual inspection in known habitat areas within the Proposal Area (Ferguson River) and in one reference site (Preston River)	Post construction: Annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold

6.3.3 BSM monitoring program

The BSM monitoring program is presented in Table 6-9.

Objective

The objective of the monitoring program is to conduct BSM surveys in areas of retained habitat and compare the survey results with data collected from reference sites

Reference sites and potential impact sites

Monitoring for impacts to BSM will be conducted at a reference site (Manea Park) and potential impact site (drainage line at southern extent of the Proposal Area (approx. Ch.110.700)). The reference site will be established for the purposes of providing comparative species and population trend data. Monitoring will comprise sampling and visual assessment, and will include photo monitoring. Monitoring will be conducted by a suitably experienced zoologist / environmental scientist.

Baseline data collection at the reference site will commence in 2020. Any changes in conditions at potential impact sites will be compared with those in reference sites. This will enable determination of the likelihood of impacts having resulted from Proposal implementation to ensure surface water flows are maintained through the implementation of the Proposal.

Photo point design

Photo points will be used in assessing sedimentation and function of the culvert and will be established prior to construction commencing. Where possible, photo points will be marked permanently with a stake and their locations will be and recorded using a handheld GPS. All photographs will be taken from the top of the stake. Photo point monitoring will form part of each monitoring event.

Data analysis

Data analysis will consist of the following:

Water quality

Assessment of change against baseline conditions and comparison with ANZECC guideline values.

Presence / absence

Assessment of presence / absence data and trends between monitoring periods and between potential impact sites and reference sites.

Table 6-9 Proposed BSM monitoring program

PERFORMANCE TARGET	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
Avoid clearing outside the approved footprint	Clearing area (ha) of BSM habitat within design specification	Pre-clearing: Assessment of final design against approved clearing area During construction: Construction area assessment to visually check / review clearing boundaries and assess vegetation clearing	During construction: Prior to clearing and daily	Area of BSM habitat cleared recorded by construction contractor and reported to Manager Environment monthly Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Maintain connectivity between potential BSM habitat areas	Culverts and / or fish pathways within design specification	Visual inspection for damage to or blockage of BSM habitat and / or fish pathways	During construction: Annually Post construction: Annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Maintain water quality levels within specified guidelines	Surface water quality parameters critical to BSM survival (including TN, TP, temperature, pH, oxidation-reduction potential, conductivity and turbidity)	Sampling using appropriate water quality meters and / or laboratory analysis Location: Upstream and downstream of the Ferguson River bridge site	Prior to construction: Quarterly During construction: Quarterly Post construction: Bi-annually for three years	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
	Bank stability including evidence of erosion or sedimentation of BSM habitat	Visual inspection	During construction: Opportunistic and weekly Post construction: Bi-annually for three years	

PERFORMANCE TARGET	PARAMETER TO BE MONITORED	METHODOLOGY	FREQUENCY	RECORDING AND REPORTING
Avoid changes in hydrology from baseline conditions	Surface water and groundwater levels in known BSM habitat	Manual water level sampling and / or measurement of waterbody depth	<p>During construction: Quarterly (where able e.g. winter / spring only for surface water)</p> <p>Post construction: Biannually for three years</p>	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold
Avoid indirect impacts to BSM in adjacent habitat	Presence /absence of BSM	Visual inspection of known habitat areas and at least one reference area	<p>During construction: Annually</p> <p>Post construction: Annually for three years</p>	Report annually as part of annual compliance reporting or in response to exceedance of an agreed trigger or threshold

6.4 Corrective actions

The adaptive management approach aims to reduce impacts by embedding a cycle of monitoring, reporting and implementing change (where required). Main Roads will apply the principles of adaptive management through monitoring, adaptive management actions and implementing changes necessary to effectively meet the environmental objective. The AMP is intended to be dynamic and will be updated to reflect changes in management practices over the life of the Proposal. This will also allow flexibility to respond to new environmental impacts and adopt new technologies / management measures. Adaptive management has been embedded throughout this document, with the key management processes described below.

Potential corrective actions for each of the conservation significant fauna species are listed, but not limited to, those outlined in Table 6-10 to Table 6-12.

Table 6-10 WRP and BTP corrective actions

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
<p>Avoid direct impacts to WRP and BTP individuals</p> <p>Preclude use of refuge sites within the Proposal Area prior to construction</p>	<p>Unexpected observation of WRP or BTP on site</p>	<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)
	<p>Live individual identified within hollow of a felled tree (despite pre-clearing fauna survey of hollows)</p>	
	<p>Injured WRP or BTP individual within Proposal Area with injury suspected to be a consequence of construction activity</p>	<ul style="list-style-type: none"> • All clearing and / or construction within known WRP and BTP habitat is immediately ceased • Investigate cause of injury or loss • Main Roads to consult with DBCA and DAWE of the WRP and BTP injury or mortality occurring • Revise clearing and construction measures for minimising impacts to WRP / BTP in consultation with DBCA to reduce likelihood of further WRP / BTP injury / mortality before work recommences • Improve training and education for all personnel • Restart clearing within core habitat area and monitor outcomes.
	<p>Possum fence installation not within design specification</p>	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevant of management measures - Improve training and education for all personnel - Improve and implement increased protective measures/controls as necessary - Review monitoring frequency and method • Monitor outcomes.

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
<p>Avoid clearing outside the approved footprint</p> <p>Reduce clearing of WRP and BTP habitat to the extent practicable in final design</p>	<p>Clearing or disturbance of WRP or BTP habitat outside of the approved works area</p> <p>Unauthorised clearing of WRP or BTP habitat within the approved development envelope</p>	<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 • Undertake remediation works (if appropriate, following consultation with DBCA and / or DAWE).
<p>Avoid indirect impacts to WRP in adjacent habitat</p>	<p>Loss of WRP in any monitoring period at potential impact sites but not in reference sites in two consecutive monitoring periods</p>	<ul style="list-style-type: none"> • Investigate cause and consult with DBCA and / or DAWE • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevance of possum fence and other management measures - Improve and implement increased protective measures / controls as necessary - Repair / alter design of fencing to block vehicular access if required - Install additional signage - Better connecting populations. • Monitor outcomes.
	<p>Reduction in habitat quality in adjacent habitat but not in reference site habitat in one monitoring period</p>	<ul style="list-style-type: none"> • Investigate cause and consult with DBCA and / or DAWE • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevance of management measures - Improve and implement increased protective measures/controls as necessary - Repair / alter design of fencing to block vehicular access if required - Install additional signage • Monitor outcomes.
<p>Maintain connectivity between known WRP and BTP habitat areas</p>	<p>WRP and BTP bridges / underpasses not included in design drawings</p>	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevant of management measures - Improve training and education for all personnel

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
		<ul style="list-style-type: none"> - Improve and implement increased protective measures / controls as necessary - Review monitoring frequency and method • Monitor outcomes.
	WRP and BTP bridges / underpasses not within design specification	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Review practicality and relevant of management measures - Improve training and education for all personnel - Improve and implement increased protective measures / controls as necessary - Review monitoring frequency and method • Monitor outcomes.
	Bridges / underpasses not used within 24 months of installation	<ul style="list-style-type: none"> • Investigate cause and consult with DBCA • Implement contingency actions which may include: <ul style="list-style-type: none"> - Assessment of bridge / underpass to determine reason for lack of utilisation - Modification of bridge / underpass structure if required. • Monitor outcomes.

Table 6-11 CFM corrective actions

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
Avoid direct impacts to CFM	CFM found in potential impact site within the Proposal Area	<ul style="list-style-type: none"> In consultation with DBCA, CFM relocated to identified recipient habitat by a suitably qualified environmental scientist
Maintain water quality levels within specified guidelines	ANZECC guidelines Vol 1 standard triggers for toxicants at 95% level of protection (Table 3.4.1) and Tables 3.3.6 – 3.3.7 default trigger values for physical and chemical stressors for south-west Australia for slightly disturbed ecosystems and/or significant difference from baseline conditions in one monitoring period	<ul style="list-style-type: none"> Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. Monitor the effectiveness of the control(s).
	Plume detected outside of silt curtain Silt curtain / fence damaged or ineffective Evidence of bank instability or new erosion / sedimentation in monitored CFM habitat	<ul style="list-style-type: none"> Investigate cause and raise an incident report Implement contingency actions which may include: <ul style="list-style-type: none"> Inspect and repair any damaged / ineffective silt curtain / fencing Review practicality and relevant of management measures A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence Review monitoring frequency and method. Monitor outcomes.
	New physical damage to or loss of adjacent riparian vegetation in known CFM habitat areas	<ul style="list-style-type: none"> Investigate cause and raise an incident report Implement contingency actions which may include: <ul style="list-style-type: none"> Inspect and repair any damaged / ineffective habitat demarcation Review practicality and relevant of management measures

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
		<ul style="list-style-type: none"> - Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence - Review monitoring frequency and method. <ul style="list-style-type: none"> • Monitor outcomes.
Maintain hydrology baseline functions and values	Change in hydrology from baseline functions and values (quantum to be determined based on baseline monitoring)	<ul style="list-style-type: none"> • Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause • Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance • Monitor outcomes.
Avoid indirect impacts to CFM	CFM absent from known habitat areas within the Proposal Area post-construction	<ul style="list-style-type: none"> • Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause • Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance • Monitor outcomes.

Table 6-12 BSM corrective actions

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
<p>Avoid clearing outside the approved footprint</p>	<p>Clearing or disturbance of BSM habitat outside of the approved works area</p> <p>Unauthorised clearing of BSM habitat within the approved development envelope</p>	<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 / or DBCA).
<p>Maintain water quality levels within specified guidelines</p>	<p>ANZECC guidelines Vol 1 standard triggers for toxicants at 95% level of protection (Table 3.4.1) and Tables 3.3.6 – 3.3.7 default trigger values for physical and chemical stressors for south-west Australia for slightly disturbed ecosystems and/or significant difference from baseline conditions in one monitoring period</p>	<ul style="list-style-type: none"> • Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion • A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. • Monitor the effectiveness of the control(s).
	<p>Evidence of bank instability or new erosion / sedimentation in monitored BSM habitat</p>	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Inspect and repair any damaged / ineffective habitat demarcation - Review practicality and relevance of management measures - Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence - Review monitoring frequency and method.

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
		<ul style="list-style-type: none"> • Monitor outcomes.
Maintain hydrology baseline functions and values	Change in hydrology from baseline functions and values (quantum to be determined based on baseline monitoring)	<ul style="list-style-type: none"> • Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause • Conduct review of management measures and / or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance • Monitor outcomes.
Maintain connectivity between potential BSM habitat areas	Culvert blocked or ineffective	<ul style="list-style-type: none"> • Investigate cause and raise an incident report • Implement contingency actions which may include: <ul style="list-style-type: none"> - Unblocking the culvert - Review practicality and relevance of management measures - Revision of maintenance and weed control program to ensure culvert remains free of debris and other matter - Preventative actions such as modifications to infrastructure and additional engineering post-construction to prevent further non-compliance - Conduct review of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence - Review monitoring frequency and method • Monitor outcomes.
Avoid indirect impacts to BSM	BSM absent from known habitat areas adjacent to the Proposal Area	<ul style="list-style-type: none"> • Investigate the cause and raise an incident report if necessary. Include consideration of results from baseline monitoring and comparison with reference sites for the same period • Remedial action controls will be undertaken if required – to be determined based on likely cause e.g. spills, sedimentation or erosion

PERFORMANCE TARGET	TRIGGER	CORRECTIVE ACTION
in adjacent habitat		<ul style="list-style-type: none"> • A review will be conducted of management measures and/or further education of staff / contractors to ensure that all possible steps are taken to prevent any reoccurrence • Preventative actions such as modifications to infrastructure and additional engineering post-construction will be taken to prevent further non-compliance. • Monitor the effectiveness of the control(s).

7 AUDIT AND REVIEW

This AMP adopts an ‘adaptive management’ approach which seeks to embed a cycle of monitoring, reporting and implementing change, where required. Accordingly, it is intended that this AMP may be updated (as required) over the life of the Proposal to reflect changes in the monitoring and management practices, subject to the results of the monitoring to identify that the environmental objectives are being achieved. The AMP may also be revised to address learnings from the implementation of corrective actions, should this occur.

In addition, auditing and review schedules are necessary to embed a formal process to identify and consider any need to update the AMP in order to achieve improved environmental performance (which may not otherwise be triggered by management or monitoring outcomes).

After completion of the construction contract, the BORR will be managed in line with Main Roads’ operational management procedures for the maintenance of roads.

7.1 Environmental auditing

This AMP will be audited annually by Main Roads during construction for the Proposal to ensure the implementation of the management and monitoring measures, and to confirm the management measures specified are achieving the environmental outcomes.

The proposed auditing schedule for this AMP is identified in Table 7-1.

Table 7-1 Environmental audit schedule

TIMING	ACTION	SCHEDULE
Pre-construction	Review of construction procedures to ensure AMP management / monitoring actions are incorporated within works procedures	Prior to construction (single event)
Construction	Inspections by site environmental personnel to identify compliance with AMP	Periodic (generally weekly)
	Independent ‘third-party’ audit for assessment of compliance with AMP	Annually (once per calendar year)
Post construction	Independent ‘third-party’ audit for assessment of compliance with AMP	Annually (once per calendar year for up to 3 years)

The results of the construction and post construction independent ‘third-party’ audit findings will be reported by Main Roads to DAWE and DWER as part of annual compliance reporting as outlined within Section 4.

7.2 Environmental review

Main Roads proposes to review this AMP annually in order to consider:

- the management and monitoring actions

- opportunities for an improvement in environmental performance (for example, changes to construction methodology or timing)
- identify a need to update this AMP to capture changes to the management and/or monitoring actions
- identify any general need to update this AMP (for example, to capture new information on Black Cockatoos knowledge or management).

Main Roads acknowledge that a revision to this AMP may trigger a need for additional approval by DAWE and / or DWER prior to implementing any changes to the specified management or monitoring actions.

The proposed AMP review schedule for the Proposal is identified in Table 7-2.

Table 7-2 AMP review schedule

TIMING	ACTION	SCHEDULE
Pre-construction, Construction and Post construction	Review of AMP management and monitoring actions Review of opportunities for an improvement in environmental performance Revise AMP (if appropriate) and seek approval of DAWE for revised AMP	Annually (once per calendar year)

7.3 Data management

Main Roads will maintain records on the implementation of this AMP in accordance with Main Roads' corporate standard document control procedures.

The retention of records held by Main Roads will be maintained and managed in accordance with the Western Australian *State Records Act 2000* (WA).

8 STAKEHOLDER CONSULTATION

8.1 Stakeholder consultation

Main Roads has consulted with a range of stakeholders on the Proposal. These consultations have assisted to inform the preparation of this AMP.

A list summary of the stakeholders consulted on the Proposal (for which the environmental impact and management of conservation significant fauna taxa were discussed) is identified in Table 8-1.

Table 8-1 Stakeholder consultation

TYPE	STAKEHOLDER	CONSULTATION ISSUES
Community	BORR Northern and Central Community Reference Group	<ul style="list-style-type: none"> • Proposal design to minimise impact to fauna habitat and wetland habitat • Residual direct and potential indirect impacts to fauna habitat • Management and monitoring of conservation significant fauna taxa • Environmental assessment processes relevant to conservation significant fauna taxa
Government	<ul style="list-style-type: none"> • Commonwealth Department of Agriculture, Water and Environment • State Department of Water and Environment Regulation (EPA Services) • State Department of Biodiversity, Conservation and Attractions 	<ul style="list-style-type: none"> • Proposal design to minimise impact to conservation significant fauna taxa habitat • Residual direct and potential indirect impacts to conservation significant fauna taxa habitat • Preparation / implementation of an AMP for the management and monitoring of impacts to conservation significant fauna taxa
Scientific community / industry	Biota Environmental Sciences (Dr. Roy Teale)	<ul style="list-style-type: none"> • Provided advice regarding monitoring and management of WRP and BTP that has been incorporated into the development of this AMP.
	Wetland Research and Management	<ul style="list-style-type: none"> • Provided advice regarding monitoring and management of CFM and BSM that has been incorporated into the development of this AMP.
	Ms. Barbara Jones	<ul style="list-style-type: none"> • Provided advice regarding monitoring and management of WRP that has been incorporated into the development of this AMP.

8.2 External communications and complaints

The Construction Contractor will develop and maintain a complaints register to record all complaints. Complaints will be recorded by the person who receives the complaint (at the time it is received). Records to be obtained about a complaint include:

- Contact details for the person making the complaint (name and phone number as a minimum)
- Approximate location that the issue was identified by complainant
- Date, time and issues that the complaint relates to.

9 REFERENCES

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APPENDIX A

Figures

Figure 1 Proposal Area

Figure 2 WRP observations and habitat clearing categories

Figure 3 Proposed clearing and clearing staging

Figure 4 Fauna crossing provisions and exclusion fencing concept plan

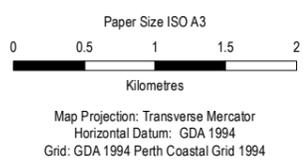
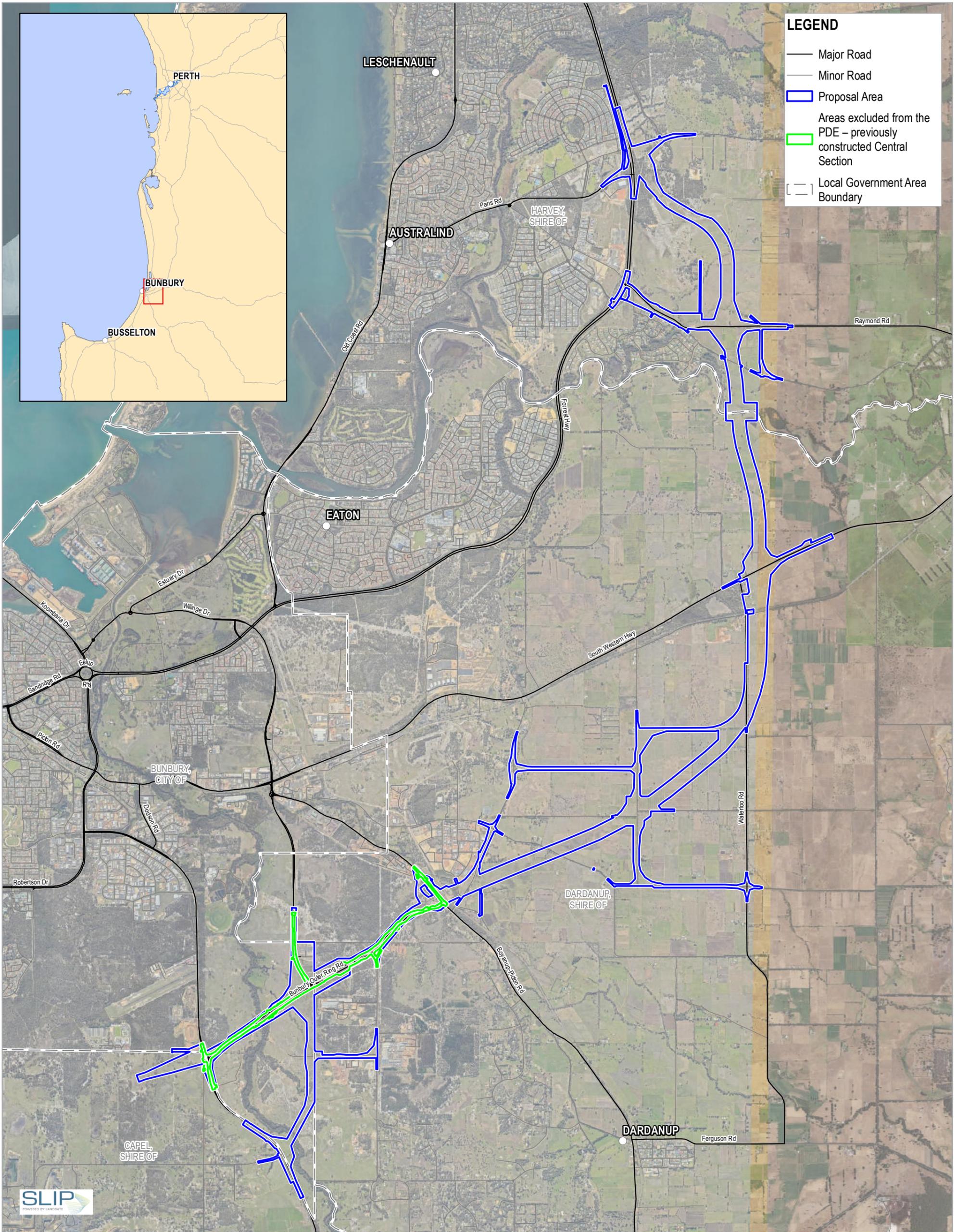
Figure 5 Fauna crossing typical details

Figure 6 Possum fence concept plan

Figure 7 Carter's Freshwater Mussel observations within and adjacent to the Proposal Area

Figure 8 Black-stripe Minnow observations within and adjacent to the Proposal Area

Figure 9 Brush-tailed Phascogale records within and adjacent to the Proposal Area

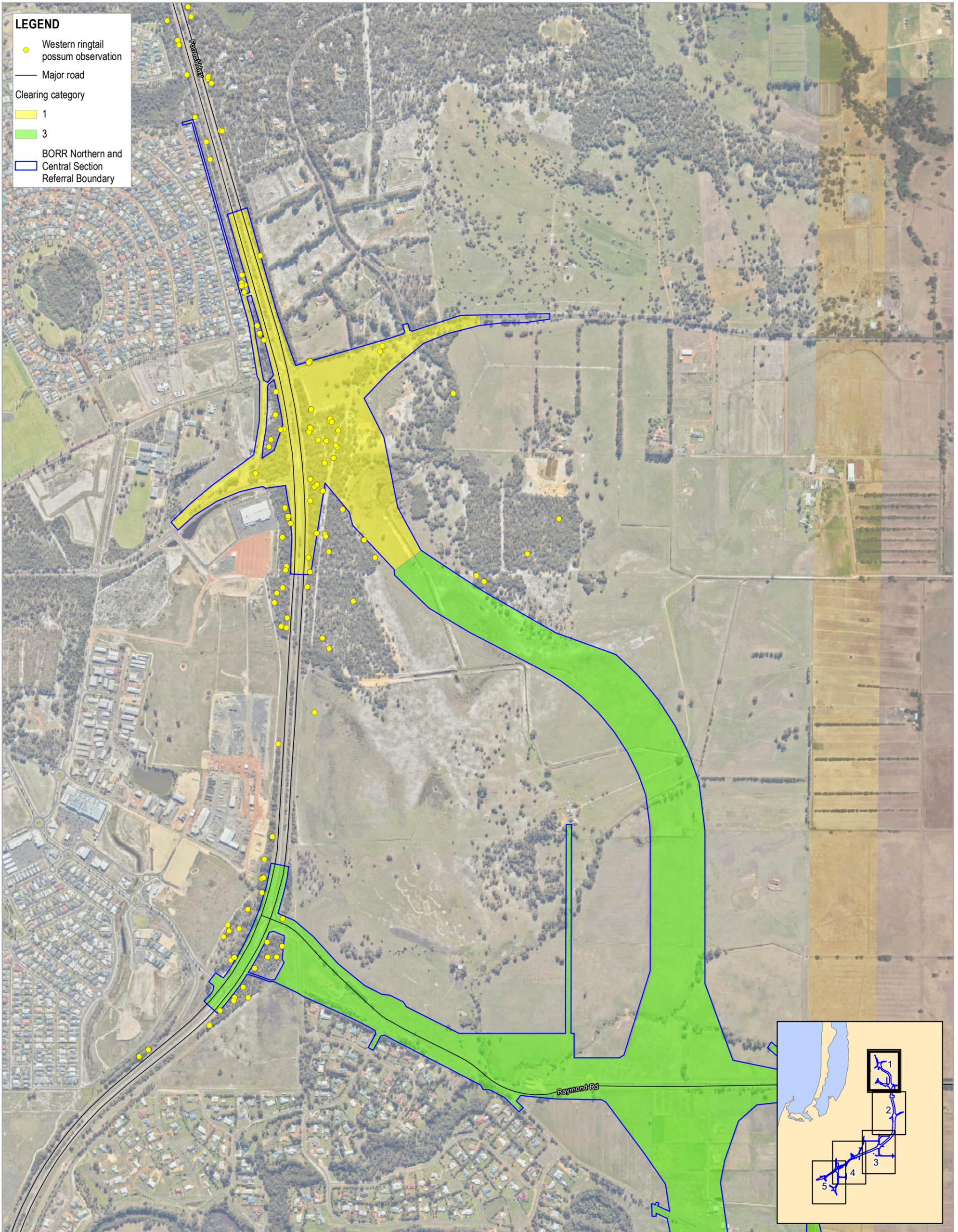


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Proposal Area

FIGURE 1



LEGEND

- Western ringtail possum observation
- Major road
- Clearing category
- 1
- 3
- BORR Northern and Central Section Referral Boundary

Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
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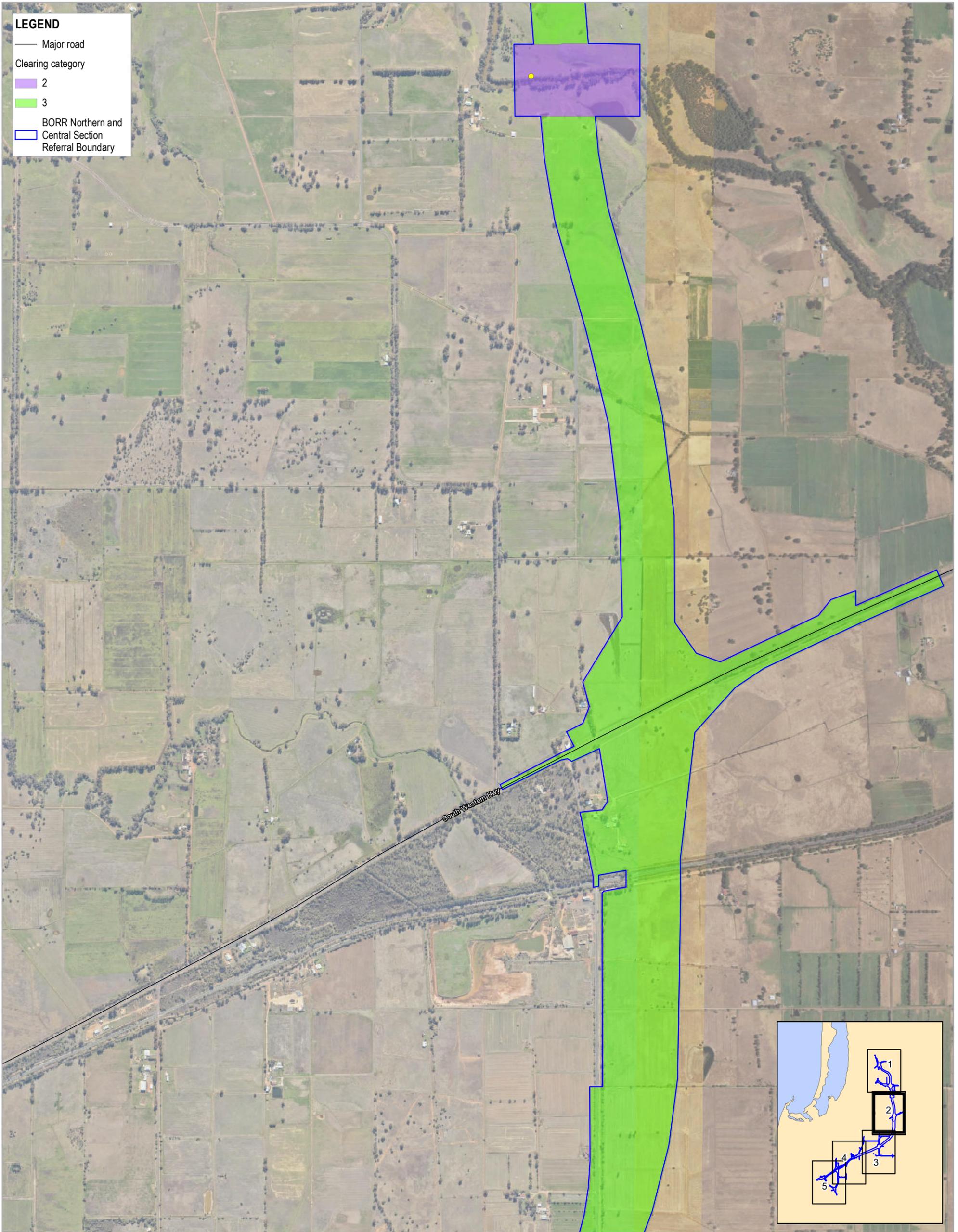
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WRP observations and habitat clearing categories

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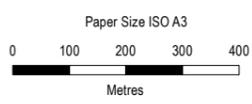
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LEGEND

- Major road
- Clearing category
- 2
- 3
- BORR Northern and Central Section Referral Boundary



Map Projection: Transverse Mercator
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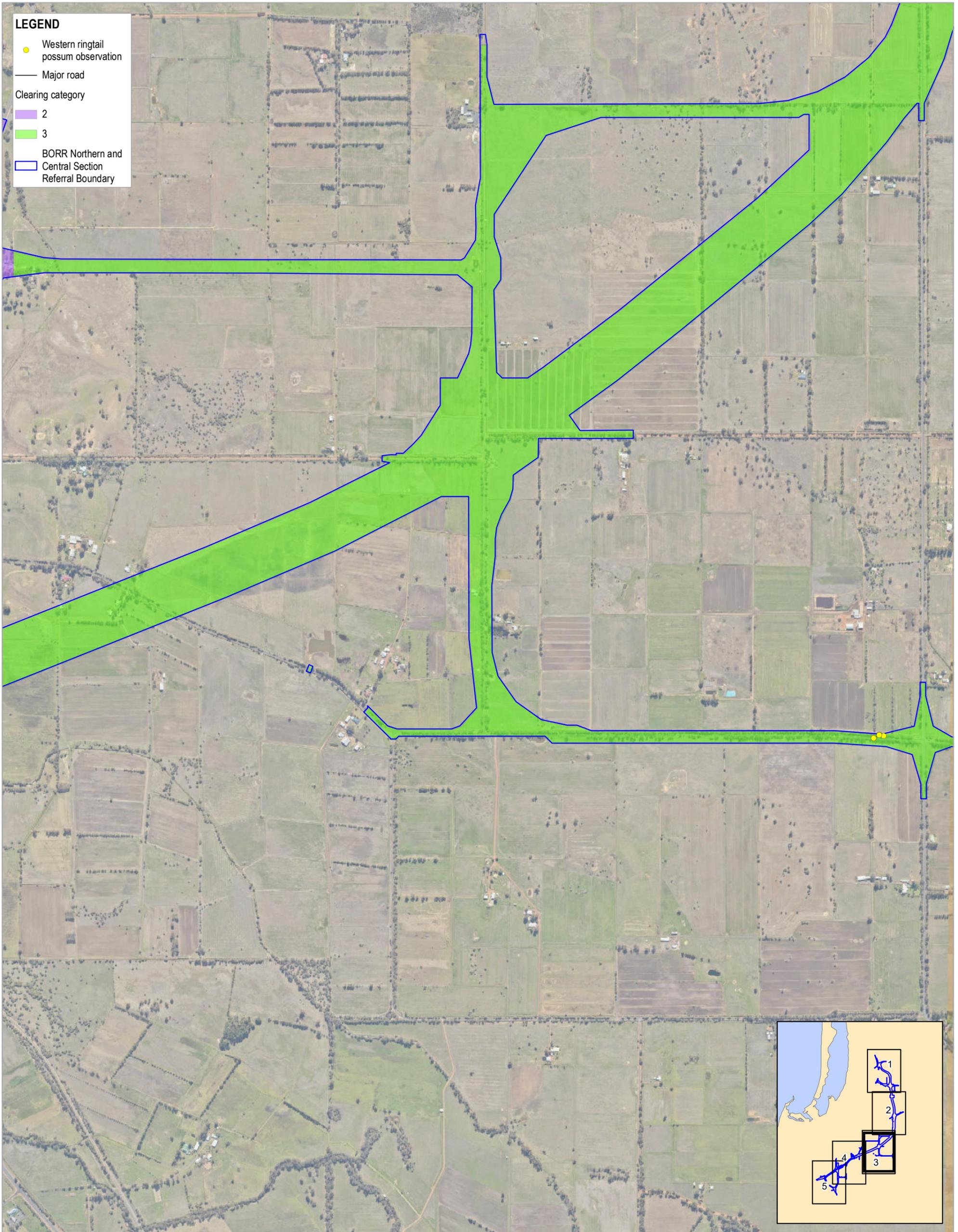


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WRP observations and
habitat clearing categories

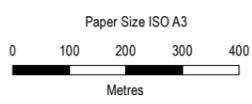
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Page 2 of 5
FIGURE 2



LEGEND

- Western ringtail possum observation
- Major road
- Clearing category
- 2
- 3
- BORR Northern and Central Section Referral Boundary



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994



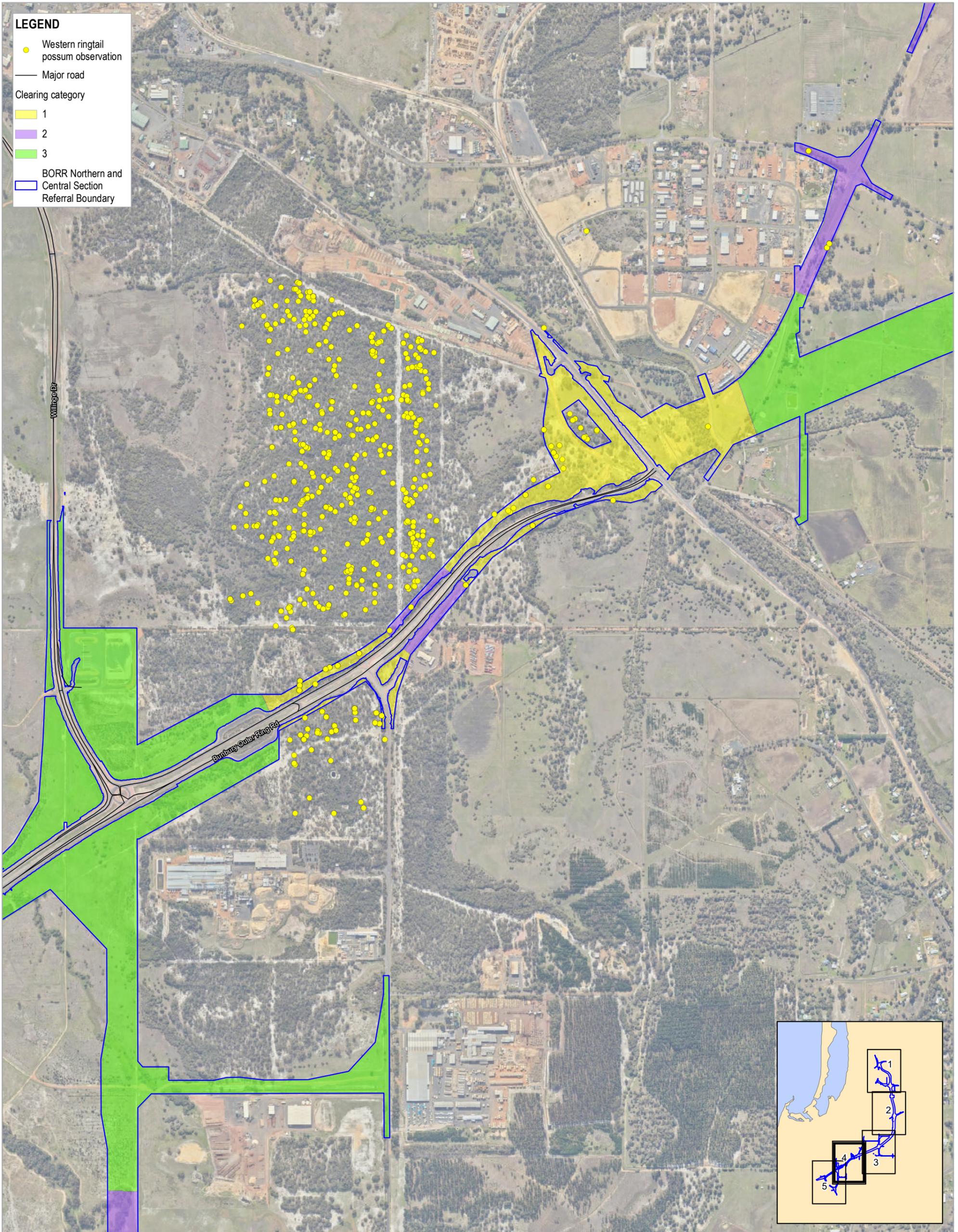
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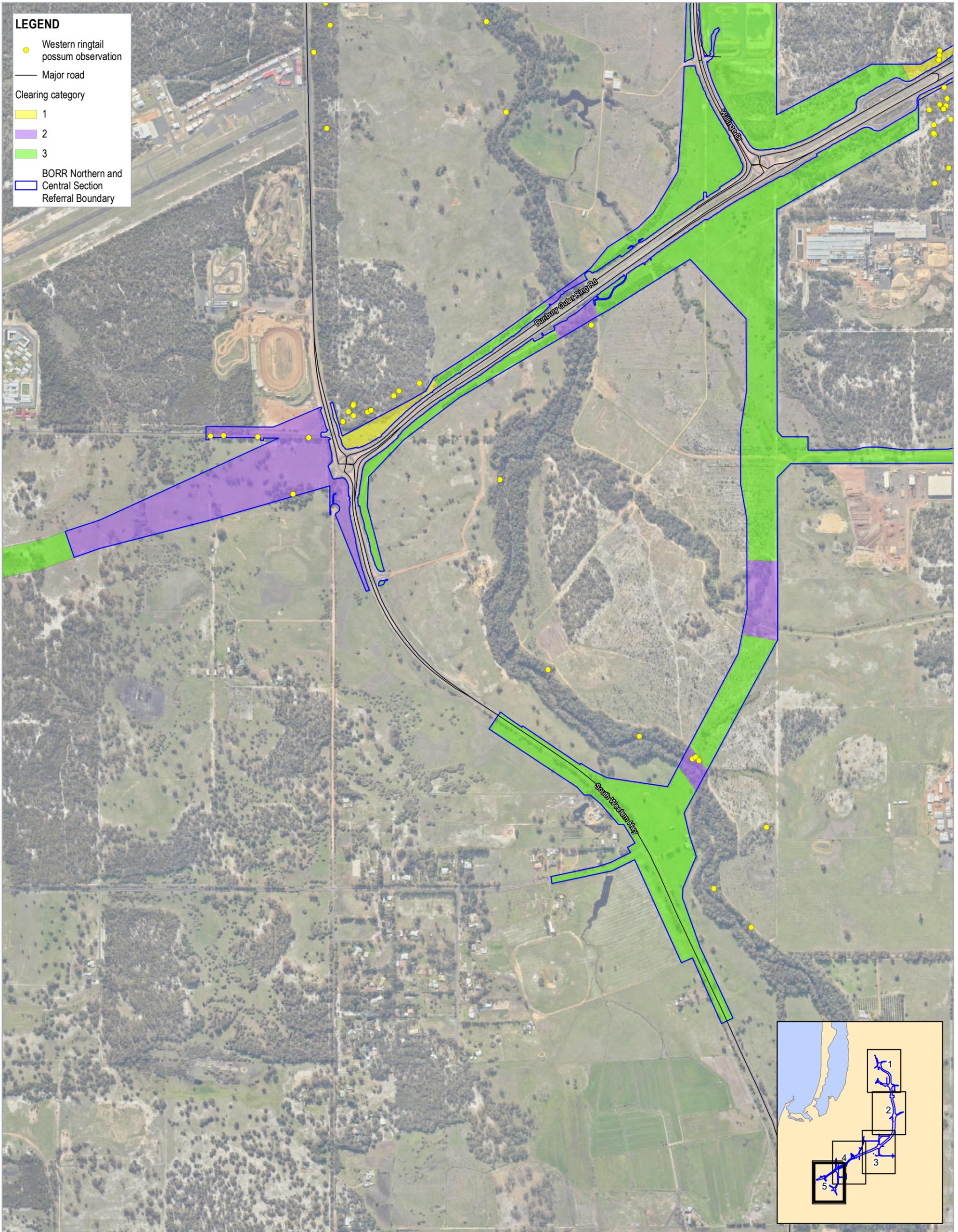
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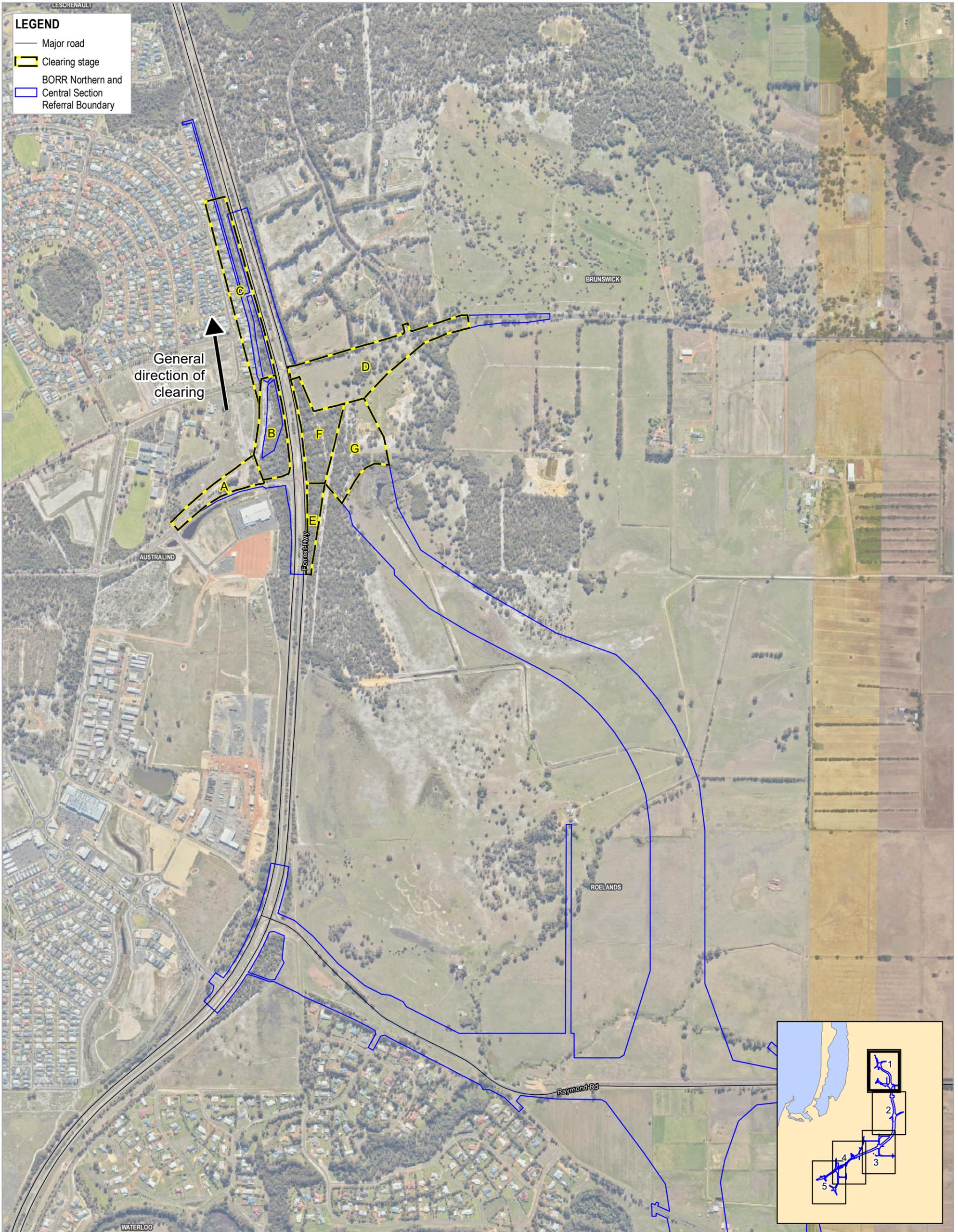
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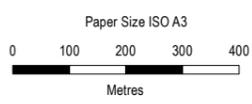
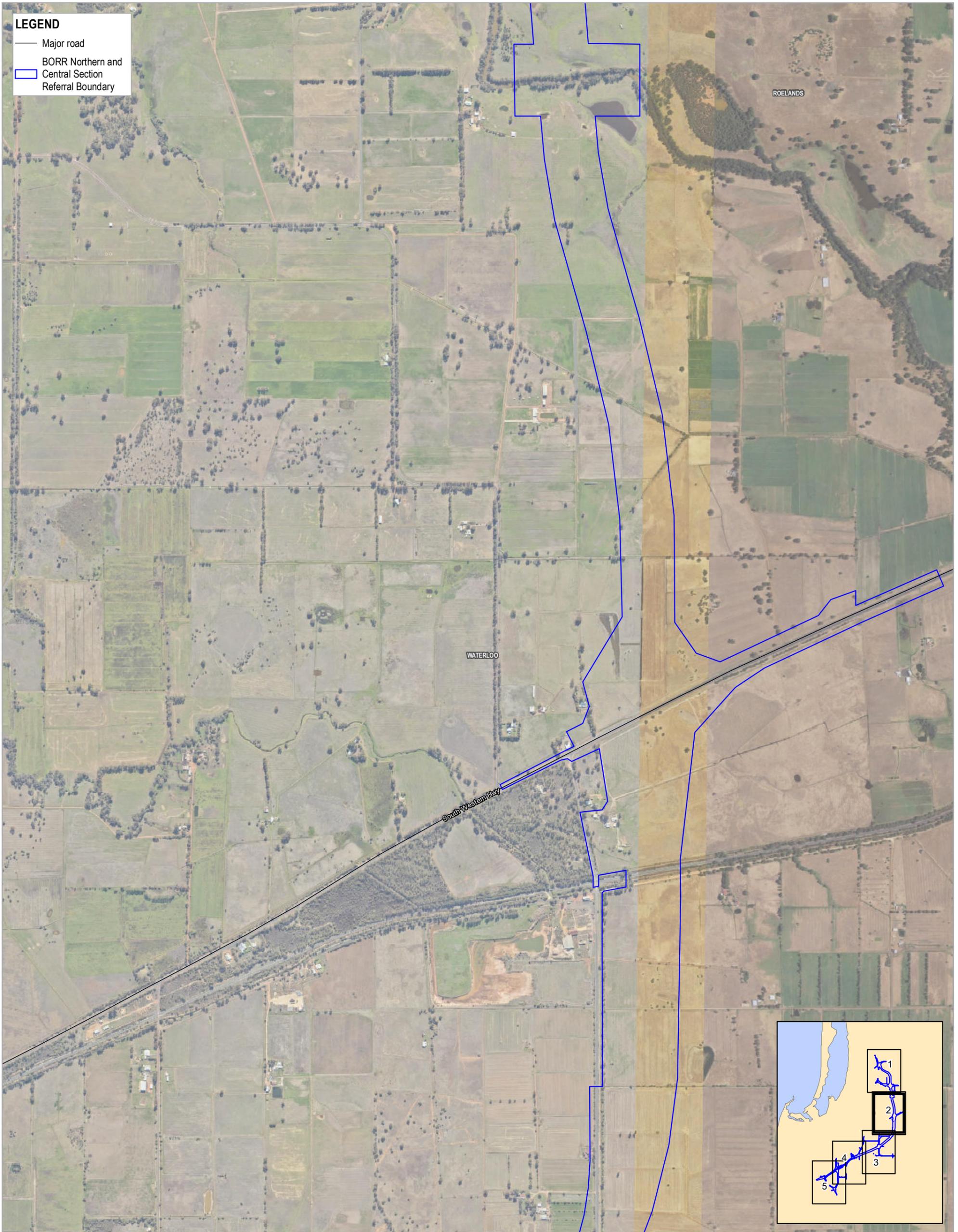
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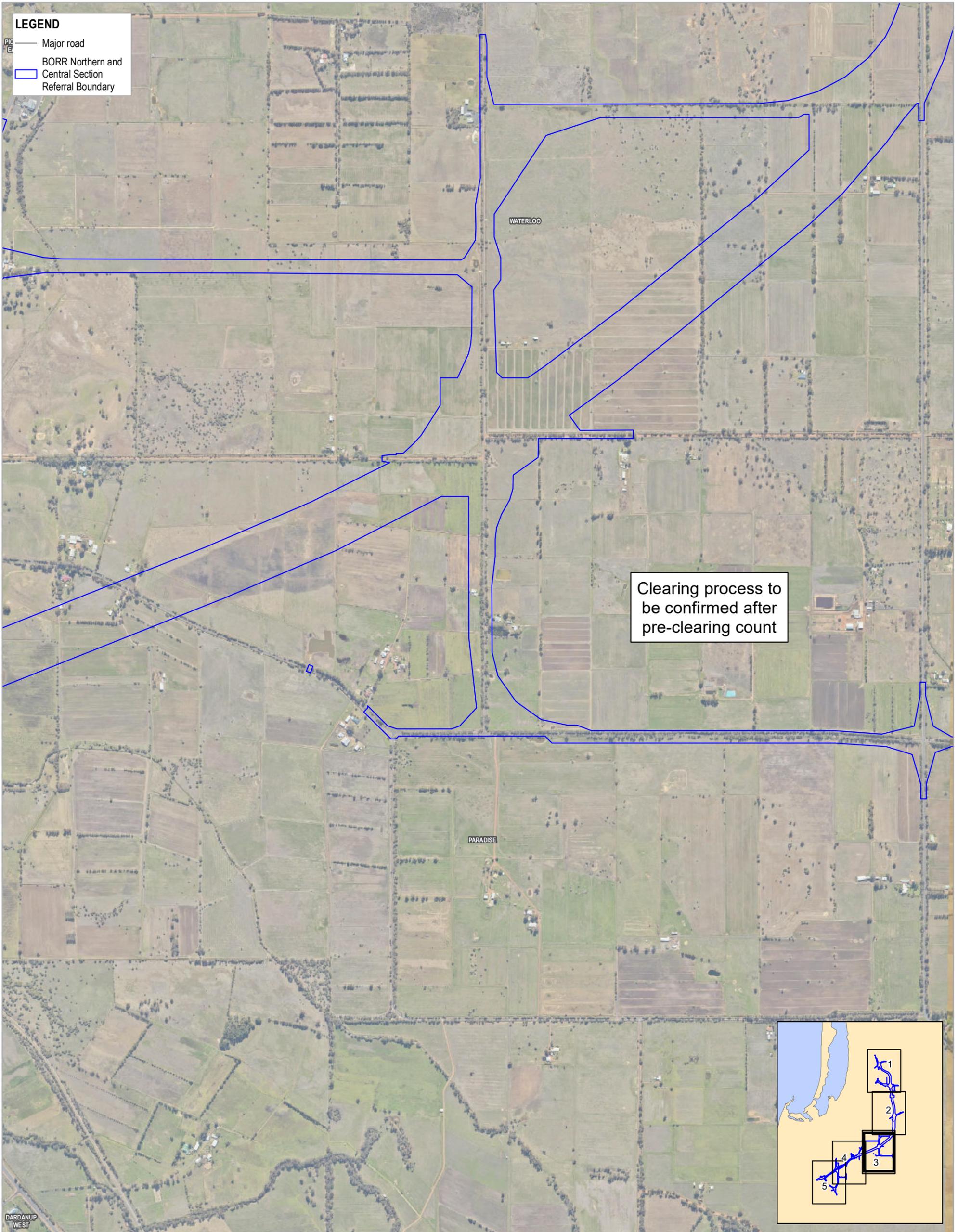


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Proposed Clearing and
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FIGURE 3

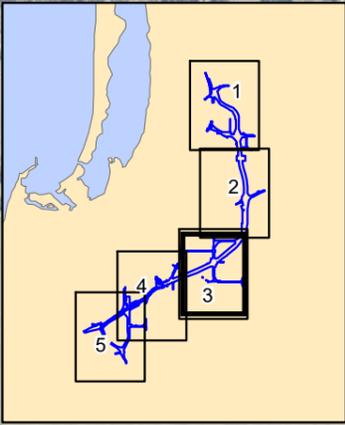
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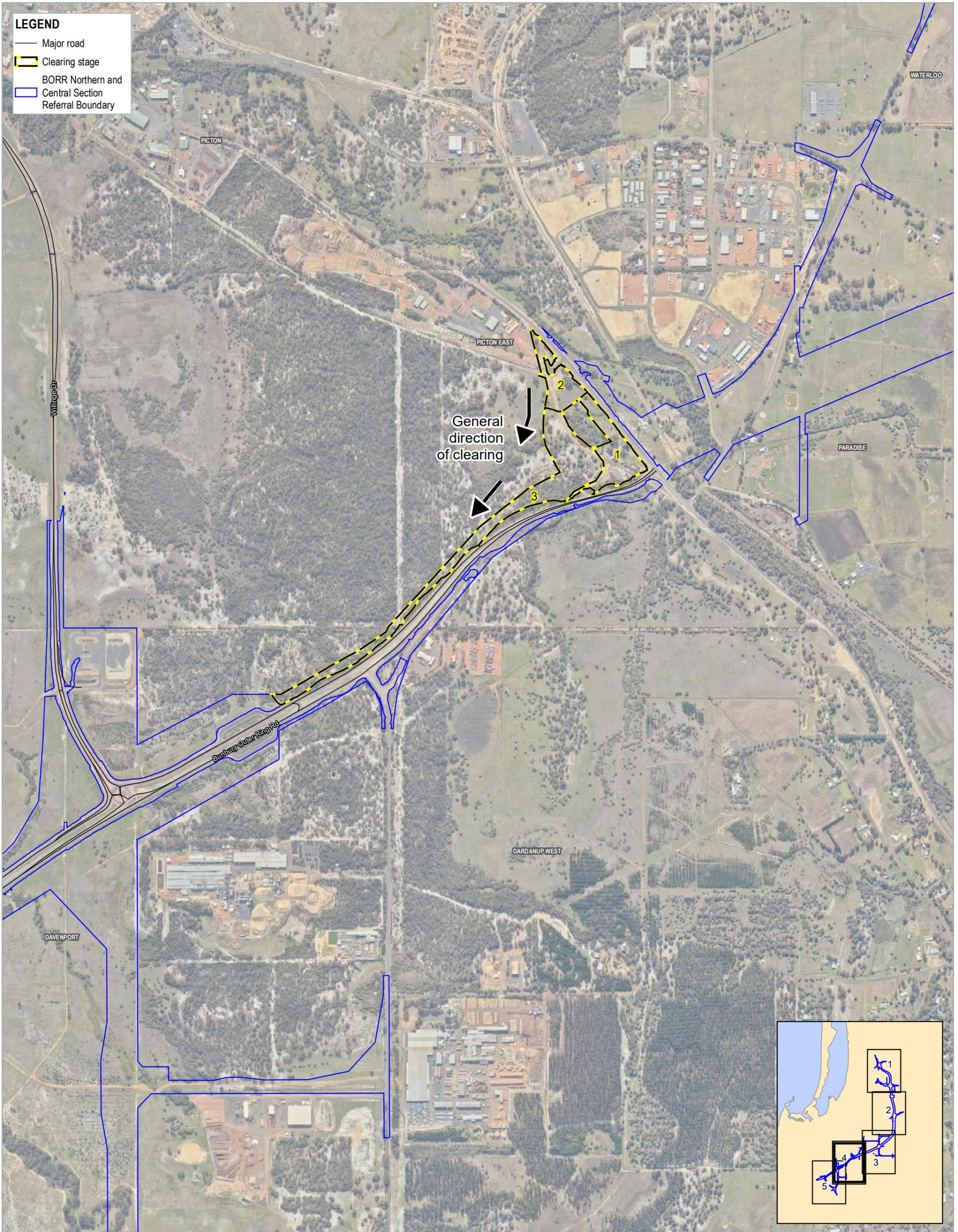
LEGEND

- Major road
- BORR Northern and Central Section Referral Boundary

Clearing process to be confirmed after pre-clearing count



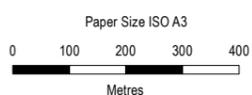
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LEGEND

- Major road
- ▬ Clearing stage
- ▭ BORR Northern and Central Section Referral Boundary

General direction of clearing



Map Projection: Transverse Mercator
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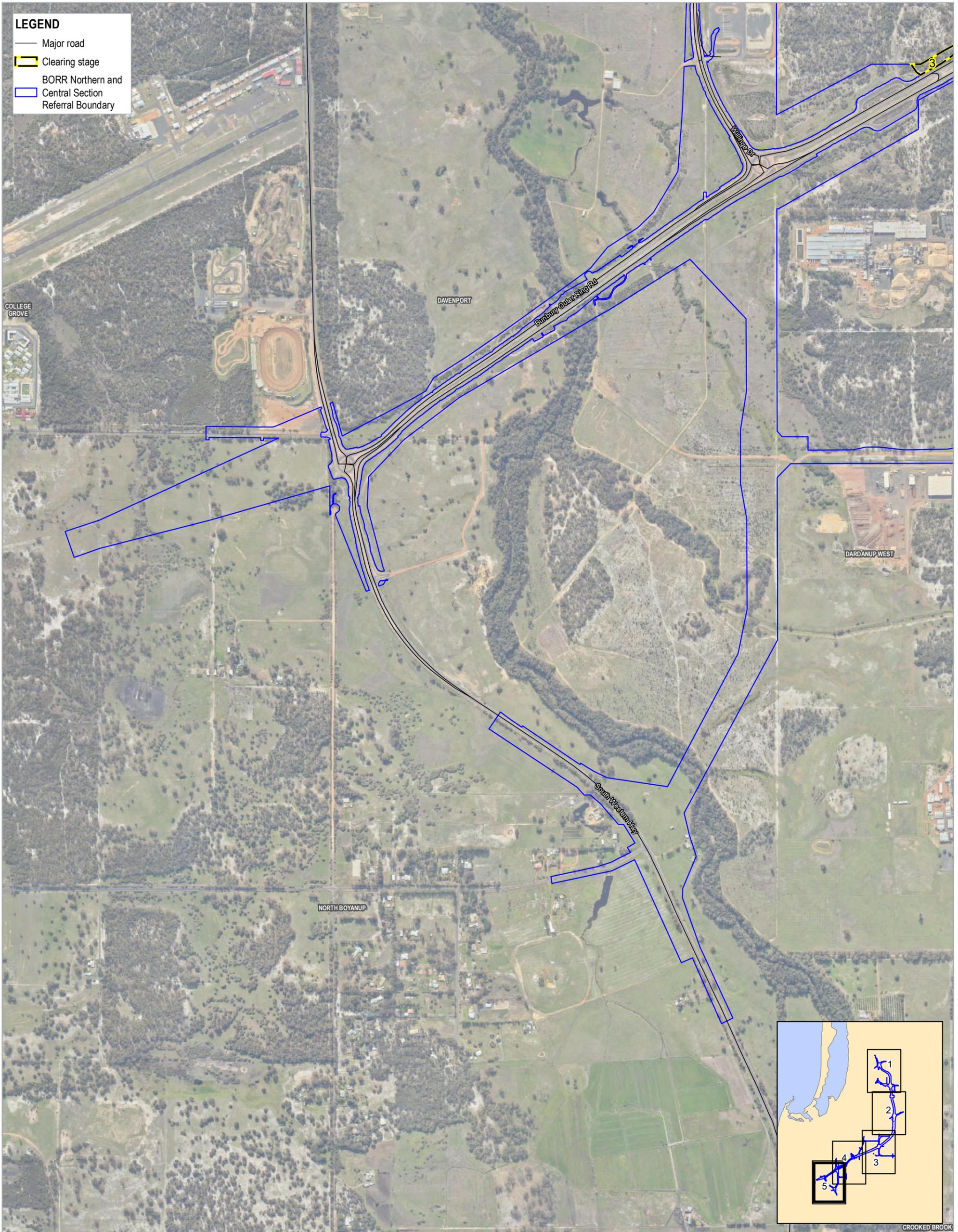


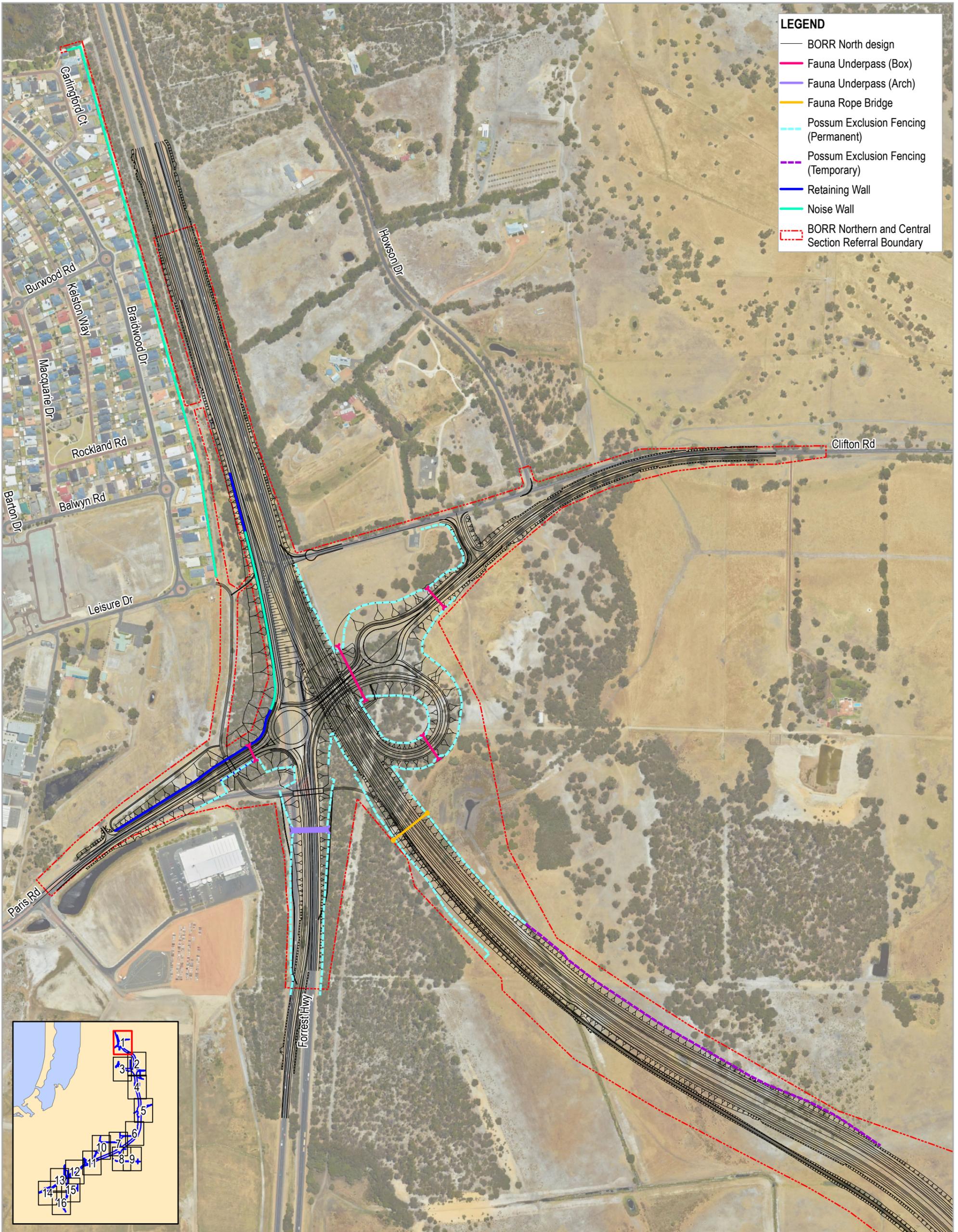
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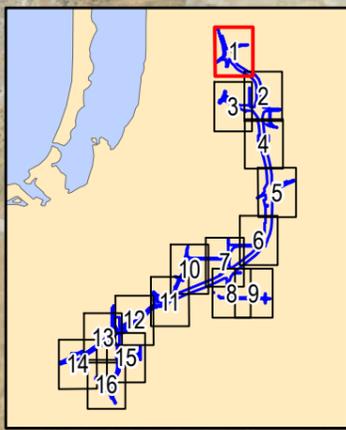
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LEGEND

- BORR North design
- Fauna Underpass (Box)
- Fauna Underpass (Arch)
- Fauna Rope Bridge
- - - Possum Exclusion Fencing (Permanent)
- - - Possum Exclusion Fencing (Temporary)
- Retaining Wall
- Noise Wall
- - - BORR Northern and Central Section Referral Boundary



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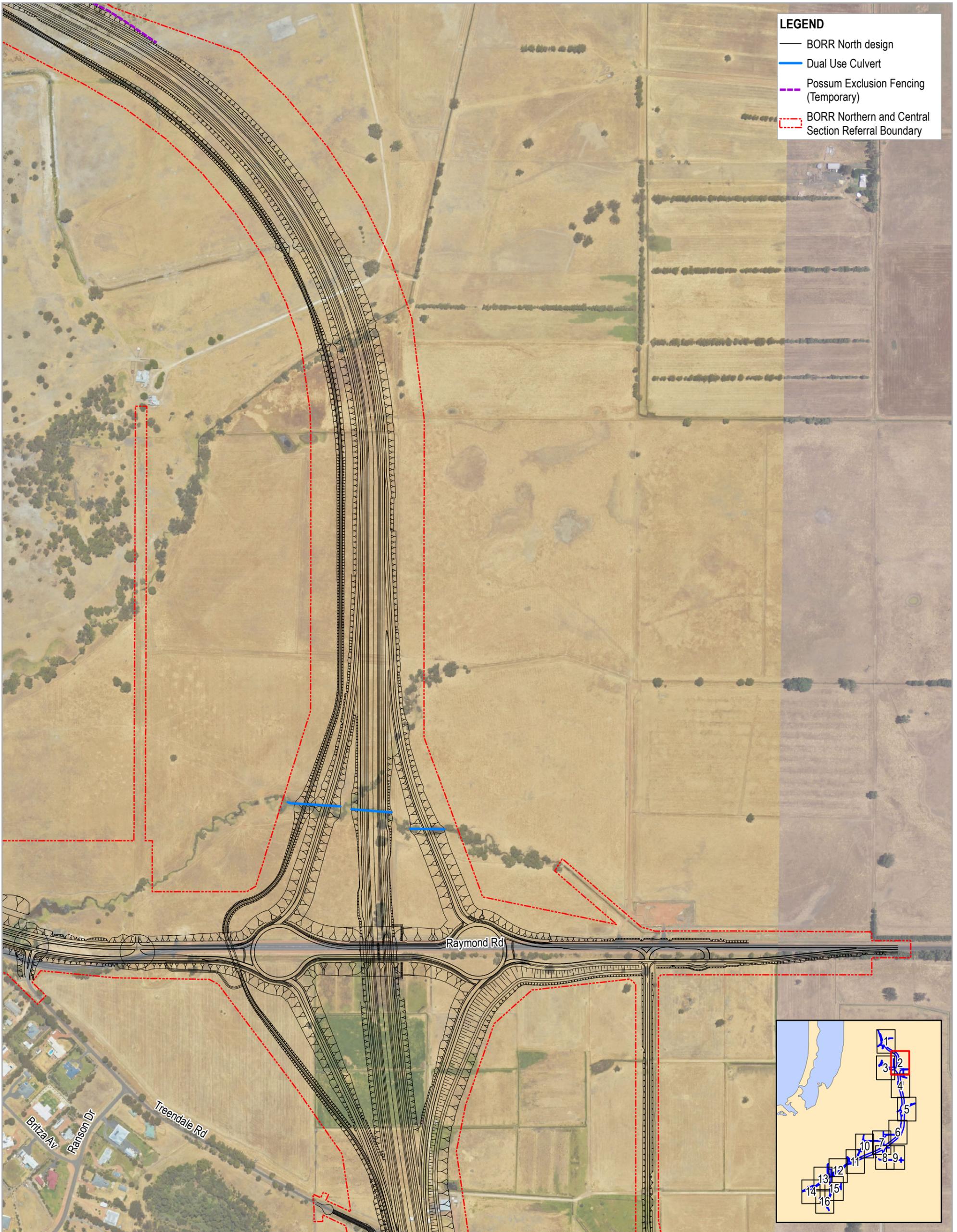
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FIGURE 4

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LEGEND

- BORR North design
- Dual Use Culvert
- Possum Exclusion Fencing (Temporary)
- - - BORR Northern and Central Section Referral Boundary

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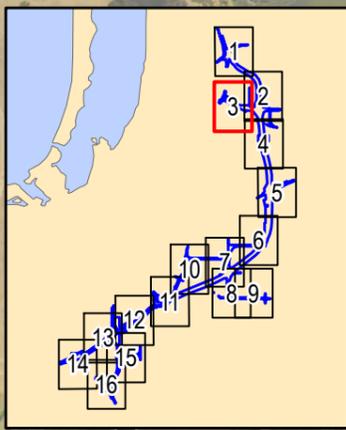
Fauna Crossing Provisions and Exclusion Fencing Concept Plan

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FIGURE 4

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FIGURE 4

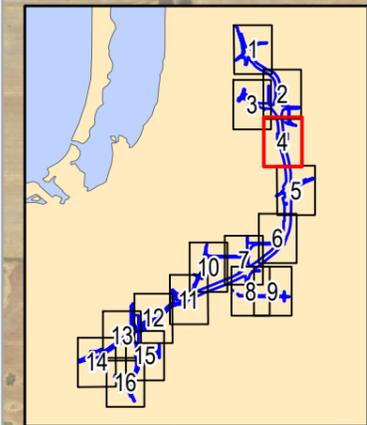
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LEGEND

- BORR North design
- Dual Use Culvert
- Fauna Rope Bridge
- - - BORR Northern and Central Section Referral Boundary



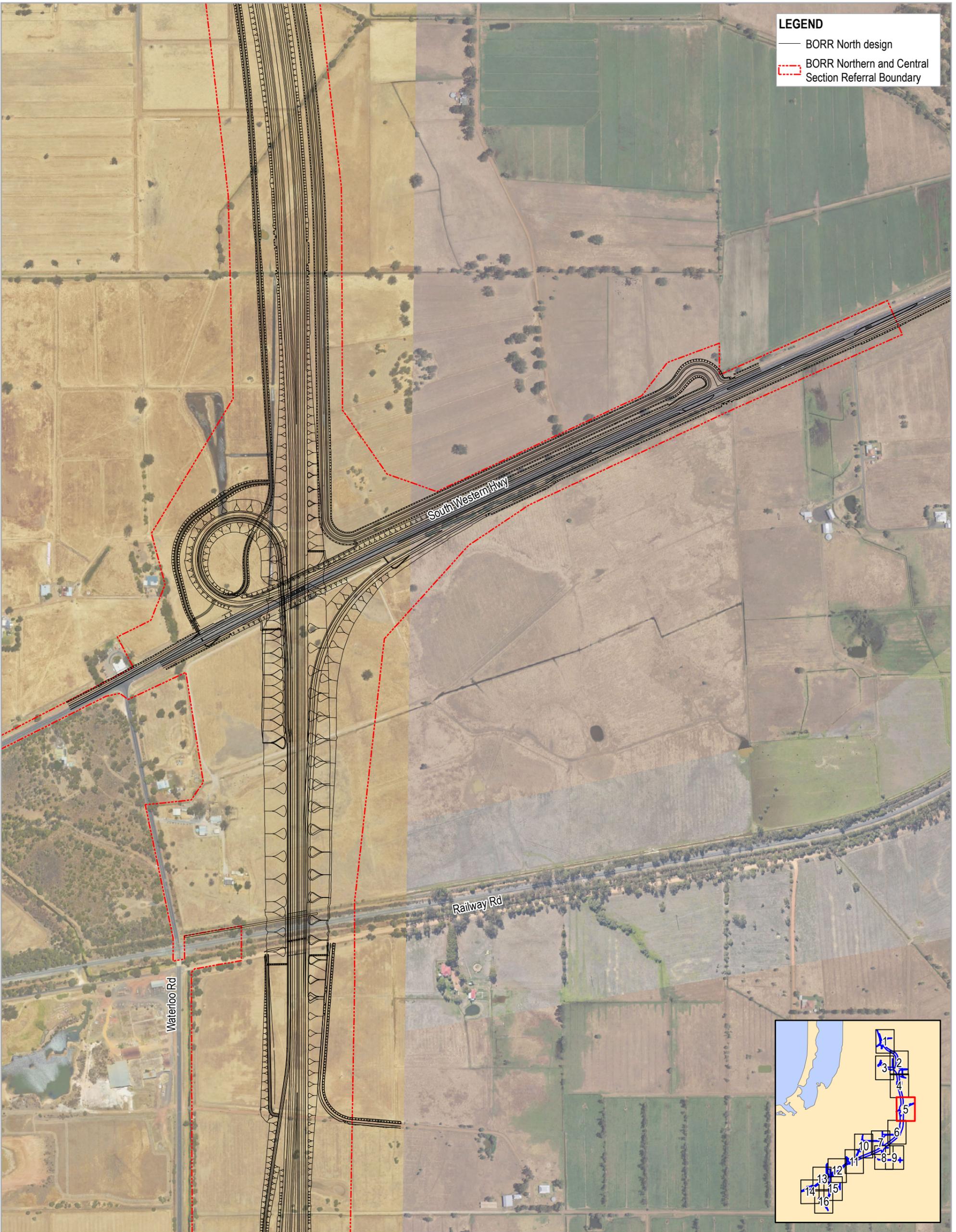
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LEGEND

- BORR North design
- - - BORR Northern and Central Section Referral Boundary



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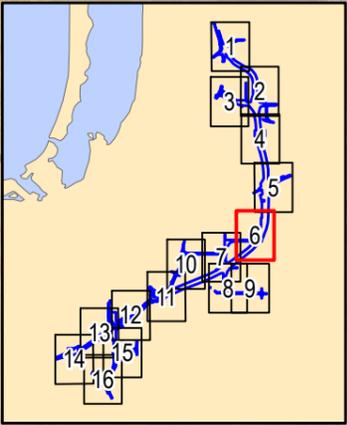
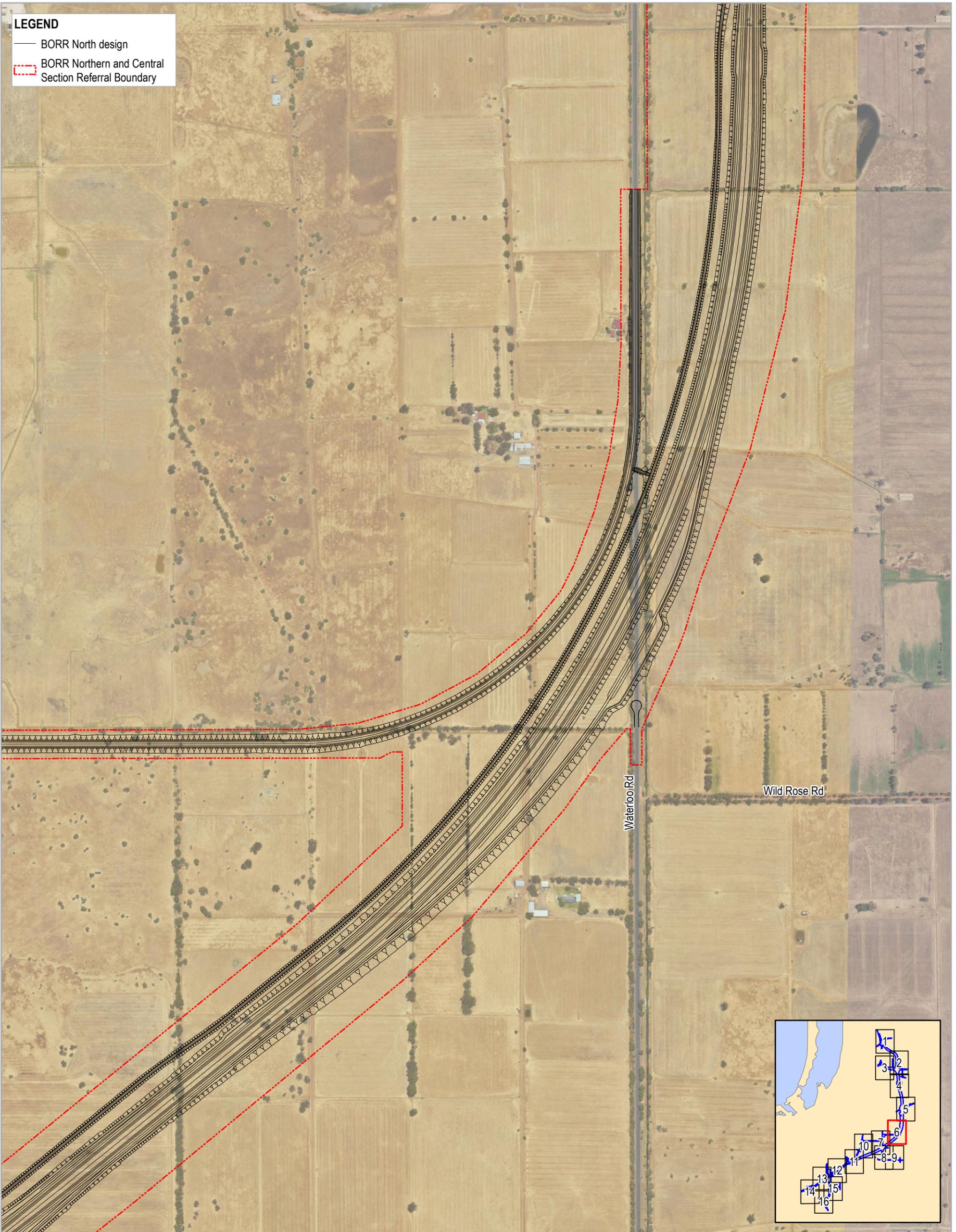
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LEGEND

- BORR North design
- BORR Northern and Central Section Referral Boundary



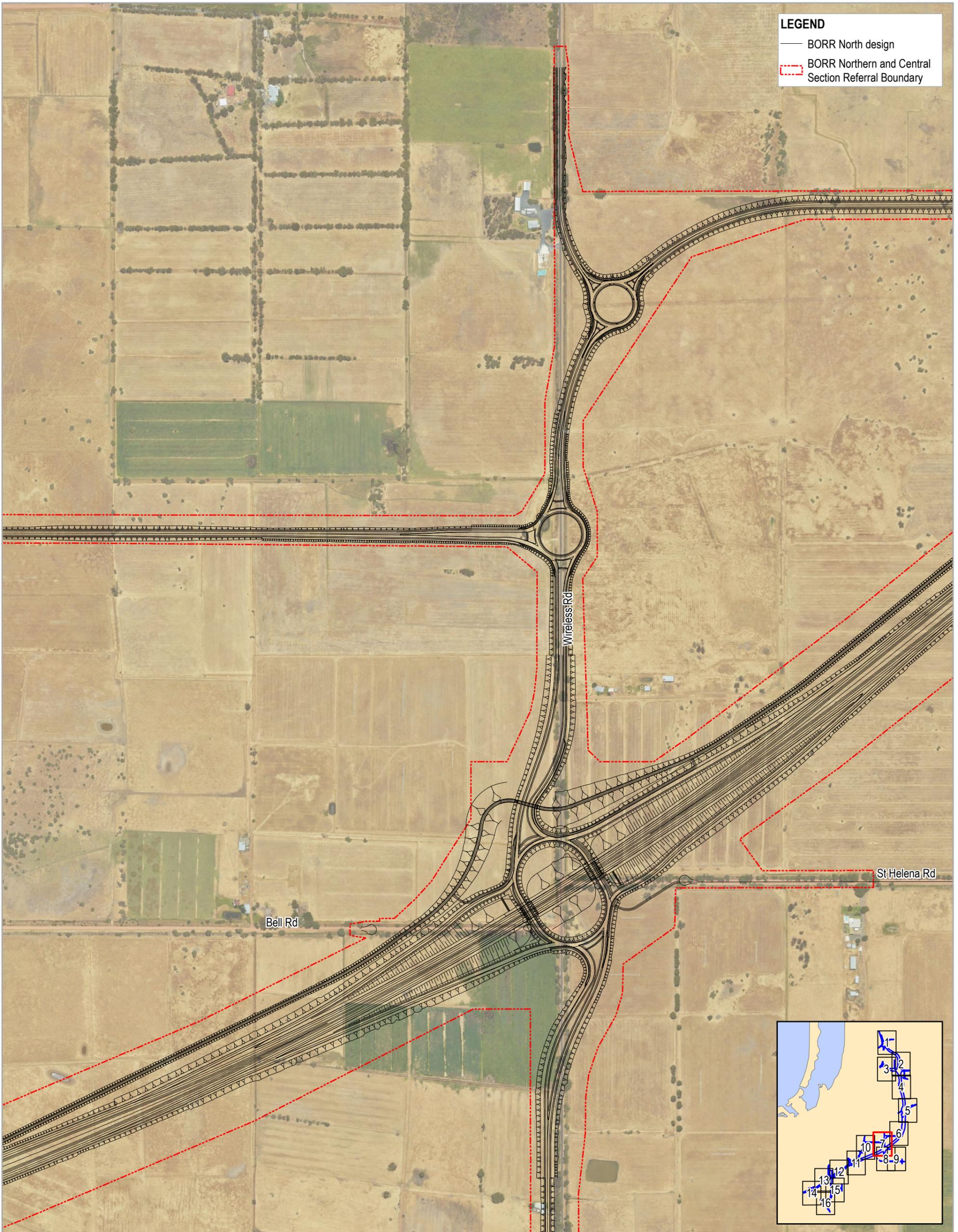
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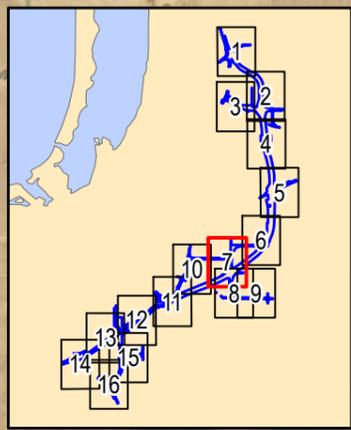
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LEGEND

- BORR North design
- BORR Northern and Central Section Referral Boundary



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LEGEND
 — BORR North design
 - - - BORR Northern and Central Section Referral Boundary



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Main Roads Western Australia
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Fauna Crossing Provisions and Exclusion Fencing Concept Plan

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FIGURE 4

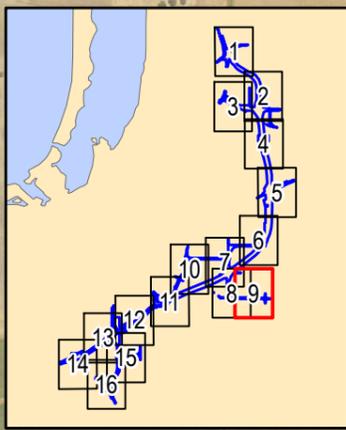
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LEGEND

- BORR North design
- - - BORR Northern and Central Section Referral Boundary



Paper Size ISO A3

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994



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LEGEND

- BORR North design
- Possum Exclusion Fencing (Permanent)
- - - BORR Northern and Central Section Referral Boundary

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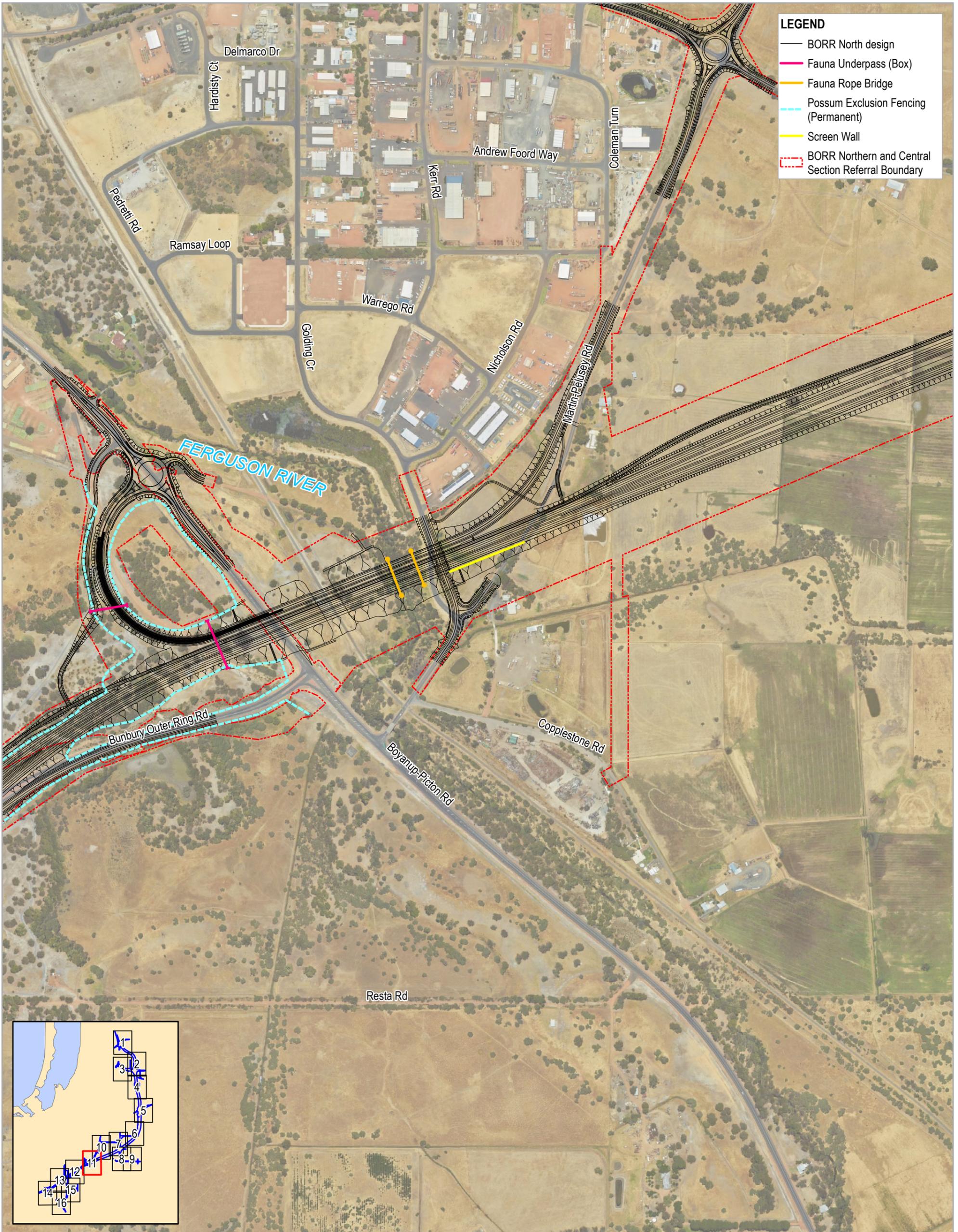
Fauna Crossing Provisions and Exclusion Fencing Concept Plan

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FIGURE 4

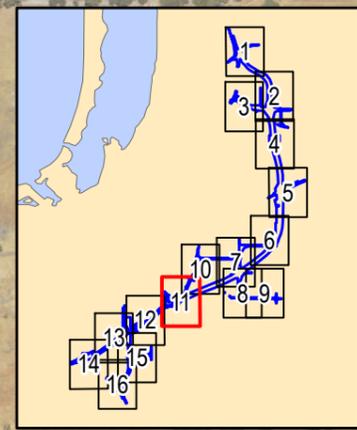
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LEGEND

- BORR North design
- Fauna Underpass (Box)
- Fauna Rope Bridge
- Possum Exclusion Fencing (Permanent)
- Screen Wall
- - - BORR Northern and Central Section Referral Boundary



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Map Projection: Transverse Mercator
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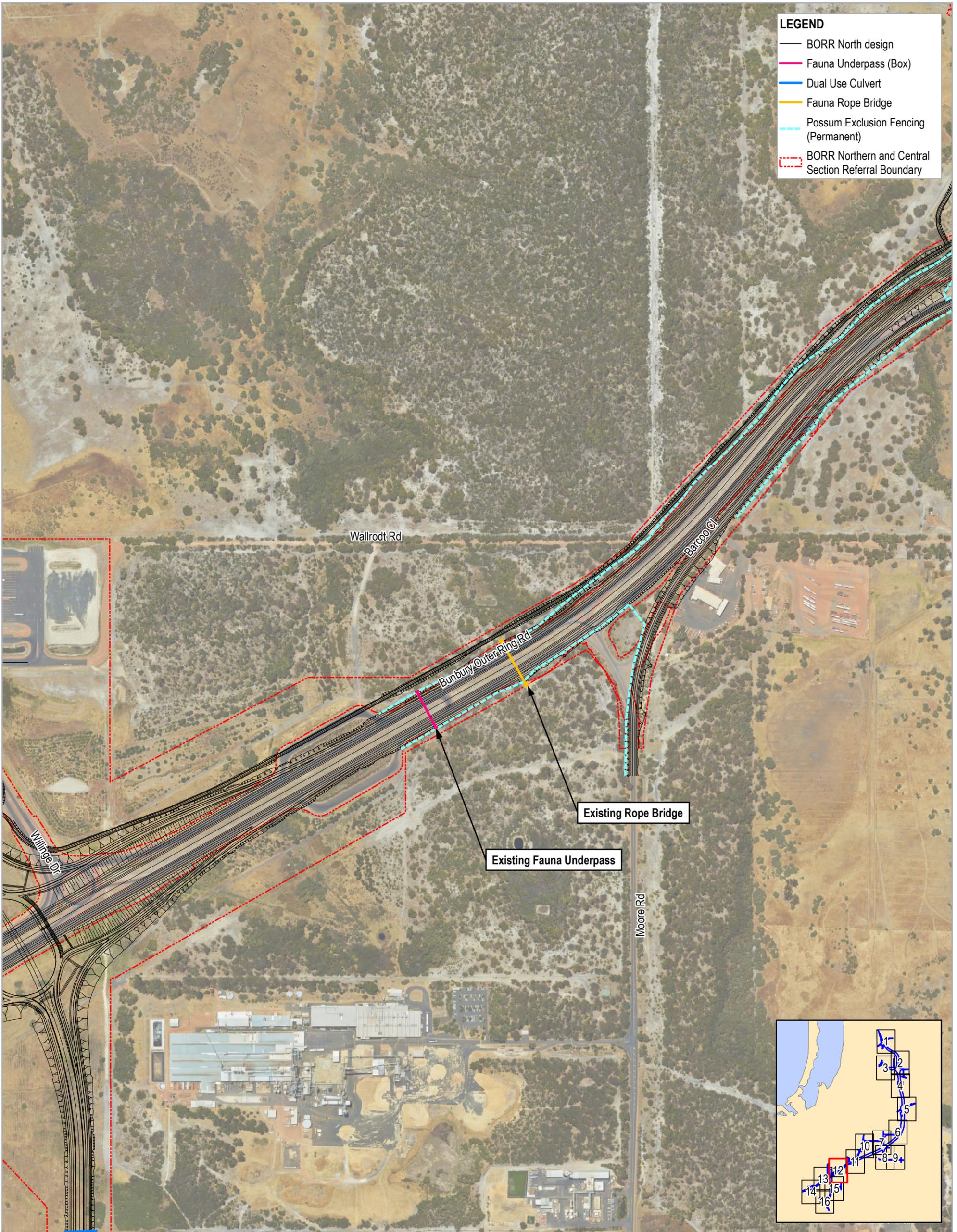
Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section

Fauna Crossing Provisions and Exclusion Fencing Concept Plan

Project No. 61-37041
Revision No. 1
Date 20 Apr 2020

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Data source: BORR team: North design - 201908, North referral boundary - 20191016, Possum Exclusion Fencing Structure - 20200420; Biota: Western Ringtail Possum Records - 20200327; Possum habitat - 201910; Landgate: Imagery - WA Now accessed 20200420. Created by: slei



LEGEND

- BORR North design
- Fauna Underpass (Box)
- Dual Use Culvert
- Fauna Rope Bridge
- Possum Exclusion Fencing (Permanent)
- BORR Northern and Central Section Referral Boundary

SLIP
POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994

N

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BUNBURY OUTER RING ROAD | PLANNING AND DEVELOPMENT

Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section

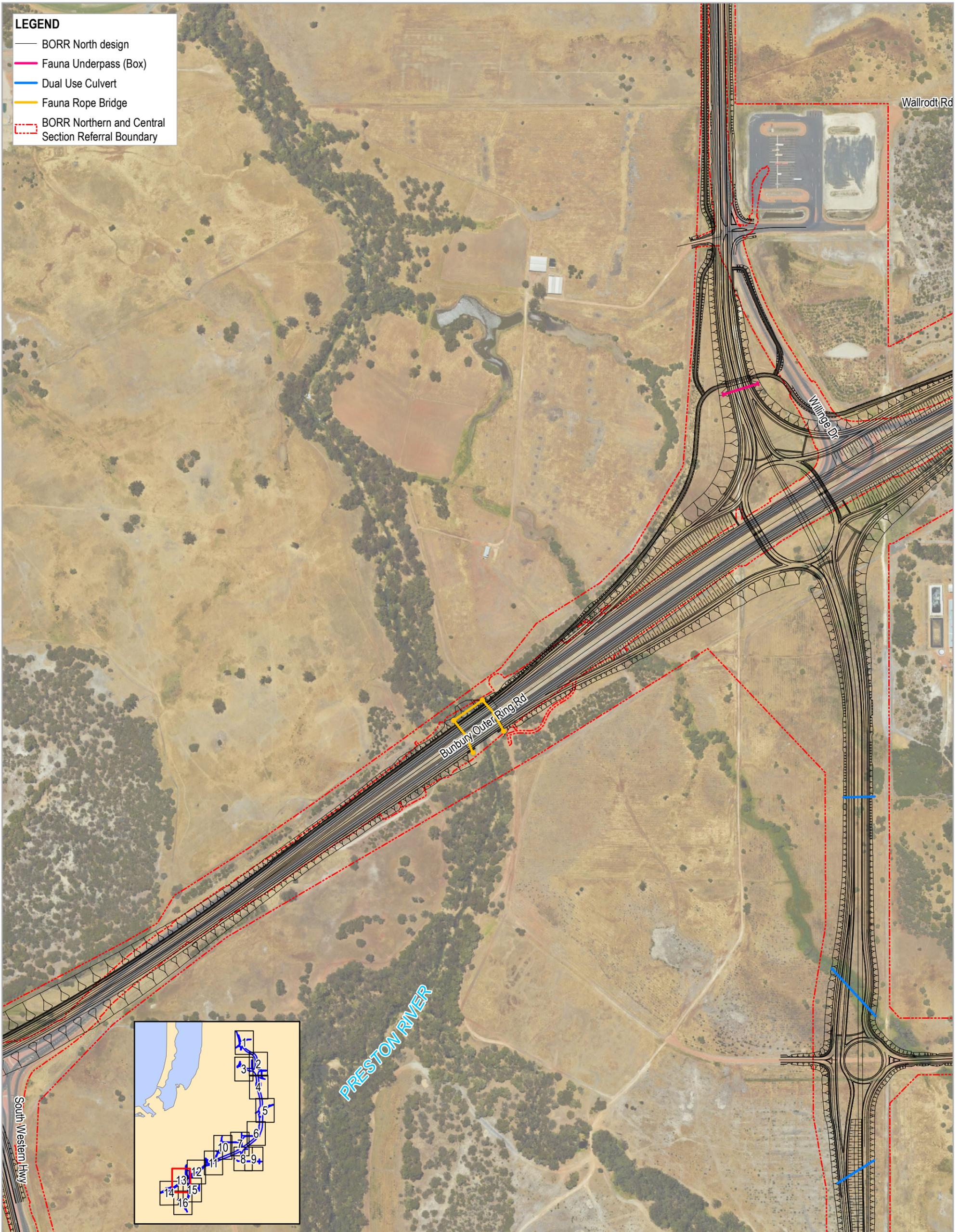
Fauna Crossing Provisions and Exclusion Fencing Concept Plan

Project No. 61-37041
Revision No. 1
Date 20 Apr 2020

Page 12 of 16
FIGURE 4

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LEGEND

- BORR North design
- Fauna Underpass (Box)
- Dual Use Culvert
- Fauna Rope Bridge
- BORR Northern and Central Section Referral Boundary

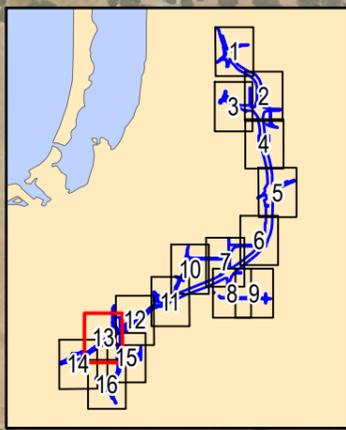
South Western Hwy

Wallrodt Rd

Willice Dr

Bunbury Outer Ring Rd

PRESTON RIVER



Paper Size ISO A3
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 Grid: GDA 1994 Perth Coastal Grid 1994



Main Roads Western Australia
 Bunbury Outer Ring Road Northern and Central Section

Fauna Crossing Provisions and Exclusion Fencing Concept Plan

Project No. 61-37041
 Revision No. 1
 Date 20 Apr 2020

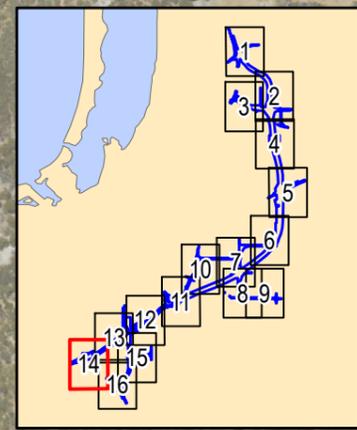
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LEGEND

- BORR North design
- - - BORR Northern and Central Section Referral Boundary



SLIP
POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994

BUNBURY OUTER RING ROAD | PLANNING AND DEVELOPMENT

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Bunbury Outer Ring Road Northern and Central Section

Fauna Crossing Provisions and Exclusion Fencing Concept Plan

Project No. 61-37041
Revision No. 1
Date 20 Apr 2020

Page 14 of 16
FIGURE 4

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LEGEND

- BORR North design
- Dual Use Culvert
- Fauna Rope Bridge
- - - BORR Northern and Central Section Referral Boundary

SLIP
POWERED BY LANDGATE

Paper Size ISO A3

0 50 100 150 200
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994

BUNBURY OUTER RING ROAD | PLANNING AND DEVELOPMENT

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Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section

Fauna Crossing Provisions and Exclusion Fencing Concept Plan

Project No. 61-37041
Revision No. 1
Date 20 Apr 2020

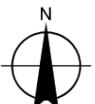
Page 15 of 16
FIGURE 4

LEGEND

- BORR North design
- Dual Use Culvert
- Fauna Rope Bridge
- - - BORR Northern and Central Section Referral Boundary



Paper Size ISO A3
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 Metres
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 Grid: GDA 1994 Perth Coastal Grid 1994



Main Roads Western Australia
 Bunbury Outer Ring Road Northern and Central Section

**Fauna Crossing Provisions and
 Exclusion Fencing Concept Plan**

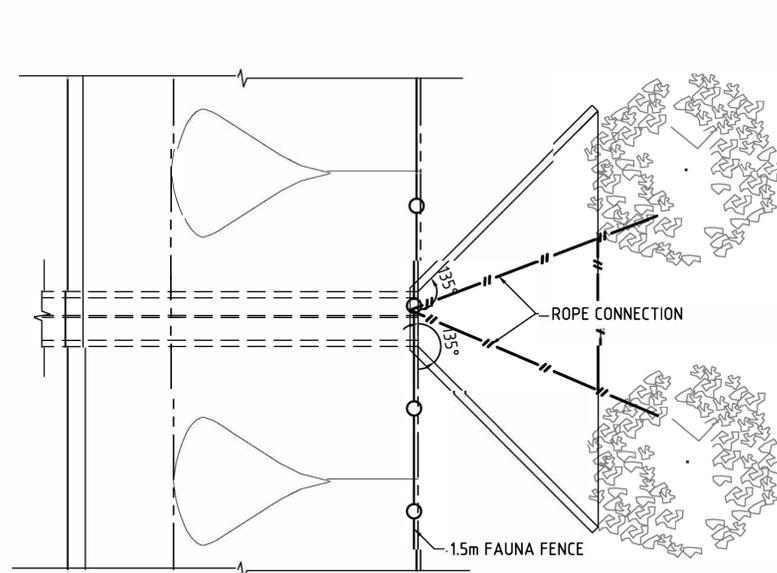
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 Revision No. 1
 Date 20 Apr 2020

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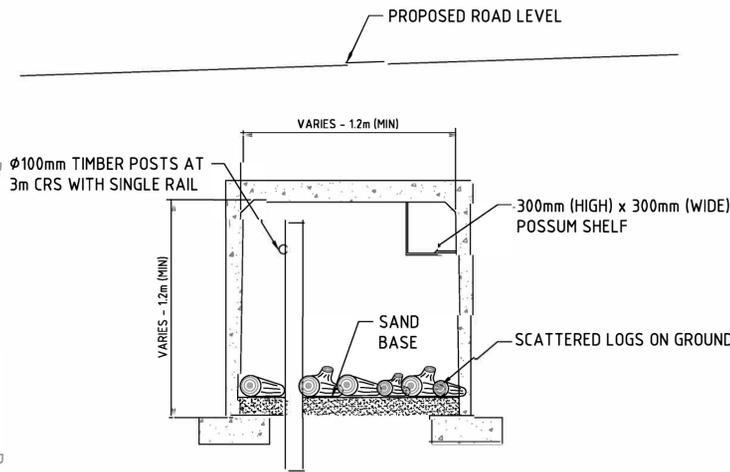
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NOTES:

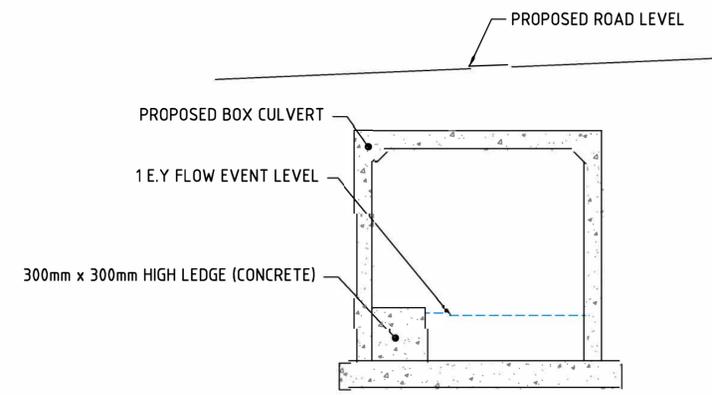
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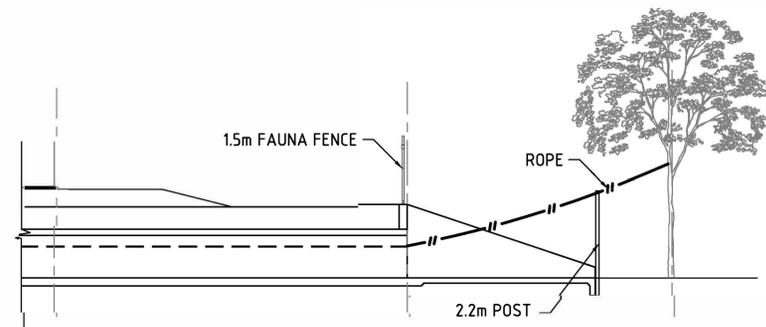
PLAN
TYPICAL FAUNA UNDERPASS
NTS



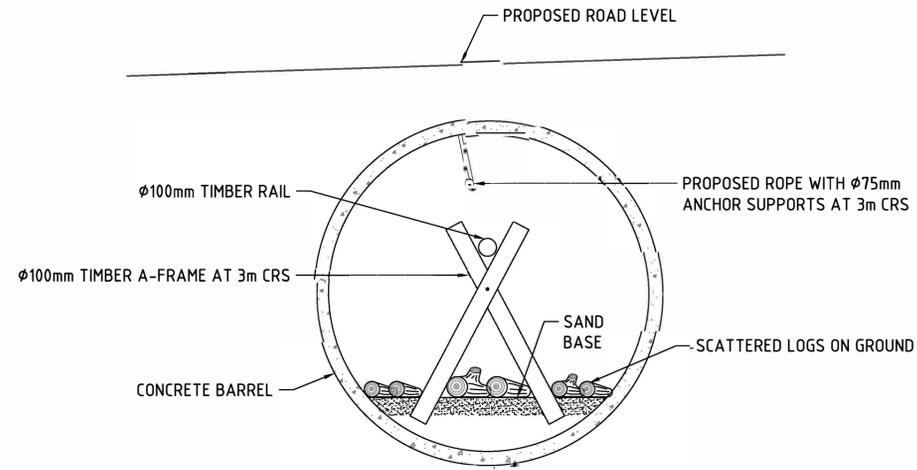
TYPICAL FAUNA UNDERPASS - BOX CULVERT
NTS



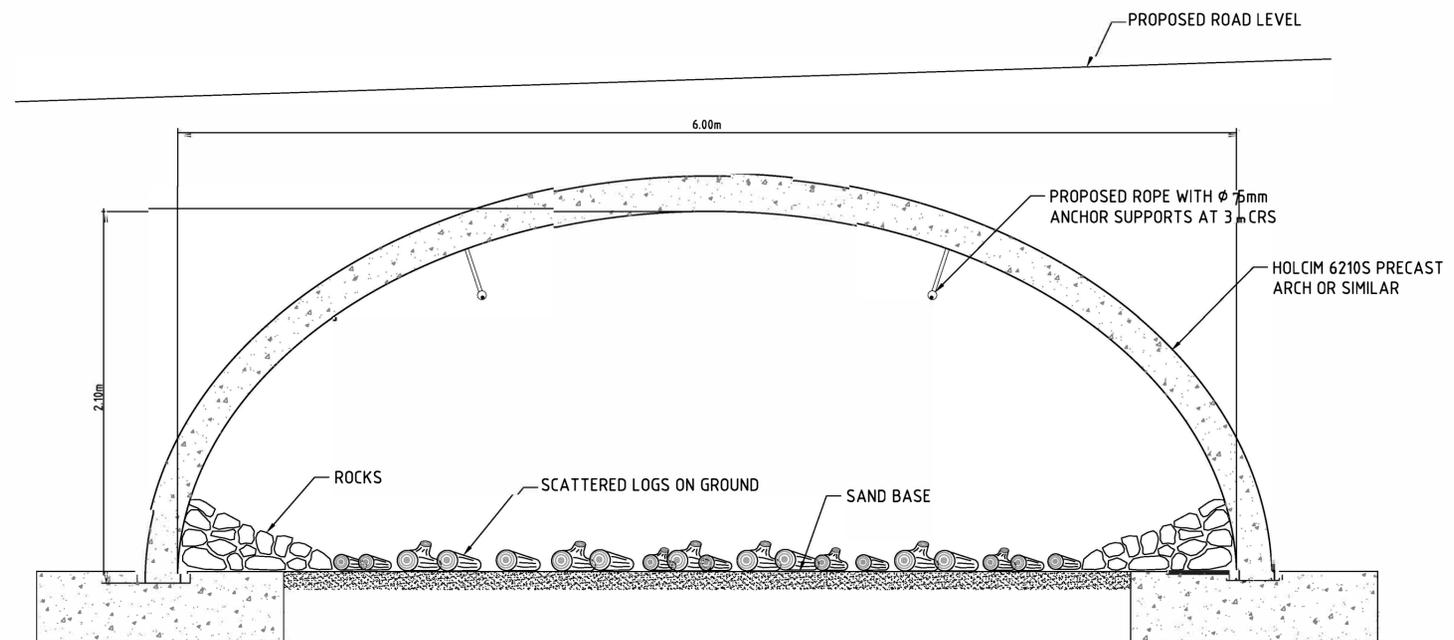
TYPICAL DUAL USE CULVERT
NTS



ELEVATION
NTS



TYPICAL FAUNA UNDERPASS - 1500 PIPE
NTS



TYPICAL FAUNA UNDERPASS - ARCH
NTS

FIGURE 5



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DATE 20/04/2020 PREPARED SG

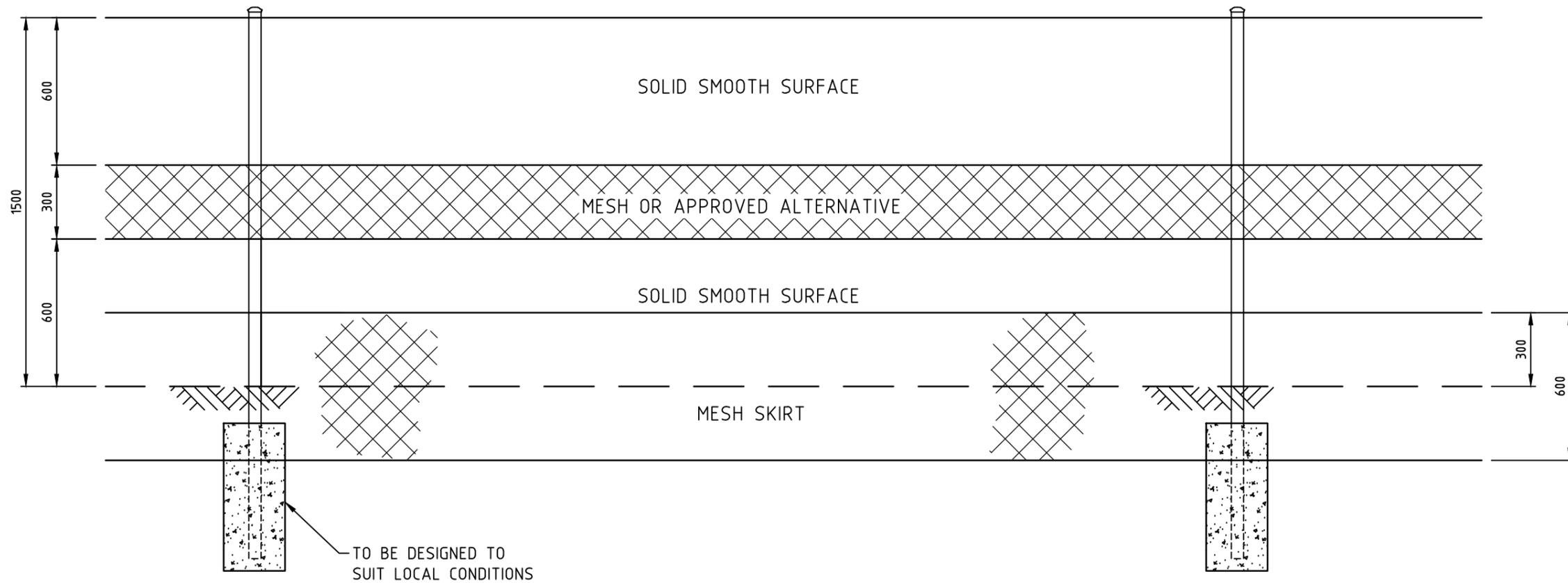
SCALE NOT TO SCALE GRID PCG 94

PROJECT BUNBURY OUTER RING ROAD (H058)

TITLE BUNBURY OUTER RING ROAD
BORR NORTH AND SOUTH
FAUNA CROSSING TYPICAL DETAILS

SKETCH No. BORR-00-SK-RD-0150 REV A

SCALE
A
1



AMENDMENTS		
No.	DATE	DESCRIPTION

- NOTES**
1. SOLID MATERIAL TO BE CONTINUOUS METAL.
 2. ANY POSTS TO BE ON ROADSIDE OF FENCE.
 3. SUITABLE END TREATMENTS/STRAINER ASSEMBLIES TO BE DESIGNED TO SUIT LOCAL CONDITIONS.
 4. REFER TO MRWA DRG No. 202002-0220 FOR MESH SKIRT DETAILS.

FIGURE 6

METADATA

GROUND SURVEY STANDARD:
 DATE OF CAPTURE:
 MAPPING SURVEY STANDARD:
 DATE OF CAPTURE:
 MAIN ROADS PROJECT ZONE:
 HEIGHT DATUM:

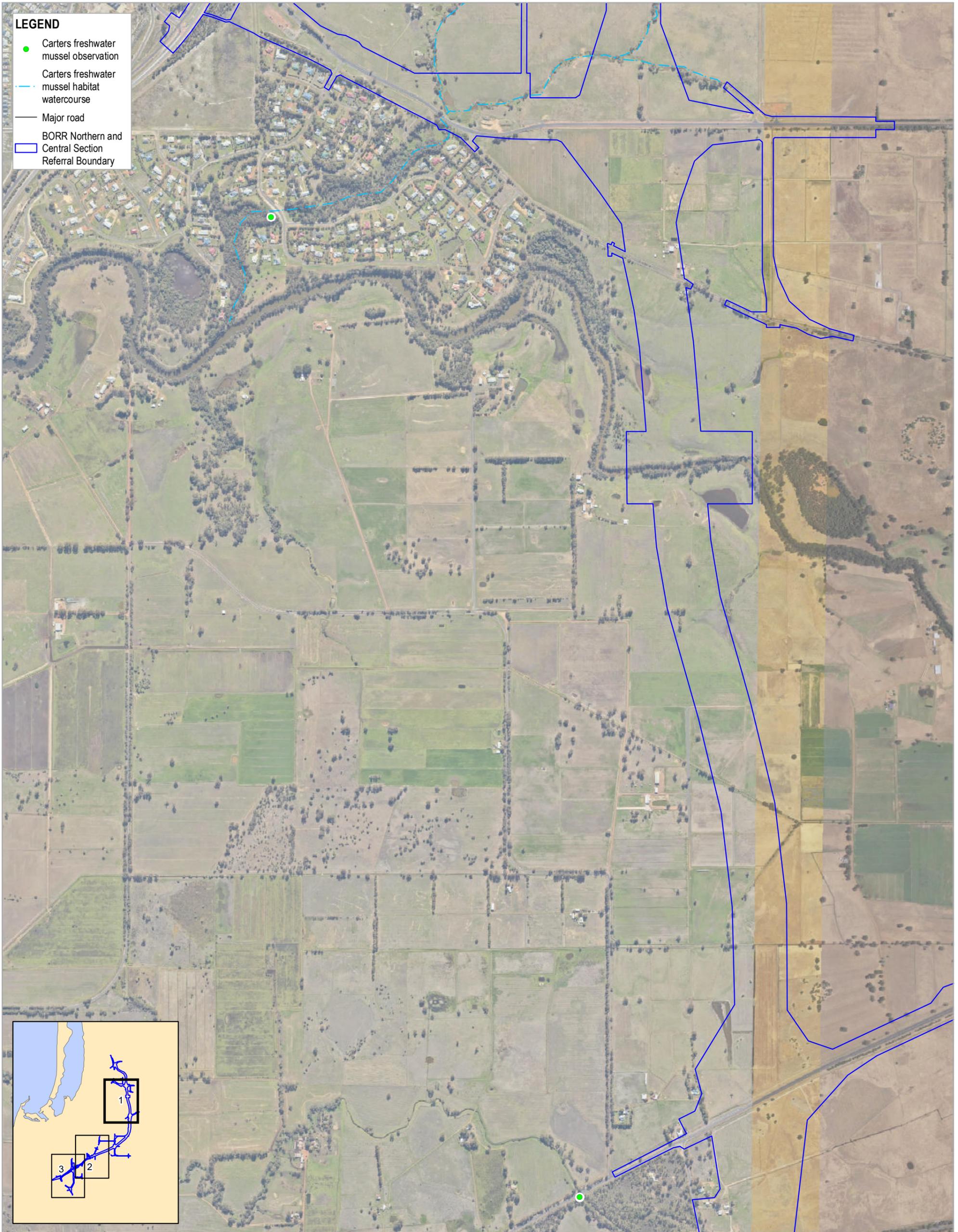
METROPOLITAN & SOUTHERN REGIONS DIRECTORATE
 SOUTH WEST REGION
 ROBERTSON DRIVE BUNBURY 6230
 Telephone(08) 9724 5600 Fax (08) 9724 5656

FILE NUMBER 18/3958
 DESIGNED / DRAWN A. SZELIGA 30/03/2020
 VERIFIED
 APPROVED

**BUNBURY OUTER RING ROAD (H058)
 FORREST HWAY (H057) TO BUSSELL HWAY (H009)
 NORTHERN AND SOUTHERN SECTIONS
 POSSUM FENCE CONCEPT PLAN**

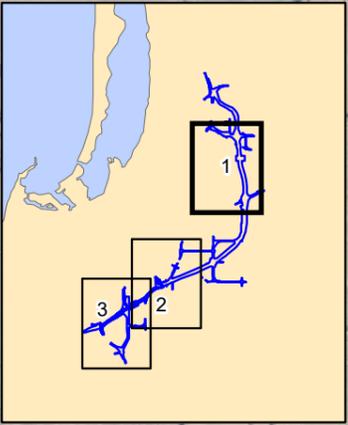
LOCAL AUTHORITY (211, 208, 206) SHIRE OF HARVEY, DARDANUP & CAPEL
 MRWA DRAWING NUMBER AMENDMENT
202002-0251

SCALE NOT TO SCALE
 A
 3



LEGEND

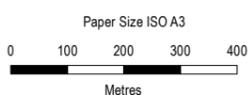
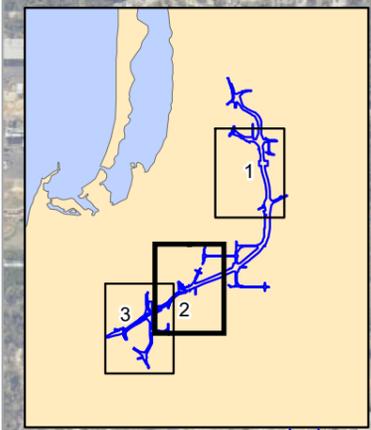
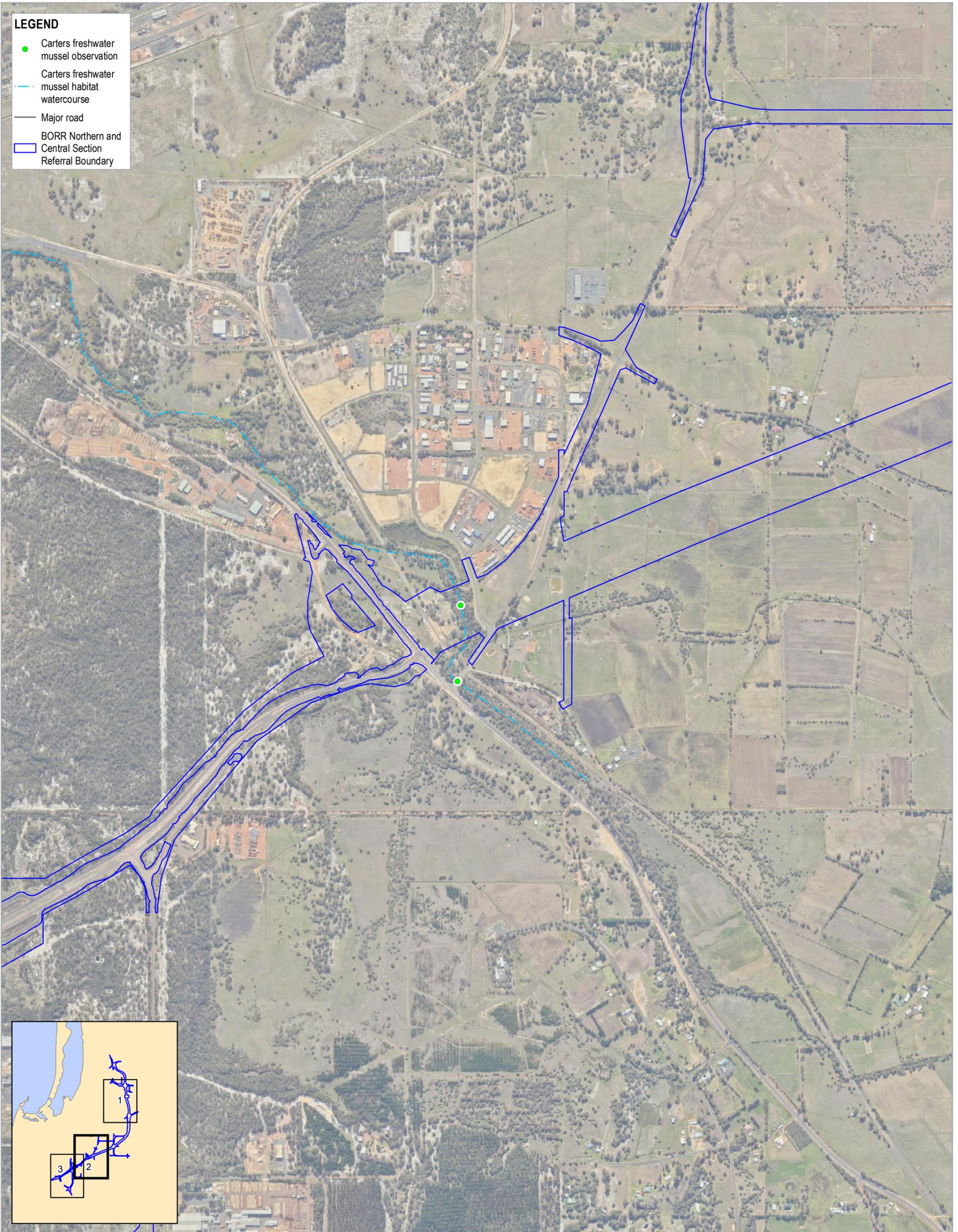
- Carters freshwater mussel observation
- Carters freshwater mussel habitat watercourse
- Major road
- BORR Northern and Central Section Referral Boundary



Data source: BORR team: North referral boundary - 20191016; WRM: Mussel habitat and observations - 201912; Landgate: Roads - 201805; Localities - 20180319; Imagery - WANA accessed 20191217. Created by: bnmorgan

LEGEND

- Carters freshwater mussel observation
- Carters freshwater mussel habitat watercourse
- Major road
- BORR Northern and Central Section Referral Boundary



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994



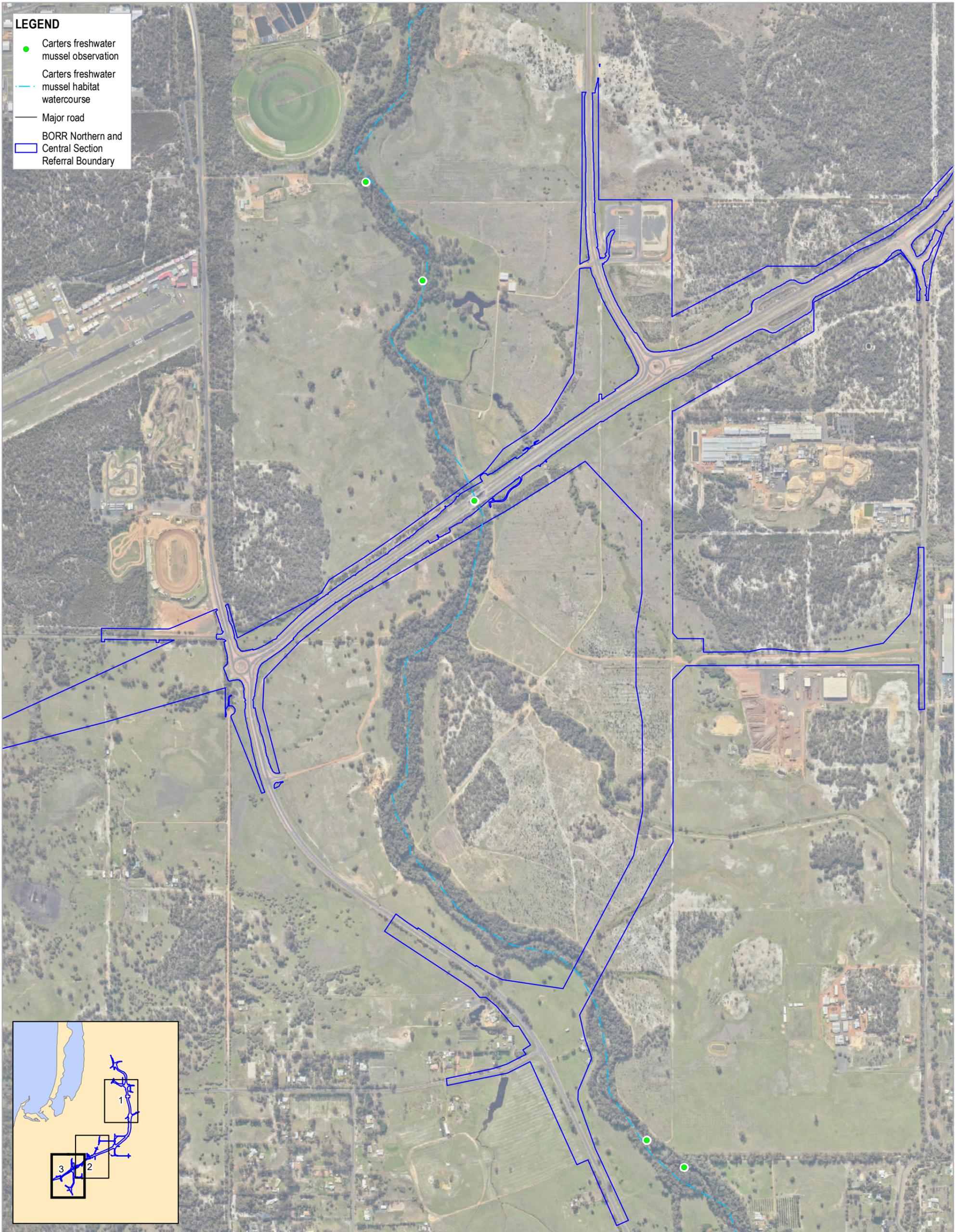
Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section
Conservation Significant Fauna
Action Management Plan

**Carter's Freshwater Mussel Observations
Within and Adjacent to the Proposal Area**

Project No. 61-37041
Revision No. 1
Date 24 Aug 2020

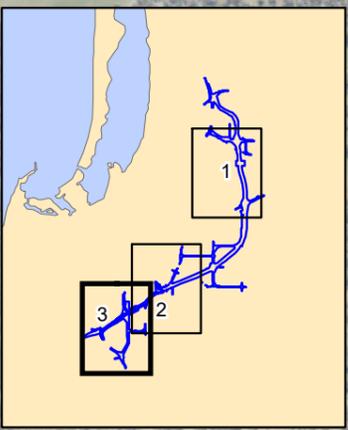
Page 2 of 3

FIGURE 7



LEGEND

- Carters freshwater mussel observation
- Carters freshwater mussel habitat watercourse
- Major road
- BORR Northern and Central Section
- Referral Boundary



Paper Size ISO A3
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 Metres

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 Perth Coastal Grid 1994

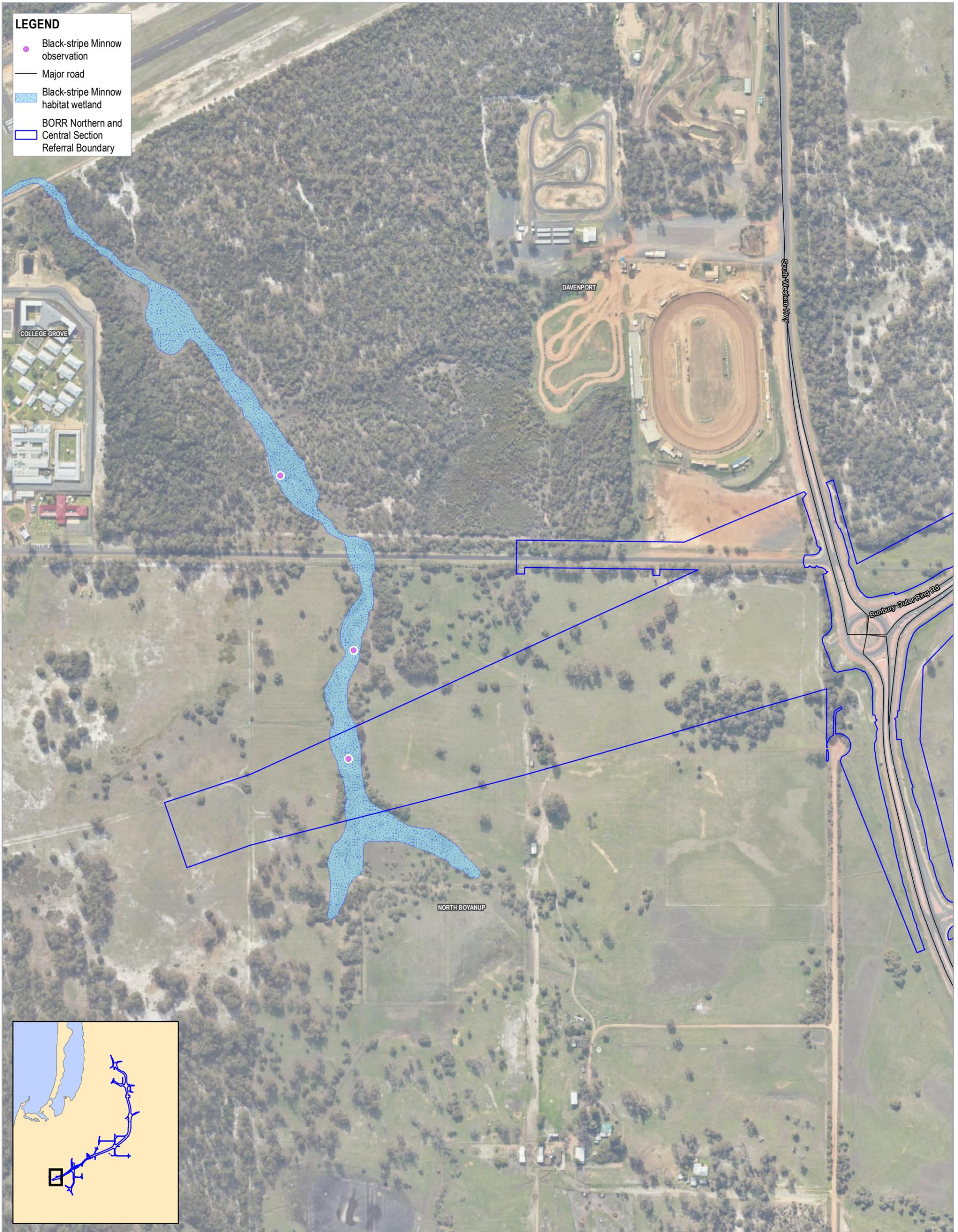


Main Roads Western Australia
 Bunbury Outer Ring Road Northern and Central Section
 Conservation Significant Fauna
 Action Management Plan

**Carter's Freshwater Mussel Observations
 Within and Adjacent to the Proposal Area**

Project No. 61-37041
 Revision No. 1
 Date 24 Aug 2020

Data source: BORR team: North referral boundary - 20191016; WRM: Mussel habitat and observations - 201912; Landgate: Roads - 201805, Localities - 20180319, Imagery - WA Now accessed 20191217. Created by: bnmorgan



LEGEND

- Black-stripe Minnow observation
- Major road
- Black-stripe Minnow habitat wetland
- BORR Northern and Central Section Referral Boundary

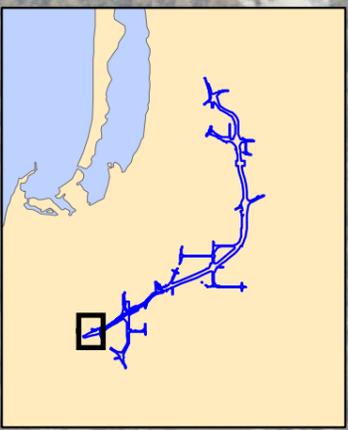
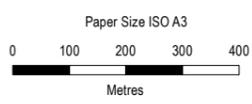
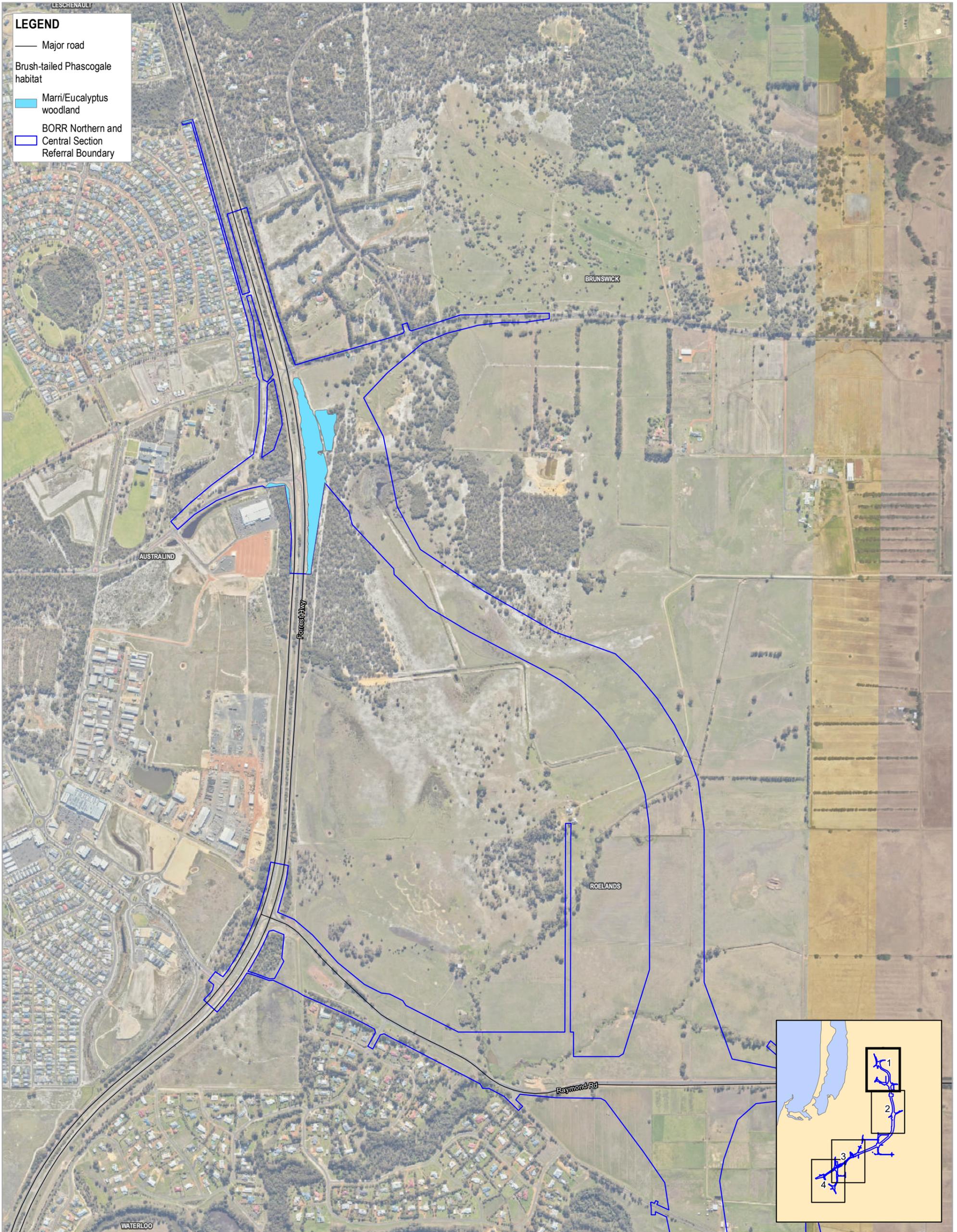


FIGURE 8

Data source: BORR team: North referral boundary - 20191016; WRM: Minnow habitat and observations - 201912; Landgate: Roads - 201805; Localities - 20180319; Imagery - WA Now accessed 20191217. Created by: bnmorgan



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994



Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section
Conservation Significant Fauna
Action Management Plan

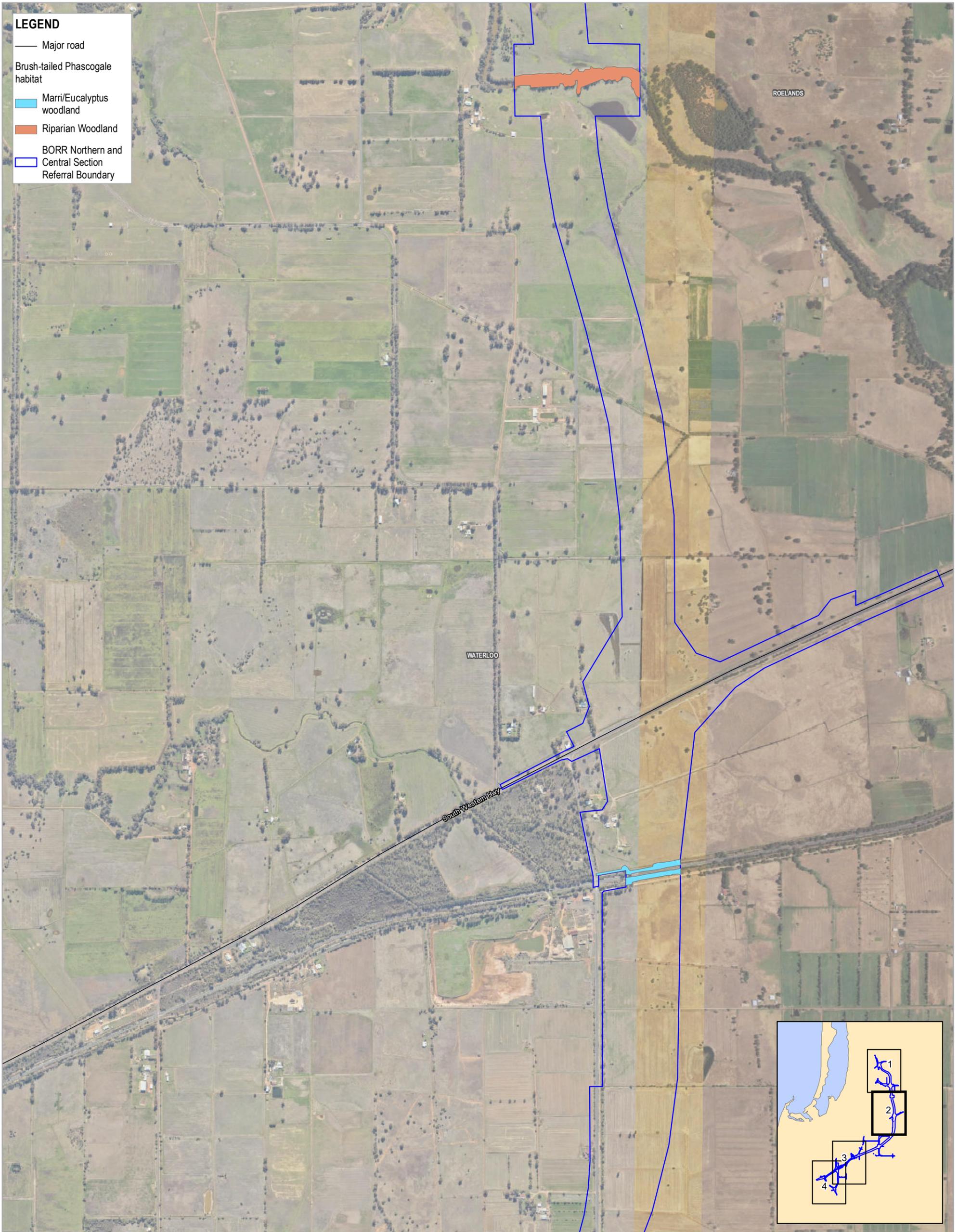
Brush-tailed Phascogale Records
Within and Adjacent to the Proposal Area

Project No. 61-37041
Revision No. 1
Date 24 Aug 2020

Page 1 of 4

FIGURE 9

Data source: BORR team: North referral boundary - 20191016; Biota: Brush-tailed Habitats & Observation 201912; Landgate: Roads - 201805, Localities - 20180319, Imagery - WA Now accessed 20200824. Created by: bnmorgan



LEGEND

- Major road
- Brush-tailed Phascogale habitat
- Marri/Eucalyptus woodland
- Riparian Woodland
- BORR Northern and Central Section Referral Boundary

SLIP
POWERED BY LANDGATE

Paper Size ISO A3
0 100 200 300 400
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994

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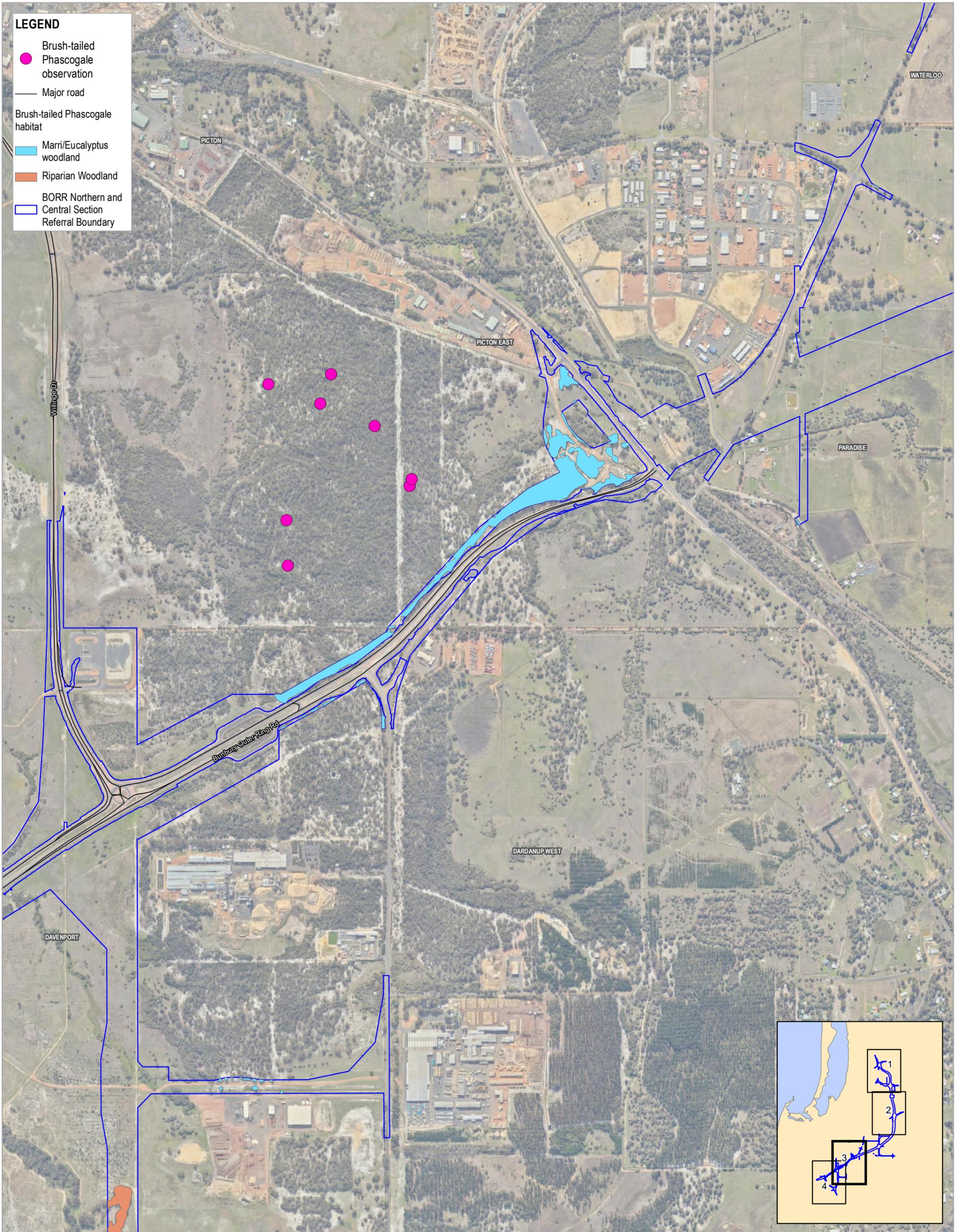
Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section
Conservation Significant Fauna
Action Management Plan

**Brush-tailed Phascogale Records
Within and Adjacent to the Proposal Area**

Project No. 61-37041
Revision No. 1
Date 24 Aug 2020

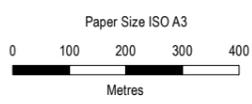
Page 2 of 4
FIGURE 9

Data source: BORR team: North referral boundary - 20191016; Biota: Brush-tailed Habitats & Observation 201912; Landgate: Roads - 201805, Localities - 20180319, Imagery - WA Now accessed 20200824. Created by: bnmorgan



LEGEND

- Brush-tailed Phascogale observation
- Major road
- Brush-tailed Phascogale habitat
- Marri/Eucalyptus woodland
- Riparian Woodland
- BORR Northern and Central Section Referral Boundary



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994

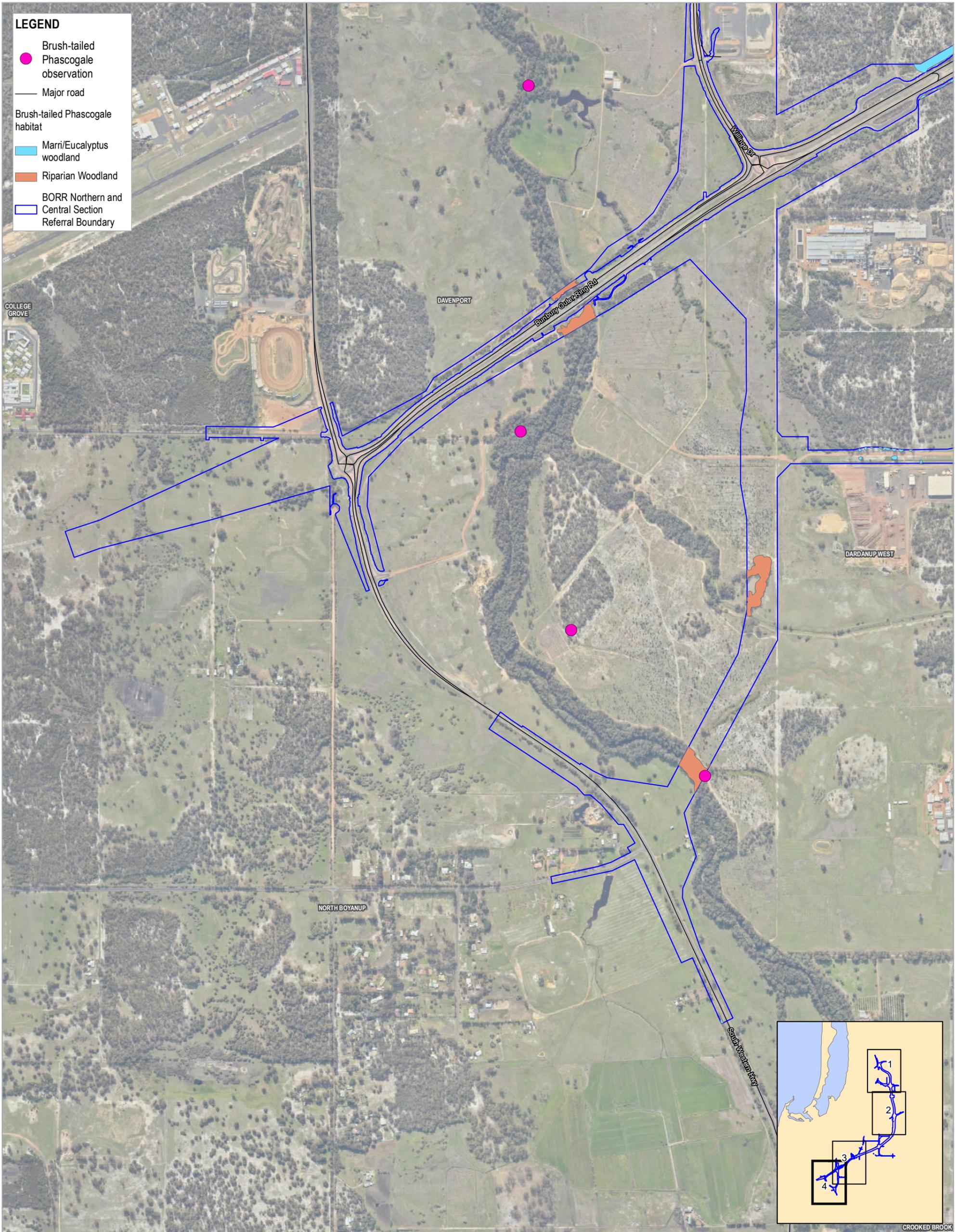


**Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section
Conservation Significant Fauna
Action Management Plan**

**Brush-tailed Phascogale Records
Within and Adjacent to the Proposal Area**

Project No. 61-37041
Revision No. 1
Date 24 Aug 2020

Data source: BORR team: North referral boundary - 20191016; Biota: Brush-tailed Habitats & Observation 201912; Landgate: Roads - 201805, Localities - 20180319, Imagery - WA Now accessed 20200824. Created by: bmcorgan



LEGEND

- Brush-tailed Phascogale observation
- Major road
- Brush-tailed Phascogale habitat
- Marri/Eucalyptus woodland
- Riparian Woodland
- BORR Northern and Central Section Referral Boundary

COLLEGE GROVE

DAVENPORT

Bunbury Outer Ring Rd

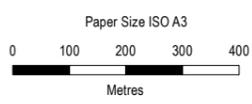
Mulleer Highway

DARDANUP WEST

NORTH BOYANUP

South Western Hwy

CROOKED BROOK



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 Perth Coastal Grid 1994



Main Roads Western Australia
Bunbury Outer Ring Road Northern and Central Section
Conservation Significant Fauna
Action Management Plan

**Brush-tailed Phascogale Records
Within and Adjacent to the Proposal Area**

Project No. 61-37041
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Page 4 of 4

FIGURE 9

Data source: BORR team: North referral boundary - 20191016; Biota: Brush-tailed Habitats & Observation 201912; Landgate: Roads - 201805, Localities - 20180319, Imagery - WA Now accessed 20200824. Created by: bnmorgan

Annual compliance report template



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EPBC 2019/8471

Annual Compliance Report

Bunbury Outer Ring Road
Northern and Central Sections
Month/Year

Contents

1. Introduction.....	3
1.1 Approval under the Environment Protection and Biodiversity Conservation Act 1999	3
1.2 Purpose of this Report	4
2. Compliance.....	5
3. Attachments.....	8
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Attachment 3:	11
Attachment 4:	12
Attachment 5:	13
Attachment 6:	14
Attachment 7:	15

1. Introduction

Main Roads Western Australia (Main Roads) is proposing to construct and operate the Northern and Central sections of the Bunbury Outer Ring Road (BORR) project. BORR is a planned Controlled Access Highway linking the Forrest Highway and Bussell Highway. The completed project will provide a high standard route for access to the Bunbury Port, improve road user safety and facilitate proposed development to the east of the City of Bunbury. BORR provides an effective bypass of Bunbury for inter-regional traffic. The proposed BORR comprises three sections:

- 'BORR Northern Section' – Forrest Highway to Boyanup-Picton Road
- 'BORR Central Section' – Boyanup-Picton Road to South Western Highway (an existing four km section which was completed in May 2013, along with a three km extension of Willinge Drive southwards to South Western Highway)
- 'BORR Southern Section' – South Western Highway (near Bunbury Airport) to Bussell Highway.

The proposed BORR Project occurs within the City of Bunbury and Shires of Capel, Dardanup and Harvey. Construction of the BORR Project is anticipated to commence in year 2021 and continue for a period of up to approximately three years.

1.1 Approval under the Environment Protection and Biodiversity Conservation Act 1999

The Project was referred to the then Department of the Environment and Energy (now Department of Agriculture, Water and Environment; DAWE) for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as the Project was deemed to potentially impact significantly on the following listed threatened species and communities:

- Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) (Critically endangered)
- Black-stripe Minnow (*Galaxiella nigrostriata*) (BSM) (Endangered)
- Carter's Freshwater Mussel (*Westralunio carteri*) (CFM) (Vulnerable)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable)
- Baudin's Cockatoo (*Calyptorhynchus baudinii*) (Endangered)
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (Endangered)
- Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered) (Banksia Woodlands TEC)
- Clay Pans of the Swan Coastal Plain (Critically Endangered) (Clay Pans TEC)
- *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain (Endangered) (Corymbia Woodlands TEC).

The Project was determined by DAWE to be a 'Controlled Action' and was assessed through Preliminary Documentation with a request for further information to assist in the assessment of the Proposal. The DAWE issued approval of the Project on Day/Month/Year (EPBC 2019/8471) and included a number of conditions that Main Roads Western Australia (Main Roads) is required to fulfil.

1.2 Purpose of this Report

Construction of the Project commenced on Day/Month/Year. This compliance report has been produced as required by Condition X of EPBC approval 2013/7091. Table 1 of this report outlines the compliance with each approval condition over the past 12 month period, Day/Month/Year to Day/Month/Year. The clearing area of TEC vegetation is shown in Figure 1 and that of conservation significant fauna habitat in Figure 2.

2. Compliance

Table 1: Year - Year compliance with EPBC Approval 2019/8471

Condition Number	Condition Description	Status

Figure 1 Total Clearing of TEC vegetation from Project Area

Figure 2 Total clearing of conservation significant fauna habitat from Project Area

3. Attachments

Attachment	Title
Attachment 1	
Attachment 2	
Attachment 3	
Attachment 4	
Attachment 5	
Attachment 6	
Attachment 7	

Attachment 1:

Attachment 2:

Attachment 3:

Attachment 4:

Attachment 5:

Attachment 6:

Attachment 7:



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