Albany Ring Road Project
Stage 2 and 3b

EPA Environmental Referral Supporting Document

May 2020

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May 2020

FIGURES

APPENDICES

Document Control				
Revision	**Description**	**Prepared**	**Reviewed**	**Approved**
A	Draft for Main Road Review	CG EJ	PW	06 April 2020
B	Draft for Main Road Review	CG	PW	30 April 2020
0	Final	CG EJ	PW	26 May 2020

EXECUTIVE SUMMARY

The Commissioner of Main Roads Western Australia (Main Roads) is proposing to construct and operate the Albany Ring Road (ARR), which is a dedicated freight route around the City of Albany located in the Great Southern Region of Western Australia (WA). The redirection of haulage vehicles around the city will reduce congestion, noise and improve safety in the built up areas of the city. The ARR will also help meet increasing demands for the transport of grain, woodchip, agricultural and mining products for export through the Port of Albany. Development of the road will compliment population growth, improve amenity of the City and will improve accessibility by tourists to the region.

Main Roads is referring the Stage 2 (the Southern Link) and 3b (part of the Western Link) portion of the ARR (the Proposal) to the Environmental Protection Authority (EPA) for a decision on assessment under Section 38 of the *Environmental Protection Act 1986* (EP Act). The purpose of this document is to provide information to support a decision on assessment of the Proposal. The staging of the road development reflects the constraints in budgeting and construction timing.

The Proposal includes the construction and operation of seven kilometres (km) of new road which will connect the intersection of South Coast Highway and Link Road, to the Port of Albany around the City of Albany, WA. Stage 2 of the ARR is the southern link of the ring road located between the Lower Denmark Road George Street Intersection and Frenchman Bay Road. The end of the proposed Stage 2 works occurs west of Festing Street. Stage 3b proposes to connect the South Coast Highway to the Lower Denmark Road. This will comprise of a dual carriageway and a single carriageway road that connects the intersection of the South Coast Highway in the north and Hanrahan Road in the south. The Proposal includes associated bridges, interchanges, local road modifications and other infrastructure including, but not limited to, drainage basins, drains, culverts, lighting, noise barriers, fencing, landscaping, road safety barriers and signs. The total area being referred by Main Roads covers up to 137.7 hectares (ha) and is referred to as the Proposal Area.

The Proposal Area is located in the City of Albany and comprises of largely cleared pasture or plantation with several areas of remnant vegetation and narrow vegetated roadside corridors. The Proposal Area excludes the Gledhow Nature Reserve and Mt Melville Public Park. No Wetlands of National or International Importance or Environmentally Sensitive Areas (ESAs) intersect the Proposal Area. The Proposal Area bisects the Munster Hill Drainage Open Earth Channel and a number of minor ephemeral drainage lines.

Almost 42 per cent of the land within the Proposal Area is cleared and highly modified, including previously constructed roads. Approximately 22 per cent of the land within the Proposal Area is native vegetation with a further 36 per cent revegetation and plantation. The remainder comprises of woody weeds, isolated trees and weed infested areas located in road reserves or as isolated patches on agricultural land.

Environmental survey work for the Proposal occurred over many years, covering an extensive area as the design has evolved. The current road design at this stage is considered preliminary at 15 per cent. Although most of the survey work has been completed, further environmental surveys might be needed in future to accommodate minor changes. A summary of potential impacts, proposed mitigation measures and outcomes of the Proposal are provided in the table below.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
EPA objective	'To protect flora and vegetation so that biological diversity and ecological integrity are maintained'
Policy and guidance	Flora and vegetation surveys to support the Proposal were conducted in accordance with the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a) and the Environmental Factor Guideline (EPA 2016b)
Potential impacts	Loss of up to 29.4 ha of native vegetation, and of up to 34.3 ha of plantation and revegetation within the 137.7 ha Proposal Area. The following potential impacts have been estimated within the 29.4 ha of native vegetation in the surveyed area: • 9.4 ha of riparian vegetation (associated with watercourses or wetlands). • 8.2 ha of Department of Biodiversity, Conservation and Attractions (DBCA) Priority 1 *Prasophyllum paulinae* habitat, which is approximately 0.3 per cent of its known habitat. • Four individuals of DBCA priority 3 *Synaphea incurva* which is less than 1 per cent of the known number of individual plants. • 13 individual DBCA priority 4 *Andersonia sp. Jamesii;* impacting approximately 1 per cent of the known number of individuals. • One DBCA priority *4 Thysanotus isantherus* plant is located within 10m of the development envelope impacting less than one per cent of the known number of individual plants. Other potential impacts include indirect impacts such as fragmentation of native vegetation, possible introduction or spread of Dieback *(Phytophthora cinnamomi*) or weeds, changes to vegetation structure in surrounding areas and damage to surrounding vegetation through bushfire may occur as a result of the Proposal.
Mitigation	**Avoid** Strategy to avoid impacts on the environment included: Clearing of remnant native vegetation was minimised through selection of the:: • Proposal Area (through the 2019 Alignment Review) to occur within a significant proportion of previously disturbed or cleared land. • Clearing of native vegetation will be avoided where practicable through consideration of potential impacts during the detailed design phase. • Cut to fill techniques will be applied where possible to reduce the amount of external fill to be sourced off site. **Minimise** • Implementation of a Construction Environmental Management Plan (CEMP) incorporating a Hygiene Management Plan and a Topsoil Management Plan. • The disturbance footprint will be minimised by using retaining walls and steepening batters where appropriate.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
	Rehabilitate • Implementation of a Topsoil Management Plan and Revegetation Strategy.
Outcomes	Permanent loss of up to 29.4 ha of native remnant vegetation and 34.3 ha of plantation and revegetation. Mitigation through revegetation of approximately 20 ha in road reserves will help mitigate impacts by clearing. Indirect impacts can be mitigated through implementation of relevant management plans during construction.
KEY ENVIRONMENTAL FACTOR – TERRESTRIAL FAUNA	
EPA objective	'To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.'
Policy and guidance	The fauna surveys to support the Proposal were conducted in accordance with the Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016c) and the Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016d).
Potential impacts	Loss of up to 79.4 ha of fauna habitat (29.4 ha native vegetation, 34.3 ha plantation and revegetation and 15.7 ha of weeds and non native vegetation) that comprises breeding and foraging habitat for conservation significant fauna species known to occur within the Proposal Area. Potential impacts include up to: • Native Vegetation (24.1 ha): o 13.4 ha of high quality Black Cockatoo foraging and breeding habitat for all three species. o 2.9 ha of low quality Black Cockatoo foraging habitat Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo. o 15.7 ha of high quality Black Cockatoo roosting habitat and 5.4 ha of low quality roosting habitat. Non-Native Vegetation (33.5 ha): o 31.5 ha high quality roosting habitat. o 2 ha low quality roosting habitat. • 41.2 ha Western Ringtail Possum (WRP) habitat (native and non-native vegetation) in varying condition with a predicted impact on approximately 26 WRP home ranges. Clearing of up to 4.5 ha of core, 0.9 ha of core (urban) habitat and 35.8 ha supporting habitat; representing approximately less than 0.1 per cent of the regional population estimate. • 137.7 ha of Southern Brown Bandicoot (Quenda) habitat. • Loss of 41.2 ha potential habitat for South-western Brush-tailed Phascogale. • Loss of habitat for a further six conservation significant fauna species that are likely to or could possibly occur within the Proposal Area. • Potential for death or displacement of fauna species may occur through vehicle movements, traffic noise exposure, light spill or disturbance of the bed and banks of watercourses.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
	In the surveyed area only, potential impacts include: • Loss of 572 Suitable Diameter Breast Height (DBH) Trees (Black Cockatoos) none of which contain Known Nesting hollows, 34 trees contained hollows that are not suitable for nesting by Black Cockatoos.
Mitigation	**Avoid** • Clearing of fauna habitat was minimised through selection of the Proposal Area where approximately 42 per cent of land has been previously cleared. • Avoiding the clearing of fauna habitat where practicable will be refined during the detailed design phase. **Minimise** • The disturbance footprint will be minimised by using retaining walls and steepening batters where appropriate. • Design and install infrastructure to facilitate fauna movement. • Implementation of a CEMP and Fauna Management Plan. **Rehabilitate** • Revegetating temporarily cleared areas with vegetation known.
Outcomes	Clearing of native vegetation for the construction of the Proposal will reduce the amount of habitat available to conservation significant fauna. It is considered likely that the Proposal will have residual impacts on Black Cockatoos and WRP. Other potential impacts can be effectively mitigated through the implementation of relevant management plans during construction. Revegetation of approximately 20 ha in the road reserve will also assist with mitigation of the impacts and provide potential habitat for Black Cockatoos and WRP.
KEY ENVIRONMENTAL FACTOR – TERRESTRIAL ENVIRONMENTAL QUALITY	
EPA objective	'To maintain the quality of land and soils so that environmental values are protected.'
Policy and guidance	Investigations to support the Proposal were conducted in accordance of the requirements of the Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016e), Department of Water and Environmental Regulation (DWER) Acid Sulfate Soil (ASS) Guideline Series (DER, 2015a) and Assessment and the Management of Contaminated Sites (DER, 2014).
Potential impacts	Without appropriate management, the Proposal has the potential to have the following impacts. **Construction Phase** • Release of contaminants through excavation activities in areas of contaminated sites or areas prone to ASS leading to contamination of land and/or waters. • Erosion of surrounding soils. • Accidental release of environmentally hazardous material from transport, storage or handling areas, causing contamination of land. • Indirect impacts such as reduced soil health from erosion and vegetation clearing.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
	Operational Phase • Contamination of land and erosion from stormwater runoff • Loss of soil function due to establishment of a permanent bituminised (road base) surface.
Mitigation	**Avoid** • Hydrocarbon and chemical handling will be managed through the implementation of a CEMP; • ASS will be managed through an ASS and Dewatering Management Plan; • Contaminated sites will be effectively assessed and managed under the *Contaminated Sites Act 2003*. • Avoidance of the low likelihood of soil salinisation will be reduced through minimising clearing of native vegetation (where practicable), revegetation and the inclusion of effective drainage infrastructure where required. • Drainage design will include containment of hazardous spills. **Minimise** • Implementation of an ASS and Dewatering Management Plan (ASSMP and DMP), CEMP and Topsoil Management Plan. • Further investigation where required through Detailed Contaminated Sites Investigations (DSI), ensuring effective management and remediation as required. • Undertake a contamination risk assessment during construction and operations of the entire alignment (when available) and remediate as required. **Rehabilitate** • Manage and respread soils as required through implementation of a Topsoil Management Plan.
Outcomes	Construction of the Proposal will result in loss of soil function for the bituminised areas (road base). The remainder of the Proposal Area can be rehabilitated to restore soil function. Risk of ASS or contaminated sites impacts through construction of the Proposal can be managed by developing and implementing an effective ASS and Dewatering Management Plan and Contaminated Sites Management Plan. Impacts by the Proposal on Terrestrial Environmental Quality are not considered significant.
KEY ENVIRONMENTAL FACTOR – INLAND WATERS	
EPA objective	'To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.'
Policy and guidance	The Inland Waters studies to support the Proposal are in the preliminary stages and comprise of were conducted in accordance with the Environmental Factor Guideline – Inland Waters (EPA, 2018a) and Contaminated Sites Guidelines (DER 2014).
Potential impacts	Without appropriate management, the Proposal has the potential to have the following impacts.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
	• Temporary and localised alteration of groundwater levels in the superficial aquifer due to dewatering and water abstraction during construction. • Potential changes to hydrological regimes within the Torbay and Princess Royal Harbour Catchments, the Conservation Class Gladhow Wetlands located 250 m to 500 m south south-east to the Proposal Area, modified drains and minor ephemeral drainage lines. • Erosion and sedimentation in surrounding areas. • Impacts to the beds and banks of waterways. • Contamination of surface or groundwater from dispersal of contaminated sites materials, contaminated stormwater, accidental release of hazardous substances and exposure of ASS or Potential Acid Sulfate Soils (PASS) during construction.
Mitigation	**Avoid** • Avoid impacts on hydrological flow regimes by road construction and drainage works, impacts from stormwater on ground and surface water quality, impacts from storm water and drainage on soil and landform values. • Drainage design to maintain hydrological flows, and manage stormwater runoff. **Minimise** • Implement a CEMP that includes an ASS and Dewatering Management Plan, a contaminated sites management plan, the effective management of drainage and groundwater, dust and hazardous materials management. • Ensure compliance with conditions of groundwater abstraction licences. **Rehabilitate** • Implement remediation as required by the Contaminated Sites Risk Assessment after construction. • Reinstate vegetation in areas where vegetation in proximity to drains and minor watercourses has been affected by construction works. • Implement the revegetation strategy to limit erosion, runoff and sedimentation from the Proposal Area
Outcomes	Impacts to hydrological flows will be effectively mitigated by road and drainage design. Temporary impacts to surface and groundwater values during construction will be managed through the CEMP, the ASS and Dewatering Management Plan and the Contaminated Sites Management Plan. Permanent change to ground and surface water regimes by the Proposal are unlikely. Significant residual impacts to inland waters are not expected.
KEY ENVIRONMENTAL FACTOR – AIR QUALITY	
EPA objective	'To maintain air quality and minimise emissions so that environmental values are protected.'

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
Policy and guidance	The Air Quality studies to support the Proposal's planning and design were conducted in accordance with the Environmental Factor Guideline – Air Quality (EPA, 2016f) and the National Environment Protection (Ambient Air Quality) Measure (AIR NEPM) (National Environment Protection Council, 2016).
Potential impacts	Without appropriate management, the Proposal has the potential to have the following impacts: • Reduced air quality due to increased construction vehicle emissions. • Dust (visible) generated from construction activities. • Smoke from accidental bushfire.
Mitigation	**Minimise** • Implement a CEMP inclusive of dust management and fire management. **Rehabilitate** • Progressively revegetate cleared areas in the road reserve to reduce dust after construction.
Outcomes	ARR is expected to have a positive impact on local emissions, as it will shift traffic away from congested roads, allowing for more efficient movement of heavy vehicles into the Port of Albany and away from residential and built up areas. The predicted traffic volumes are less than 10,000 vehicles per day and the impacts on air quality are considered to be low. Visible dust emissions are likely to occur during construction. Dust emissions are expected to be minor and will be appropriately managed. Impacts by the Proposal are expected to meet the EPA's objective to maintain air quality and minimise emissions so that environmental values are protected. Given the proposed mitigation measures outlined above, residual impacts by the Proposal are not expected.
KEY ENVIRONMENTAL FACTOR – SOCIAL SURROUNDS	
EPA objective	'To protect social surroundings from significant harm.'
Policy and guidance	The social surroundings investigations to support the Proposal were conducted in accordance with Environmental Factor Guideline Social Surroundings (EPA, 2016g), State Planning Policy 5.4 Road and Rail Noise, Environmental Protection (Noise) Regulations 1997 (SPP 5.4), *Aboriginal Heritage Act 1972* (AH Act) and *Heritage Act 2018.*
Potential impacts	Without appropriate management, the Proposal has the potential to have the following impacts: **Construction Phase** • Disturbance of unknown Aboriginal and Historical Heritage Sites and Heritage materials. • Reduced visual amenity due to vegetation clearing and construction activities. • Noise and dust from equipment and vehicle operations during construction.

KEY ENVIRONMENTAL FACTOR – FLORA AND VEGETATION	
	• Increased traffic and congestion on local road network during construction. **Operational Phase** • Reduced visual amenity where the new road is visible to nearby residents. • Increased noise in rural areas due to roadway. • Increased glare or light spill from lighting at interchanges and from vehicle headlights.
Mitigation	**Avoid** • Implement noise reduction methods such as construction of noise walls or housing treatments • Obtain necessary permits for preservation, relocation or disposal of Aboriginal or Historical Heritage values. **Minimise** • Minimise noise emissions through site selection, design (e.g. noise walls and facades) and implementation of a CEMP (construction noise management). • The design will ensure the Proposal complies with SPP 5.4. • Design of the Proposal has been informed by the results of environmental and other surveys and adjusted where possible to minimise the impacts. • Minimise vibration and dust through implementation of a CEMP (incorporating vibration and dust management). • Implement a Heritage Management Plan **Rehabilitate** Revegetate portions of the road reserve.
Outcomes	Changes to visual amenity near the road, positive benefit to current sensitive receivers by removal of heavy haulage off residential roads leading to reduced traffic and a decrease in noise in some areas. Main Roads considers that the EPA objective for Social Environment will be met through the implementation of appropriate management and mitigation measures provided in the stakeholder engagement plan, various environmental management plans; the application and compliance with the State Planning Policy No. 5.4 (SPP 5.4) Road and Rail Noise.

ACRONYMS

ACM	asbestos containing materials
AEP	Annual exceedance probability
AH Act	*Aboriginal Heritage Act 1972*
ARR	Albany Ring Road
ARC	ARC Infrastructure
ARVS	Albany Regional Vegetation Survey
ASS	Acid sulfate soils
AST	above-ground storage tanks
BC Act	*State Biodiversity Conservation Act 2016*
Biota	Biota Environmental Sciences
Category E	historic site with few or no built features'
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CALM	Department of Conservation and Land Management
CSBP	fertiliser and chemical manufacturers
CSE Plan	Community Stakeholder Engagement Plan
Cwlth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment
DER	Department of Environment Regulation
DSI	Detailed Site Investigation
DBH	Diameter at Breast Height
DBCA	Department of Biodiversity, Conservation & Attractions
DEE	Department of Environment and Energy (Commonwealth)
DOH	Department of Health,
DPaW	Department of Parks and Wildlife
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth)
ESA	Environmentally Sensitive Areas
GHPDP	Government Heritage Property Disposal Process
GIS	Global Information Systems
GOWA	Government of Western Australia
IA	Migratory birds protected under international agreement

IBRA	Interim Biogeographic Regionalisation of Australia
ID	identification number
ISCA	Infrastructure Sustainability Council of Australia
L	licence
LOR	Limits of Reporting
NRM	Natural Resource Management
MNES	Matters of National Environmental Significance
MRWA	Main Roads Western Australia
No.	Number
NR	Nature Reserve
NP	National Park
PEC	Priority Ecological Communities
P	Priority
PFAS	polyfluoroalkyl substances
PSI	Preliminary Site Investigation
PTA	Perth Transport Authority
RDS	Route Definition Study
RIWI Act	Rights in Water and Irrigation Act 1914
RPA	Remote Piloted Aircraft
SPP 5.4	State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning
TECs	Threatened Ecological Communities
T-CR	Threatened Critically Endangered
T-EN	Threatened Endangered
T-VN	Threatened Vulnerable
UPDC	Ultimate Planning Design Concept
Veg Assoc	Vegetation Association
WONS	Weeds of National Significance
WRP	Western Ringtail Possum
WA	Western Australia
WAPC	Western Australian Planning Commission

* Invasive

1. INTRODUCTION

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

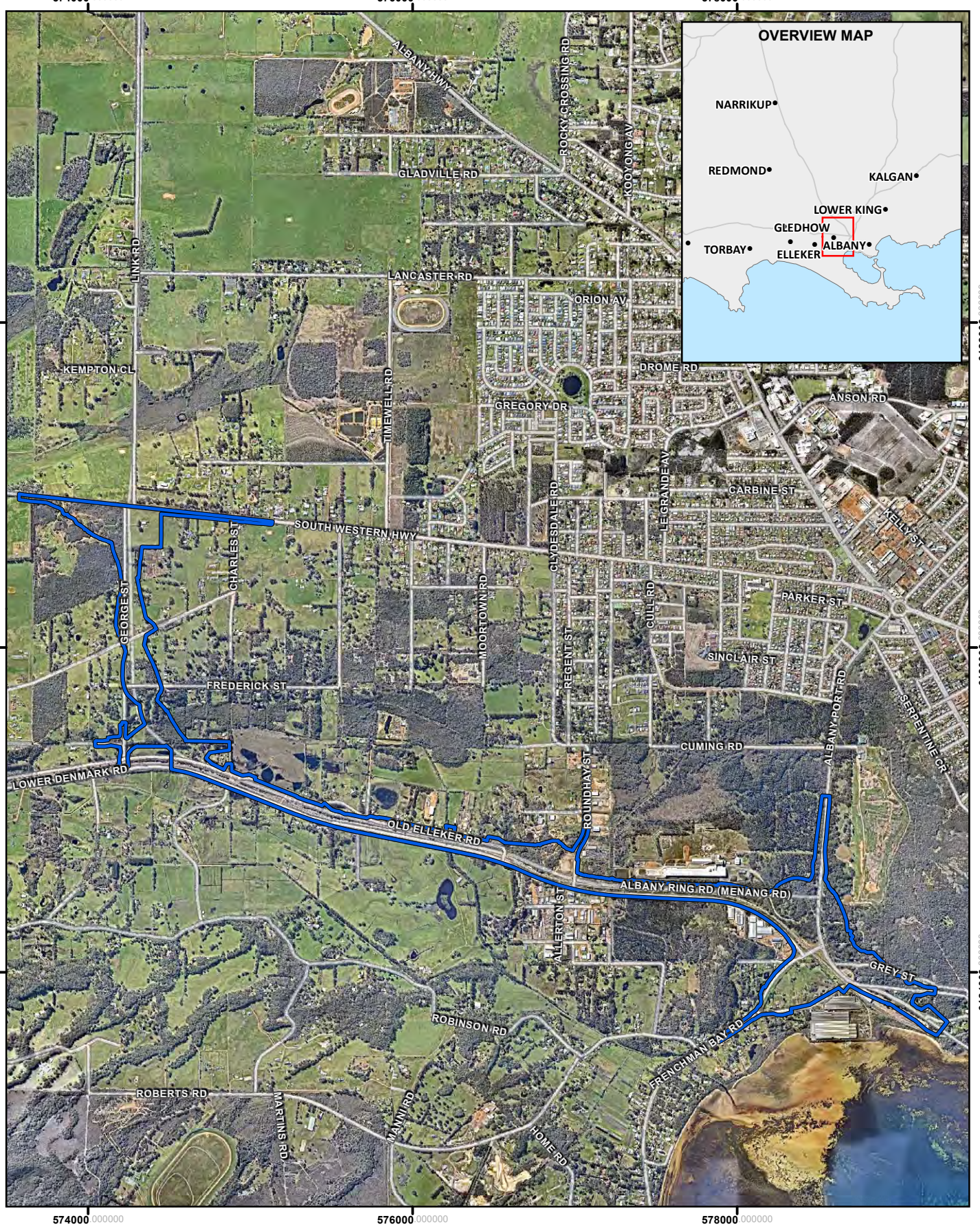
The location of the Port of Albany, adjacent to the Central Business District (CBD), presents a challenge for the movement of freight. The current access to the Port of Albany through the Albany townsite is inefficient due to the presence of major intersections and local traffic conditions. It passes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

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

The current alignment of the ARR has been endorsed by government and consists of four stages:

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

The Commissioner of Main Roads is proposing the construction and operation of Stage 2 and 3b of the ARR commencing in 2021. The disturbance associated with Stage 2 and 3b aligns with the ultimate design disturbance footprint where the final phase of development will include a two-way dual carriageway, referred to hereafter as the Proposal Area. The completion of the two-way dual carriageway is likely to occur around 2050. The initial phase of this Proposal involves the construction of a two way single lane carriage way.



Legend:

- Proposal area
- Local and Regional Roads

Scale 1:32,000 at A4

0 250 500 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 26-Mar-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGE 2
ENVIRONMENTAL PROTECTION ACT REFERRAL

PROPOSAL AREA

FIGURE 1

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_01_ProposalArea.mxd
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1.1 Purpose of this Document

Main Roads is referring the Stage 2 and 3b of the ARR to the Environmental Protection Authority (EPA) under Section 38 of the EP Act. The purpose of this document includes information on the Proposal, the potential environmental impacts and proposed mitigation measures associated with construction and operation of the ARR Stage 2 and 3b.

This document has been prepared in accordance with Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016 (EPA, 2016h) and Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2018b).

1.2 Proposal description

The development of the ARR Stage 2 and 3b being referred to the EPA includes the construction of approximately seven kilometres of new dual carriageway within a Proposal Area of approximately 137.7 ha (Figure 1). The Proposal Area will connect the intersection of South Coast Highway and Link Road, to the Port of Albany around the City of Albany. Stage 2 of the ARR is the southern link of the ring road located between the Lower Denmark Road George Street Intersection and Frenchman Bay Road. The end of the proposed Stage 2 works occurs west of Festing Street. Stage 3b proposes to connect South Coast Highway to Lower Denmark Road. This will comprise of a dual carriageway road that connects the intersection of the South Coast Highway With ARR in the north and Hanrahan Road with ARR in the south.

Stage 3a was referred to the EPA in December 2019, where it was determined it Stage 3a Proposal was not to be assessed under Part IV of the EP Act.

The Proposal will require clearing of up to 29.4 ha of native vegetation and up to 50 ha of non-native revegetated and/or plantation vegetation. The remaining 58.3ha (approx. 42 per cent of the Proposal Area) consists of cleared land.

1.3 The Proponent

Details of the Proposal proponent are in the table below.

DESCRIPTION	
PROPONENT	Commissioner of Main Roads Western Australia PO Box 6202 East Perth WA 6002 ABN/CAN 50 860 676 021
PROPOSAL KEY CONTACT	Elizabeth Johnston Senior Environmental Officer Main Roads Western Australia Don Aitken Centre (DAC)

1.4 Environmental impact assessment process

1.4.1 *Environmental Protection Act 1986*, Part IV Environmental Impacts Assessment

The Proposal will be referred under Part IV of the EP Act, which is the primary legislation governing environmental protection and impact assessment in WA. Division 1 of Part IV of the EP Act provides for the referral and assessment of significant and strategic proposals.

Main Roads considers impacts by the Proposal can be effectively managed with limited residual impacts on conservation significant species listed under state legislation and Matters of National Environmental Significance (MNES).

The Proposal is widely supported by the community. Main Roads hereby refers the Proposal under Part IV of the EP Act given the local community interest and the commitments made by Main Roads to stakeholders during the planning process.

1.4.2 Environmental Protection and Biodiversity Conservation Act 1999

A proposed action that may have a significant impact on a MNES requires approval from the Commonwealth under *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Impacts associated with the implementation of this proposal may be considered significant, therefore Main Roads intend to refer Stage 2 and 3b to the Department of the Agriculture Water and Heritage (DAWE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). Further details on potential MNES within the Proposal Area are provided in Sections 4.4 and Section 5.

1.4.3 Other Approvals and Regulation

Following primary environmental approval of the Proposal under Part IV of the EP Act, additional regulatory approvals will be required to develop and operate the Proposal. These are summarised in Table 1.

Table 1: Summary of Other Regulatory Approvals

PROPOSED ACTIVITIES	TYPE OF APPROVAL	REGULATORY AGENCY	LEGALISATION REGULATING THE ACTIVITY
Interference with bed and banks of a watercourse (clearing of vegetation and construction works)	Application for a permit to authorise interference or obstruction of the bed and banks of a watercourse	Department of Water and Environmental Regulation (DWER)	*Rights in Water and Irrigation Act 1914* (RIWI Act)
Sourcing of construction water	Licence to take^	DWER	RIWI Act
Land acquisition process	Administration of State Land Transfer of private land	Department of Planning, Lands and Heritage	*Land Administration Act 1997*
Preconstruction and Clearing of Native Vegetation	Licence to take flora or fauna	Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016*
Clearing of Native Vegetation	Application for a permit to approve clearing of native vegetation*	DWER	*Part V of the EP Act*

* Required if not assessed by EPA
^ Only required if agreement to access and use water sources from the landowner for is not reached.

Planning approvals

The Western Australian Planning Commission (WAPC) agreed to the proposed route for inclusion into the town-planning scheme in March 2001. The indicative boundary of the Albany Ring Road is shown on the Albany Local Planning Strategy Urban Map 9B, is discussed in the Local Planning Scheme No.1 and the Local Planning Strategy (City of Albany, 2010).

Land within the proposed alignment will be acquired by Main Roads and dedicated as a road pursuant to Section 28 (1) of the *Land Administration Act 1997*.

1.4.4 Decision making authorities

Table 2 lists the key Decision Making Authorities identified for the Proposal.

Table 2: Key Decision Making Authorities of the Proposal

DECISION MAKING AUTHORITY	RELEVANT LEGISLATION
Minister for Lands	*Land Administration Act 1997*
Minister for Planning	*Planning and Development Act 2005*
Western Australian Planning Commission	*Planning and Development Act 2005*
Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER)	*Rights in Water and Irrigation Act 1914*
Wildlife Licensing, Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016*
Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972*

2. THE PROPOSAL

2.1 Proposal justification

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

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

1) *Improve freight capacity, efficiency and productivity*

Supply chain, freight productivity and reliability will be improved through increased average speed of freight along the new route. The region's competitiveness and development opportunities will improve through efficiencies in freight movement, particularly the types of cargo that support existing and emerging projects in the Great Southern Region of WA. The improved connectivity will contribute to efficiencies in the supply and demand of goods thereby improving the region's global competitive advantage.

2) Reduce urban congestion now and into the future

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

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

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

4) Maximise sustainability through economic, social and environmental responsibility

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

5) *Improve amenity for the community, tourists and road users*

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

6) *Create value through affordable infrastructure*

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

2.2 Key Proposal Characteristics

The Proposal Area (Figure 1) incorporates an area of approximately 137.7 ha, of which ~42.3 per cent is comprised of cleared land. The remaining 57.7 per cent of land within the Proposal Area consists of native vegetation (21.4 per cent) and non-native plantation or revegetation (36.3 per cent) in road reserves or as isolated patches on rural residential properties.

The Proposal Area will accommodate both the construction works and the road infrastructure. The actual amount of disturbance required to complete construction of the ARR will be somewhat less than the area currently depicted as the Proposal Area. The final disturbance footprint will be refined (and reduced wherever possible) during the detailed design stage. The extent of disturbance includes the carriageway, upgrades and modifications to adjacent local roads, earthworks, drainage, barriers and fencing.

Key characteristics of the Proposal are in Table 3.

Table 3: Key Characteristics of the Proposal

ELEMENT	LOCATION	PROPOSED EXTENT
Physical elements		
Overall Proposal footprint (including all physical elements below)	Figure 1	Clearing or disturbance within a 137.7 ha footprint area comprised of up to: • 29.4 ha native vegetation. • 58.3 ha of pastoral cleared land. • 34.3 ha revegetation or plantation (non-native species). • 15.7 ha non native vegetation: o 9 ha isolated plants. o 6 ha woody weeds. o 0.7 ha other weeds.
Road and Rail construction and associated infrastructure		Road construction and associated infrastructure for the Proposal includes the following components: • Approximately 7 km of new heavy haulage road. • Local road modifications. • Utility modifications. • Bridge at South Coast Highway for grade separation bridges at Hanrahan Road for bridged intersection. • Realignment to the Albany-Wagin railway line between George Street and the Hanrahan / Frenchman Bay Interchange. • Other road infrastructure including, but not limited to culverts, drainage infrastructure, lighting, noise barriers, fencing, landscaping, road safety barriers, underpasses and signs.

ELEMENT	LOCATION	PROPOSED EXTENT
Operational elements		
Constructed ARR Stage 2 and 3b		Main Roads will operate the Proposal using standard management and maintenance practices.

2.3 Proposal Stages

2.3.1 Design

Stage 2 and 3b of ARR includes bridged interchanges at South Coast Highway, between Hanrahan and Frenchman Bay Road and will complete the connection from the existing Menang Drive to Princess Royal Drive. This would serve the purpose of providing a dedicated freight and commuter route from Chester Pass Road, Albany Highway, South Coast Highway and Lower Denmark Road to the Port of Albany. Construction will occur in stages with a single lane carriage being the first of the design and construct phase.

The Proposal includes the following key components:

- Approximately 7 km of new dual carriage road.
- Grade separated interchanges with key existing roads.
- Bridges.
- Water retention basins and other drainage structures (i.e. culverts).
- Landscaping and revegetation works.
- Modifications to local roads.

Subsequent timing of the Stage 4 development is yet to be determined and will be influenced by a number of factors including government priorities, funding availability, urban growth and traffic demand.

Landscaping and Revegetation Works

A substantial amount of earthworks will be required for construction as the majority of the alignment will be built above the surrounding landscape. Large volumes of fill are required for road geometry within natural gullies, for the elevated ramps and at the bridged interchanges. In addition, large volumes of material will be generated from areas of road cut through hill sides at South Coast Highway, Roundhay Street and Hanrahan Road and Frenchman Bay Road. Where practicable, vertical alignments have been designed to be as low as possible to minimise impacts on the landscape and reduce requirements for imported fill. The adopted cross sections and geometry for road construction are consistent with Austroads, Main Roads and local government standards. Detailed design will address key constraints such as groundwater level, culvert clearances, sight distance, vertical curve lengths and surfacing which may result in changes to the concept design. In general, road verges will be landscaped and replanted or seeded with native tube stock.

Noise

Noise modelling results have indicated that the future noise levels from ARR are expected to exceed the criteria prescribed in the SPP 5.4 at a number of premises adjacent to the route (Lloyd George Acoustics 2020). Twelve individual properties affected by the development of Phase 1 of the Proposal comprising of a single carriageway will require noise mitigation. Seventeen properties will be affected by development of Phase 2 of the Proposal proposed to occur in 2050 and may require noise mitigation. Proposed noise mitigation includes façade protection or a combination of noise barriers and house façade protection (Lloyd George Acoustics, 2020),

Locally, the Proposal is expected to reduce noise levels in many residences that are located on the existing heavy haulage route to the port, with large vehicles being removed from residential roads.

2.3.2 Construction

Commencement of construction is planned for the 2021 and expected to take three years. The construction methodology for structures will depend on final design forms. Construction will employ traditional earth-moving equipment and construction techniques. As previously described, road formation will be built using fill materials sourced within the Proposal Area and, where necessary, imported fill. Geohydrology investigations and modelling (currently underway) will inform site excavation levels and final design.

Laydown areas required for the placement of construction materials will be established by the contractor in consultation with Main Roads and Local Government Authorities. Laydown area locations are expected to occur within already cleared areas within the Proposal Area.

Modification to the Albany-Wagin Railway Line

Construction of the Proposal will require modifications to the Albany to Wagin railway line owned by the Perth Transport Authority and operated by ARC Infrastructure, which resides within the Ultimate Planning Design Concept (UPDC).

Starting at George Street the existing railway line will be shifted south towards Lower Denmark Road to maintain the desired 25 m road or rail offset from the ring road. The railway will be located within a 30 m rail corridor for the existing railway and allow for inclusion in future of a second railway line (not included in this proposal). The realignment will occur over a distance of approximately 4 km (remaining north of Lower Denmark Road) before re-joining the existing railway line east of Hanrahan Road and Lower Denmark Road. Lower Denmark Road will be retained within the existing cadastral boundary however, will require some modification to accommodate the railway line realignment whilst maintain suitable separation

As noted previously, the initial construction will allow for the existing Albany to Wagin railway line to remain without modification. Initial construction of the road will align a single carriageway road to the north of the corridor to maintain an agreed minimum 20.3 m offset from road to the centre of the railway. This will ensure suitable clearance for operational purposes and possible train derailments.

Modification to local roads

Construction will require modifications to some local roads. Modifications may include severance, realignment or reconfiguration. Local road modifications affected by the Proposal are in Table 4.

Table 4: Local road modification

Road	Locality	Modification required
South Coast Highway	McKail	Bridge over the Proposal.
Lowana Drive	Gledhow	Severed and cul-de-sac installed on each side of the Proposal.
Fredrick Street	Gledhow	Severed and cul-de-sac installed on each side of the Proposal.
Cuming Road	Gledhow	Severed and cul-de-sac installed on each side of the Proposal.
George Street / lower Denmark Road	Gledhow	Retained with reconfigured at grade tee-junction.

Road	Locality	Modification required
Old Elleker Drive	Gledhow	Severed and directed to Roundhay Street.
Roundhay Street	Gledhow	Retained with reconfigured at grade tee-junction.
Frenchman Bay Road or Hanrahan Road	Mount Elphinstone	Bridge over the Proposal.
Carlisle Street or Grey Street west	Mount Elphinstone	Severed and directed to Hanrahan Road on north side of Proposal.
Festing Street	Mount Elphinstone	Retained with reconfigured at grade tee-junction.

2.3.3 Operation

The ARR Stage 2 and 3b will operate as a component of the ARR. The road will be subject to normal routine, recurrent and periodic maintenance during operation of the highway. Maintenance will be confined to the road corridors and the roads themselves, typically including vegetation, drainage, lighting, road markings, signs and road surfaces.

2.4 Alternative Options Considered

A number of changes to the design have occurred as a result of studies undertaken and issues raised by stakeholders during the consultation process. These changes resulted in avoidance of impacts to key environmental factors:

- The Proposal was redesigned at South Coast Highway to remove the requirement for a road realignment through native vegetation west of George Street.
- The width of the Proposal footprint was reduced between Albany Highway and Lower Denmark Road to reduce the Proposal footprint.
- Connections at selected existing roads will be removed. Access to suburbs and key transport routes will be controlled at key sections along the alignment which reduce the Proposal footprint.

Further avoidance measures will be considered during preliminary and detailed design phases.

2.4.1 Planning History

1997 to 2001 - Planning study

Planning for the ARR commenced in 1997. Proposed routes were developed in consultation with the Ministry of Planning, City of Albany, Great Southern Development Commission and the community, culminating in a Planning Study Report and selection of the preferred route linking Chester Pass Road, to Albany Highway and the Port of Albany (Maunsell, 2001). In March 2001, the WAPC agreed to the inclusion of the proposed route into the town-planning scheme. Following endorsement of the plan, the Minister of Planning and Infrastructure advised that planning for the ARR should be viewed in the context of an overall strategic plan for the region as a priority freight route.

2004 to 2009 - Route Definition Study

In 2004, Main Roads commissioned a Route Definition Study (RDS), which included a conceptual design. Maunsell completed the Route Definition Study in 2008. The decision to designate the ARR as a priority freight route meant the road required unimpeded access to the Port of Albany via a dual carriageway standard road. To accommodate the dual carriageway road, a wider road cross section was necessary; ARR Stage 2 subsequently required relocation of the existing freight railway line to accommodate the road cross section. A number of road / rail options were considered during this study (refer below for summary of the assessed options). Planning at the time included agreement between all stakeholders on the conceptual design. This agreement focused on the potential

reduction to the rail reserve from a historical width of 40 m to 25 m. It included the proposed road or rail offset (measured from the carriageway edge to the nearest rail centerline) of 22 m, which is less than is desirable as an offset between road and rail. A risk assessment workshop involving Main Roads, PTA and the then Brookfield Rail (asset operator now ARC Infrastructure) was held in May 2006. All stakeholders approved the reduction of the rail reserve and the associated road or rail offset on the condition that the risks are satisfactorily treated, not just considered. In 2009, agreement in principal was reached between Main Roads and PTA based on the specific design detail for the preferred alignment presented in the 2006 Route Definition Study.

In 2004, the State Government announced that it would bring forward the construction of northern link (Stage 1) of the ARR to 2005 to 2006. As a result, Stage 1 was completed and opened to traffic in 2007.

Summary of previously considered road and rail corridor options

As part of the RDS, Main Roads reviewed alignment options for Stage 2 of the Ring Road and the resulting rail road interface. Three preliminary road or rail options were investigated during this study. They included RDS:

- Option 1 where the ARR is developed on the northern side of the existing freight railway line, such that no relocation of the existing freight railway line is required.
- Option 2 where the existing freight railway is relocated from its current position between Allerton Road to 300 m west of Frenchman Bay Road in order to provide sufficient clearance between the Ring Road and CSBP site. Sections of the existing Lower Denmark Road and Old Elleker Road will form service roads for adjacent properties.
- Option 3 where the existing freight railway is relocated from its current position between George Street and 300 m west of Frenchman Bay Road. This relocation will minimise property impacts to the north of the Ring Road and provide adequate clearance between the Ring Road and CSBP site. A section of the existing Old Elleker Road will form a service road for adjacent properties.

Based on a preliminary comparative assessment and comprehensive stakeholder consultation, Option 3 was selected as the preferred rail and road alignment during the RDS. This option was preferred given:

- It prioritised the ring road as the main route into the Port of Albany.
- It maintains local road connectivity.
- Of the three options, it has the least impact on houses and properties.
- Of the three options, it has the least impact on vegetation near the CSBP site.
- It requires no service road on the northern side of ARR.
- The proposed land requirement boundary is the most consistent with the 2001 Planning Study requirements.

Within Option 3, the existing freight railway was relocated from its current position between George Street and 300 m west of Frenchman Bay Road as part of the initial construction of Stage 2. This relocation provides adequate clearance between ARR and rail with allowance for incorporation of a second railway track in the long term.

2014 to 2015 - Initial Preliminary Design (Stages 2 and 3)

In 2014, Main Roads progressed development of Stages 2 and 3 of ARR. AECOM completed a preliminary design in 2015. This design differed from the preferred alignment identified by the RDS, particularly along Stage 2 of ARR to reduce overall project costs and further limit environmental impacts through reduced clearing of existing vegetation. The Preliminary Design retained the existing rail line abandoning the preferred Option 3 road or rail alignment. This was achieved by providing a reduced road or rail offset, from 22 m to an average offset of 5 to 6 m and adopting a reduced road formation width (the dual carriageway road median was narrowed and separated by a concrete barrier) so that the existing freight line did not require relocation.

Main Roads liaised with PTA and Brookfield Rail (now ARC Infrastructure) regarding the proposed Preliminary Design, in particular, the reduced road or rail offset to retain the existing rail line for ARR Stage 2 works. PTA and Brookfield Rail indicated that acceptance of the reduced road or rail offset was unlikely due to the significant ongoing operational management costs by insufficient access and negative project impacts when the rail line is duplicated.

2019 – Preliminary design (Stages 2 and 3)

In 2018, Main Roads commissioned GHD to update the Preliminary Design for the ARR Stage 2 addressing comments raised by PTA and ARC Infrastructure (formally Brookfield Rail) received in March 2015. The objective for GHD was to consider the previous planning, update the Preliminary Design for the ARR Stage 2 and enable the 'in principle' agreement with stakeholders for the works on the preferred road and rail corridor alignment.

3. STAKEHOLDER CONSULTATION

Stakeholder consultation was done in association with the planning and design works, starting in 2006 when the alignment definition works began. Discussions were initially limited to government agencies and heritage groups. An extended gap occurred in stakeholder communications and engagement since the last round in 2008 where consultation involved the RDS process (see Section 2.4.1). A concerted effort and more focussed consultation commenced in May 2019 when the Federal and State Governments allocated funding for the planning, development and construction of the Proposal.

Main Roads Western Australia developed a Communications and Stakeholder Engagement Plan (CSE Plan) to revisit and re-engage with key stakeholders. This included state and local government agencies, landowners, interested communities or community groups.

The objectives of the CSE Plan are to:

- Generate awareness of and support (where possible) for the Proposal, including its core objectives.
- Understand or confirm stakeholder and community aspirations, opportunities, issues and concerns associated with the Proposal.
- Obtain community support for the design and construction methodology, ensuring where possible that the project addresses community concerns, and if not, explains why not.
- Minimise the impact of works.
- Build strong, ongoing relationships with the local community, generating trust and confidence in Main Roads and our vision for the road network.

The purpose of the CSE Plan was to:

- Explain the rationale for the review of ARR to minimise negative conversations in the community.
- Advise that early input is being sought from state or local agencies and potentially impacted landowners.
- Advise that input is being sought to assist Main Roads with the review of the previous issues and identify any new issues since previous engagement.
- Advise that Main Roads is also seeking to investigate sustainability and legacy opportunities.

Stakeholder consultation was re-initiated in 2019 and the CSE Plan actioned. Details of recent consultation are provided in Table 5. Stakeholder and community engagement is continuing with landowners and local residents, local community, environmental groups, local government authorities and State Government agencies. A summary of the recent stakeholder consultation is provided in Table 5 and the concerns raised to date are provided in Table 6.

Table 5: Recent Stakeholder Consultation (Source: MRWA, 2019)

STAKEHOLDER	DATE	CONSULTATION TYPE, TOPICS DISCUSSED	OUTCOME
Department of Environment and Energy (Cwlth)	8 February 2019	Proposal briefing/presentation.	Status update.
City of Albany.	16 April 2019	Proposal briefing to Council following inclusion of Proposal funding in both State and Federal Budgets.	Status update.

STAKEHOLDER	DATE	CONSULTATION TYPE, TOPICS DISCUSSED	OUTCOME
General Community.	May 2019	Minister announces funding Proposal update on Main Roads website.	General awareness.
Great Southern Development Commission.	24 May 2019	Briefing to Board on Main Roads Western Australia Proposals including ARR.	Status update.
City of Albany Department of Planning, Lands and Heritage Great Southern Development Commission.	19 June 2019	Key Stakeholder Project Development Update.	Status update.
Department of Planning, Lands and Heritage Department of Housing.	19 July 2019	Meeting.	Discuss accesses to/ from ARR. Seek advice on current and future planning around ARR.
Great Southern Major Projects Planning Group.	3 September 2019	Briefing or presentation.	Present the latest concept design developments.
Letters to Landowners.	September 2019	Letter.	Seek approval to enter properties for geotechnical investigations.
City of Albany Council.	September 2019	Briefing to Council (prior to Elections) on current status of Proposal.	Status update.
Albany Chamber of Commerce and Industry.	16 September 2019	Presentation on ARR and contractor opportunities.	Database of local contractors for future communication.
City of Albany (including airport) Department of Planning, Lands and Heritage Public Transport Authority Southern Ports Department of Transport Freight Industry Timber Roads Operations Group Plantagenet Shire President / Southern Haulage Australian Bluegum Plantations PF Olsen Australia Albany Plantation Export Company Great Southern Development Commission	23 September 2019	Stakeholder workshop.	Determine any changes required to the design. Collate opportunities for investigation. Seek early involvement in informing the decision making in the planning and development process. Review issues raised in previous engagement. Identify new issues and opportunities, including sustainability and legacy. Discussing input timelines (milestones). Manage expectations. Seek input into wider stakeholder and community engagement program.

STAKEHOLDER	DATE	CONSULTATION TYPE, TOPICS DISCUSSED	OUTCOME
Department of Biodiversity, Conservation and Attractions (DBCA) Department of Fire and Emergency Services Forest Industries Federation WA WA Police (Great Southern) CBH Albany Chamber of Commerce Shire of Denmark Regional Development Australia Albany Chamber of Commerce Timber Resources Operations Group The Amazing South Coast (tourism) Indigenous representation			
EPA	October 2019	Project briefing/presentation, update on anticipated approval pathway, and intention to refer sections to EPA for transparency and Proposal certainty for Stage 2 and Stage 3.	The impacts associated with the Project are not considered significant, and while the Proposal does not need to be referred, the EPA will review referred Proposals.
DBCA	October 2019	Project briefing/presentation.	No concerns noted. DBCA advised Main Roads that consultation in relation to the Bibbulum track will need to be considered and preserving any WRP corridors should be considered in planning.
DWER	October 2019	Project briefing/presentation and discussions on submitted bed and banks permit application and need for further applications.	No concerns noted. DWER advised that locations where bed and banks permits would be required would be communicated to Main Roads.
Landowners	October 2019	Letters and meetings.	Provide latest design. Seek early advice regarding potential issues.
Torbay Catchment Group, Wildflower Society WA, DBCA,	6 November 2019	Project briefing/presentation including	Main Roads noted concerns, requested and received additional information on potential WRP

STAKEHOLDER	DATE	CONSULTATION TYPE, TOPICS DISCUSSED	OUTCOME
South Coast Region and South Coast NRM		background and history, ARR stages, construction elements and design, Proposal timeline and environmental aspects. Specific information on clearing, WRP and Black Cockatoos.	management and conservation opportunities. Opportunities for supporting local environmental groups revegetation work will be explored.
Albany Agricultural Show	8-9 November	Stand in exhibition pavilion.	General community support for the Proposal. Feedback forms and comments documented.
South Coast NRM Torbay Catchment Group	19 December 2019	Email correspondence to inform the groups of the submission of the EPA Referral Document. The inclusion of structures to maintain fauna movement in engineering designs, opportunities for interested parties in future to engage in monitoring and maintenance of structures and in revegetation works. A commitment by Main Roads and contractors to maintain contact for local input and involvement in the Proposal.	Arrangement to meet with Torbay Catchment Group.
Denmark Environmental Group and Albany Environmental Group	21 January 2020	Discussed Stages 2, 3a and 3b.	Confirmation that fauna underpasses have been considered and included in the Proposals. Acid sulfate soils have been considered, particularly for the Stage 2 section of the Proposal, a risk assessment and management has been completed to ensure the effective management
Minister's briefing in Albany	24 February 2020	Radio, television, social media, email and joint Ministerial Media Statement.	Widespread support for the Proposal with some concerns raised about Lancaster Road (See Table 6).

STAKEHOLDER	DATE	CONSULTATION TYPE, TOPICS DISCUSSED	OUTCOME
Torbay Catchment Group	21 April 2020	Proposal overview, contract model, reporting structure, proposed environmental reference group	Discussed rope bridges and potential suitable locations. Agreed that discussion and relationship was mutually beneficial, the group look forward to receiving more information about the Proposal as it evolves. Main Roads look forward to continued relationship with the group.
Torbay Catchment Group Oyster Harbour Catchment Group Denmark Community Environmental Centre Albany Environmental Centre DBCA Albany District Wildflower Society South Coast NRM	29 April 2020	Invitation to the Environmental Reference Group	Personal invitation sent to contacts within each group.

Table 6: Summary of Key Concerns Raised During Recent Consultation

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

STAKEHOLDER	FORUM	CONCERN RAISED	MAIN ROADS RESPONSE
Wildflower Society of WA	Project briefing/presentation	Cumulative impacts of current and future projects on flora species and creation of genetic barrier.	Main Roads explained results of flora surveys and requested suggested management options to maintain transfer of genetic material via email.
South Coast Natural Resource Management	Project briefing/presentation	Dieback.	Main Roads advised of dieback assessment results and management measures to be implemented.
Local resident	Stand in exhibition pavilion	Will local school bus route be impacted.	Resident advised that the Public Transport Authority is a key stakeholder, and has provided input into the Proposal. Any changes that may impact bus routes will be communicated by the PTA.
Local resident	Stand in exhibition pavilion	Impacts to local wildlife.	Environmental survey finding and impacts explained. Area of concern is not within alignment. Main Roads to provide additional fact sheet information following submission of EPA referral documentation.
Landowner within alignment	Stand in exhibition pavilion	Access to properties on either side of Lower Denmark road has been severed.	Road design, alignment and access arrangements discussed. Landowner provided with additional information on land acquisition process.
Landowner within alignment	Stand in exhibition pavilion	Impacts to private land and access.	Road design, alignment and access arrangements discussed. Landowner provided with additional information on land acquisition process.

4. ENVIRONMENTAL PRINCIPLES, THEMES AND FACTORS

4.1 Principles

Section 4A of the EP Act establishes the object and principles of the EP Act. In accordance with the EPA's Statement of Environmental Principles, Factors and Objectives (EPA, 2018b), this section describes how each of the five principles of the EP Act have been applied to the Proposal (Table 7).

Table 7: Environmental Protection Act 1986 Principles

NO.	PRINCIPLE	CONSIDERATION OF PRINCIPLE IN THE PROPOSAL
1	The precautionary principle. *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In the application of the precautionary principle, decision should be guided by:* • *careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* • *an assessment of the risk-weighted consequences of various options.*	A wide range of comprehensive desktop and field studies were undertaken within and adjacent to the corridor for the last two decades to assess the impacts of the Proposal. Studies have included: • Flora and vegetation. • Terrestrial fauna. • Amenity (to be considered in detailed design stage). • Heritage (Aboriginal and Historic). • ASS. • Noise. Impacts have been assessed and described under each key environmental factor. Information gathered during these studies has reduced the uncertainty surrounding the prediction of impacts by the Proposal. Mitigation and management measures have been proposed to ensure impacts are environmentally acceptable. Main Roads has ensured that the Proposal's design (where possible) avoids serious or irreversible damage to the environment.
2	The principle of intergenerational equity. *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*	The Proposal will ensure the health, diversity and productivity of the environment is maintained through retaining as much habitat as possible and revegetating the road reserve.
3	The principle of the conservation of biological diversity and ecological integrity. *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	There are patches of limited biological diversity and ecological integrity within and adjacent the Proposal. Main Roads has sought to preserve as much of the remnant vegetation as possible by avoiding areas where practicable.

NO.	PRINCIPLE	CONSIDERATION OF PRINCIPLE IN THE PROPOSAL
4	Principles relating to improved valuation, pricing and incentive mechanisms. *Environmental factors should be included in the valuation of assets and services.* *The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *The users of goods and services should pay prices based on the full life cycle costs of providing goods and services including the use of natural resources and assets and the ultimate disposal of any wastes.* *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	Main Roads acknowledges the need for improved valuation, pricing and incentive mechanisms and endeavours to pursue these principles when appropriate. For example, environmental factors will determine the location of road corridors within the Proposal Area having a strong focus on reducing the direct and indirect clearing footprint. Impacts on flora, vegetation and terrestrial fauna have been assessed, mitigation and management measures proposed. Main Roads accepts that the cost of the Proposal must include mitigation of the environmental impacts, management and maintenance activities. These requirements have been incorporated into the overall Proposal costs. The Proposal will be subject to assessment and rating by the ISCA. The ICSA will assess the environmental, social and economic impacts of the Proposal including its waste stream and the resources utilised for construction. The ISCA rating scheme is designed around the establishment of goals for a Proposal against which the achievement of these goals by the Proposal is assessed.
5	The principle of waste minimisation. *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	The Proposal will be subject to an ISCA sustainability rating, which will assess the environmental, social and economic impacts including waste minimisation and associated discharges. Cut to fill materials sourced from the Proposal Area will help minimise the import of fill requirements. Use of alternative waste materials such as crushed concrete (recycled) will be considered where appropriate. The Proposal design has included drainage intended to minimise discharge of contaminated water into the environment. Management strategies will be implemented to ensure that generation of waste during the construction phase is minimised.

4.2 Identification of Environmental Factors

Environmental factors are those parts of the environment that may be impacted by an aspect of a Proposal. The EPA has 13 environmental factors, organised into five themes: Sea, Land, Water, Air and People. The environmental factors and EPA objectives are in Table 8. The relevance of each factor to the Proposal has been summarised and the significant environmental factors that require further consideration identified.

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Table 8: **Environmental Factors Relevant to the Proposal**

Theme	Factor	Objective	Relevance to Proposal	Significant Environmental Factor
Sea	Benthic Communities and Habitats.	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	The Proposal will not directly nor indirectly impact to benthic habitats.	No.
	Coastal Processes.	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	The Proposal is inland and will not affect coastal processes.	No.
	Marine Environmental Quality.	To maintain the quality of water, sediment and biota so that environmental values are protected.	The Proposal is inland and will not affect marine environmental quality.	No.
	Marine Fauna.	To protect marine fauna so that biological diversity and ecological integrity are maintained.	There will be no impacts to marine fauna.	No.
Land	Flora and Vegetation.	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Construction requires vegetation clearing of 58 per cent of the Proposal Area where 22 per cent comprises of native vegetation, 36 per cent comprises of plantation or revegetation and 42 per cent cleared land.	Yes.
	Landforms.	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	There are no distinctive landforms present in the Proposal Area.	No.
	Subterranean Fauna.	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	There are no conservation significant subterranean fauna given the location of the Proposal Area (South West Australia).	No.
	Terrestrial Environmental Quality.	To maintain the quality of land and soils so that environmental values are protected.	Acid Sulfate Soils (ASS) and contaminated sites are present within the Proposal Area.	Yes.
	Terrestrial Fauna.	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Construction will result in some habitat clearing affecting high and low value Black Cockatoo Habitat, Suitable DBH Trees, habitat trees with	Yes

Theme	Factor	Objective	Relevance to Proposal	Significant Environmental Factor
			hollows of which none are suitable for Black Cockatoo nesting.	
Water	Inland Waters.	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	There are no wetlands or rivers present within the Proposal Area. There are downstream beneficial users with potential to be affected by the Proposal and the Gledhow Conservation Class Wetland south, south-west of the Proposal Area, and possibly other downstream sensitive receptors.	No.
Air	Air Quality.	To maintain air quality and minimise emissions so that environmental values are protected.	Air emissions will be generated during construction of the Proposal.	No.
People	Social Surroundings.	To protect social surroundings from significant harm.	Proposal Area is within a populated area. Consents for the proposed activity have been obtained from the the Wagyl Kaip. The Southern Noongar Native Title Claim representatives have no objections. For Historical Heritage, one property was listed under the City of Albany's Municipal Inventory with heritage assessments confirming low potential for archaeological materials to occur. disturbance and noise and amenity issues.	No.
	Human Health	To protect human health from significant harm.	No human health impacts are expected. No radiation emissions.	No.

4.3 Key Environmental Factor – Flora and Vegetation

4.3.1 EPA Objective

The EPA's objective for flora and vegetation is 'to protect flora and vegetation so that biological diversity and ecological integrity are maintained' (EPA, 2016b).

4.3.2 Policy and guidance

Applicable guidance and regulations employed in the assessment of flora and vegetation included:

- Environmental Factor Guideline 'Flora and Vegetation (EPA ,2016b).
- Technical Guidance 'Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a).
- Protection of Naturally Vegetated Areas through Planning and Development, Environmental Protection Bulletin No. 20 (EPA, 2013).
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations).

4.3.3 Receiving environment

Regional biogeography

The Proposal Area is located within the Jarrah Forest Interim Biogeographic Regionalisation of Australia (IBRA) region and the Southern Jarrah Forest subregion (JF2) (DEE, 2014). The Southern Jarrah Forrest sub-region is a duricrusted plateau of Yilgarn Craton characterised by Jarrah, Marri forest on laterite gravels and in the eastern part, by Wandoo, Marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species rich shrublands (DEE, 2014).

Broad vegetation types

Broad scale (1:250,000) pre-European vegetation mapping indicates the native vegetation is composed of two associations described in Table 9.

Table 9: Broad vegetation associations (Beard, 1979)

Beard (1979) Associations	Stage 2 and 3b (ha)
978 - Low forest; jarrah, *Eucalyptus staeri* and *Allocasuarina fraseriana*	25
3 - Medium forest; jarrah-marri	110.8

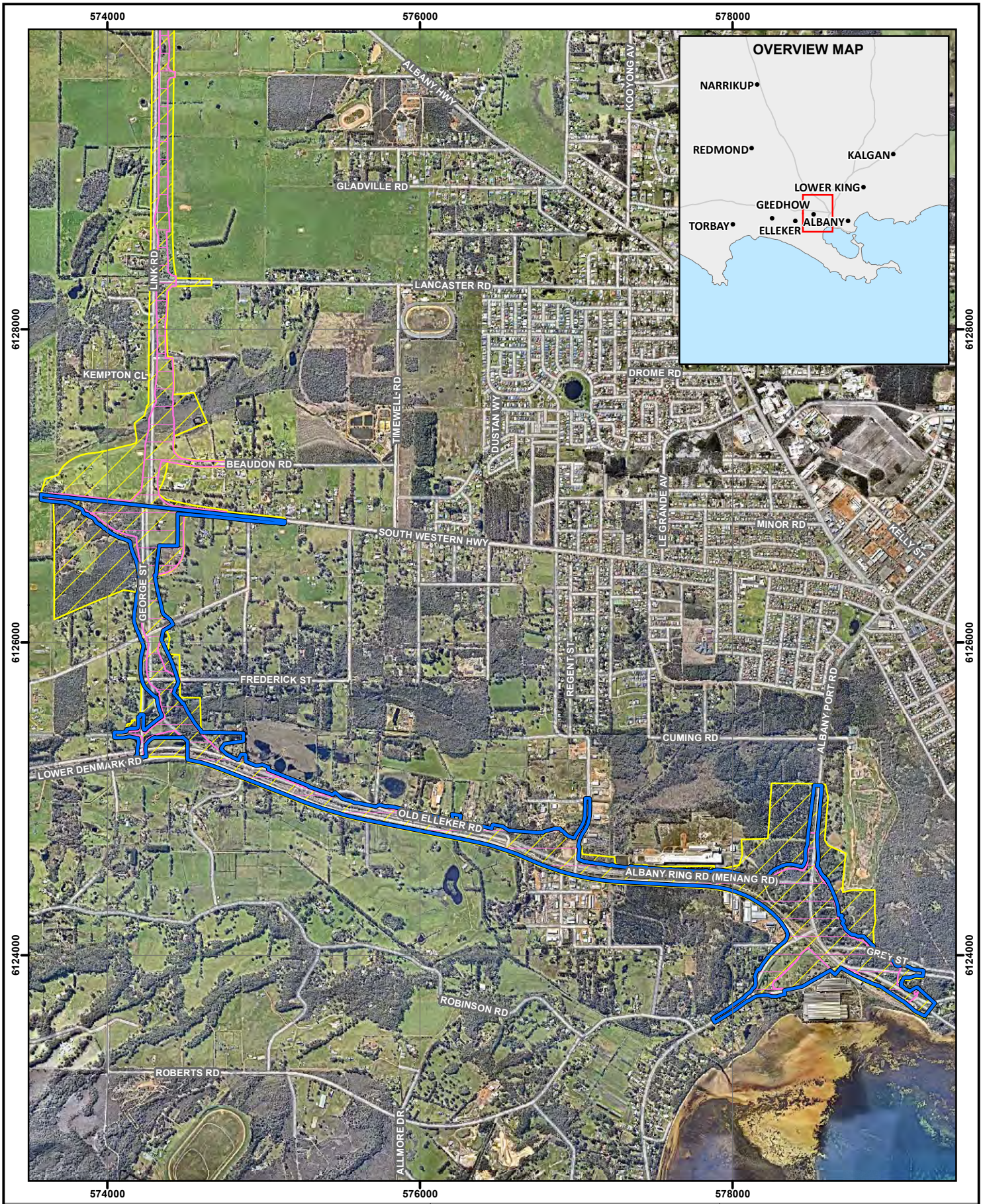
Albany Regional Survey

The Albany Regional Vegetation Survey (ARVS) (Sandiford and Barrett 2010) provides a local and regional overview of the native vegetation of the Albany region. The ARVS area encompasses the entire Proposal Area and extends 30 km east and west of Albany and 20 km north (124,415 ha).

Flora and vegetation studies

Figure 2 shows the surveyed areas within and adjacent to the Proposal Area. Environmental survey work for the ARR has occurred over many years and has covered an extensive area.

The flora and vegetation survey reports prepared by Southern Ecology (2020) are provided in Appendix A and Appendix B.



Legend:

- Proposal area
- Biological survey areas (Southern Ecology, 2020)
- Biological survey areas (Biota, 2018)
- Local and regional roads

Scale 1:32,000 at A4

0 250 500 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
***ENVIRONMENTAL PROTECTION ACT* REFERRAL**

BIOLOGICAL SURVEYS UNDERTAKEN WITHIN THE PROPOSAL AREA

FIGURE 2

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_02_SurveyAreas.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.

Flora, fauna and vegetation studies completed by Southern Ecology included the follow key components (Table 10):

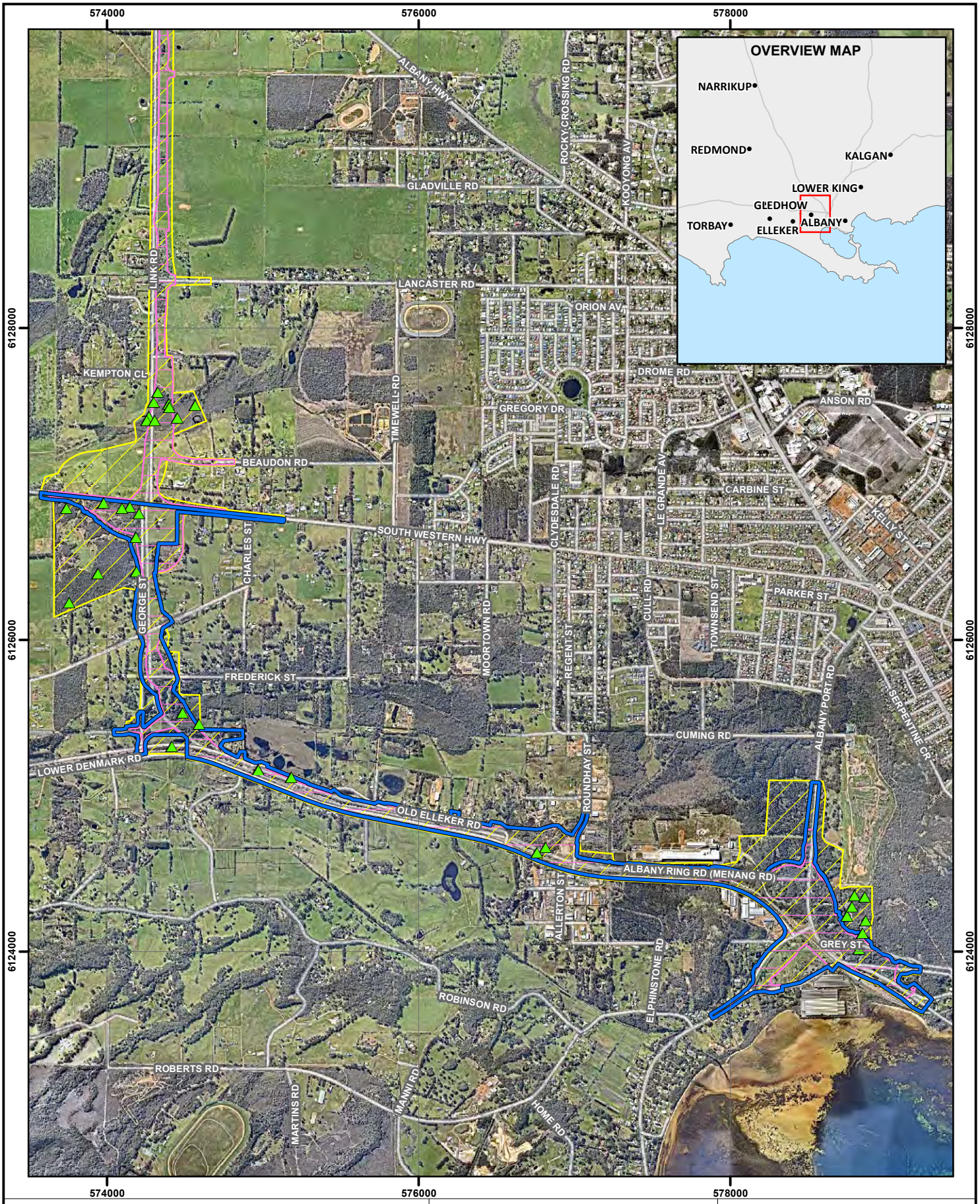
- A desktop assessment (10 km buffer of the flora field survey area) and review of previous flora and vegetation assessments undertaken within or close to the flora field survey area.
- Biological field survey to identify:
    - Vegetation community types present, including presence of any Threatened or Priority Ecological Communities (TECs or PECs) or other significant vegetation.
    - Vegetation condition, including the location of any Weeds of National Significance (WoNS) or Declared Weeds.
    - Flora species present including introduced species.
    - The presence or potential presence of any Threatened or priority flora.
    - The presence of conservation significant fauna and general fauna habitat assessment.
    - Identification and quantification of habitat for WRP and three species of Black Cockatoo (Figure 3).
- Preparation of a biological survey report that:
    - Documents the results of the desktop assessment and field survey, including mapping.
    - Identifies and discusses significant flora, fauna and vegetation communities which potentially occur.
    - Provides spatial files in GIS format.

Flora, fauna and vegetation values evaluated by additional studies and investigations are listed in Table 10 and include:

- ARR WRP Assessment (Biota, 2020) (Provided as Appendix C).
- ARR Black Cockatoo Habitat Assessment (Biota, 2019a) (Provided as Appendix E).
- ARR Draft Memorandum: Defining habitat categories for WRPs in the South Coast population (Southern Ecology, 2020) (Provided as Appendix D).

Table 10: Summary of Flora and Vegetation Surveys Undertaken for the Proposal

SURVEY/REPORT NAME	SURVEY EFFORT AND AREA	RELEVANCE TO PROPOSAL AREA
Southern Ecology (2018)	A biological survey was undertaken in February 2018 by Southern Ecology over a 247.4 ha survey area (Figure 2). Field visits were conducted over several weeks from October 2017 to January 2018. Targeted flora surveys were conducted on the 24th October and 7th, 9th, 22nd, 23rd, 24th, 27th, 28th and 30th of November. Fauna habitat surveys and habitat tree measuring occurred on 24th, 25th, 26th 31st October; 7th, 9th, 13th, 15th, 21st, 23rd and 30th November; 7th, 11th, 13th, 14th December and 22nd January 2018.	Provides a basis for current information on vegetation types, condition and species composition, as well as general fauna habitat assessment based on vegetation type.
Southern Ecology (2019)	An addendum to the February 2018 biological survey was completed by Southern Ecology in November 2018 over four days. The survey targeted flora species of conservation significance, with a dedicated survey for *Prasophyllum paulineae* (P1).	Provides updated information on flora species of conservation significance.



Legend:

- Proposal area
- Biological survey areas (Southern Ecology, 2020)
- Biological survey areas (Biota, 2018)
- Quadrat locations
- Local and regional roads

Scale 1:32,000 at A4

0 250 500 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
***ENVIRONMENTAL PROTECTION ACT* REFERRAL**

QUADRAT LOCATIONS WITHIN SURVEY AREA

FIGURE 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_03_QuadratLocs.mxd
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Vegetation communities and condition

Southern Ecology (2020) described ten vegetation communities within the Proposal Area, these included two granite, five upland and three wetland vegetation types (Table 11 and Figure 4). An additional two vegetation types were recorded within the Southern Ecology (2020) survey area that did not occur within the Proposal Area.

The surveyed portion of the Proposal Area (137.7 ha) consists of 29.4 ha of native vegetation (comprising the upland, granites and wetland vegetation types). The surveyed Proposal Area also contained 34.3 ha of revegetation or planted species, 6 ha of Woody Weeds, 9 ha of islolated plants, 0.7 ha of other weeds and 58.3 ha of Cleared area.

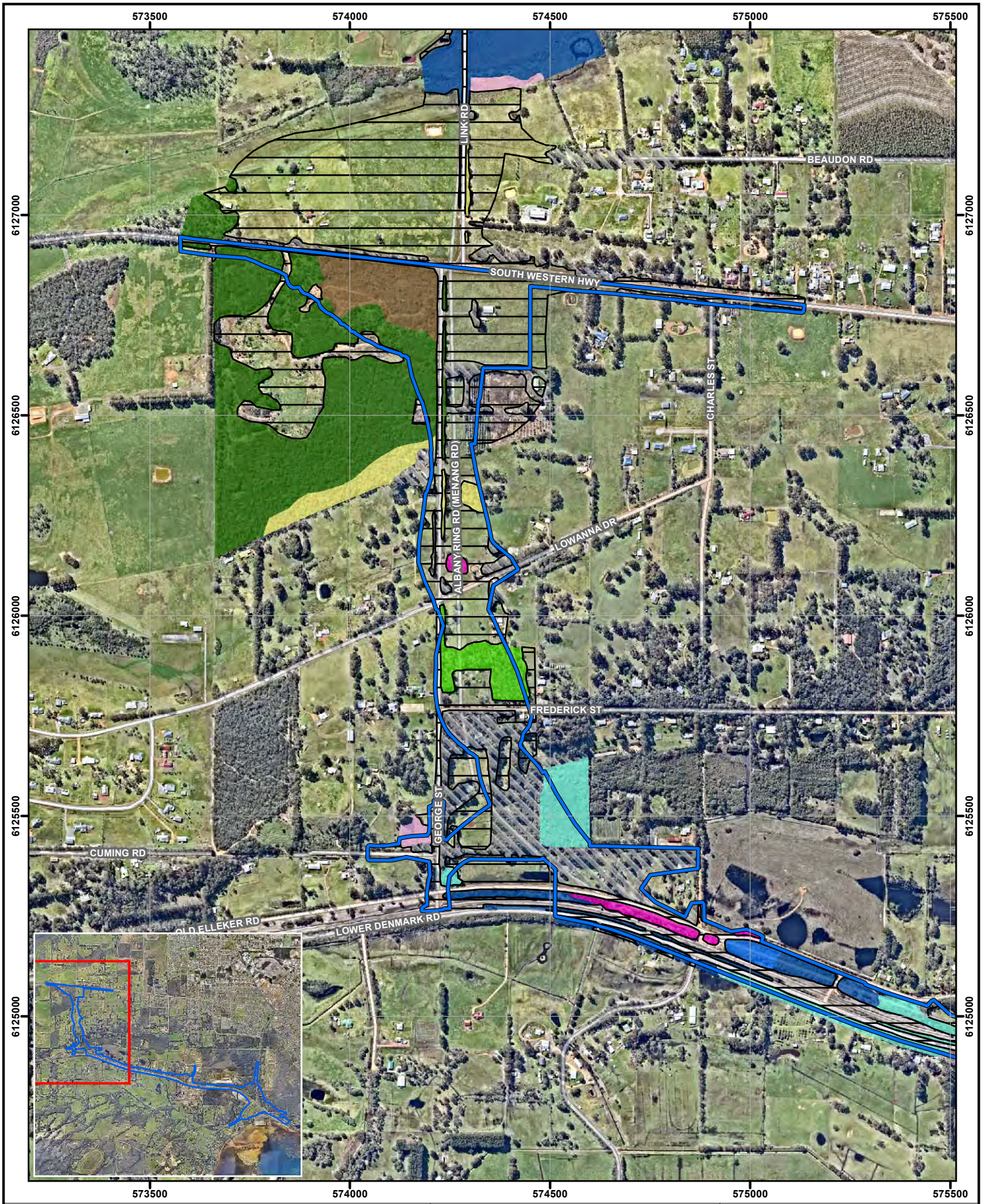
A summary of the vegetation types recorded by the surveys are summarised in Table 11.

Table 11: Vegetation Types within this Proposal Area

VEGETATION TYPE	EXTENT IN THE PROPOSAL AREA
Evandra aristata Sedgeland	0.6 ha in total 0.6 ha in Very Good Condition
Hakea spp Shrubland/Woodland Complex	4.0 ha in total 1.5 ha in Degraded Condition 2.5 ha in Excellent Condition
Homalospermum firmum/*Callistemon glaucus* Peat Thicket	2.0 ha in total 0.9 ha in Very Good Condition 1.1 ha in Completely Degraded Condition
Jarrah, Marri, Sheoak Laterite Forest	4.2 ha in total 3.2 ha in Excellent Condition 0.7 ha in Very Good Condition 0.3 ha in Degraded Condition
Jarrah, Sheoak, E.staeri Sandy Woodland	0.6 ha in total 0.5 ha Degraded 0.1 ha Excellent Condition
Marri, Jarrah Forest, Peppermint Woodland	8.4 ha in total 1.1 ha in Good Condition 3.3 ha in Very Good Condition 3.3 ha Degraded 0.7 ha Completely Degraded
Mosaic T. marginata/Gastrolobium bilobum Granite Shrubland/*Yate Woodland*	1.2 ha in total 1 ha Degraded 0.2 ha in Very Good Condition
Peppermint Low Forest	1.3 ha in total 1.3 ha Completely Degraded
Taxandria juniperina Closed Forest	6.1 ha in total 3.6 ha Completely Degraded 1.2 ha Degraded 1.3 ha Very Good Condition

VEGETATION TYPE		EXTENT IN THE PROPOSAL AREA	
Taxandria marginata Granite Shrubland		0.3 ha in total 0.3 Completely Degraded	
Melaleuca preissiana Low Woodland		0.6 ha in total 0.5 ha Completely Degraded 0.1 ha Very Good	
Planted trees		34.3 ha in total	
Non-native species:	Isolated plants	15. 7 ha in total	9 ha
	Woody weeds		6 ha
	Other weeds		0.7 ha
Cleared		58.3 ha in total	
Total Proposal Area		137.7 ha	

SURVEY/REPORT NAME	SURVEY EFFORT AND AREA	RELEVANCE TO PROPOSAL AREA
Southern Ecology (2020)	Southern Ecology completed a survey in August 2019 of additional areas (67.6 ha) outside of the Southern Ecology (2020) biological survey area, following the same methods as the 2018 survey. The 2019 survey focused on vegetation and habitat mapping, with a specific focus on habitat for WRP and Black Cockatoos. A spring survey was completed for September-October 2019 to identify conservation significant flora.	Provides updated information on vegetation types, condition, species composition, flora species of conservation significance and fauna occurrence and habitats.
Southern Ecology (2020)	Southern Ecology completed a targeted regional survey of previously known populations in the Two People Bay area of *Prasophyllum paulineae* within the peak flowering period (Survey assessed an area of approximately 320 ha).	Provides updated information on flora species of conservation significance.
Southern Ecology (2020)	Southern Ecology zoologist Sandra Gilfillan completed a review of WRP habitat categories for the sub population. These habitat categories were applied across the vegetation found within the Proposal Area. The review was conducted in collaboration with the University of Western Australia, Biota Environmental Sciences and the WRP Working Group.	Provides updated information of WRP possum habitat, habitat categories and its context in the local area.
Biota (2020)	Biota completed a targeted WRP assessment. The purpose of the assessment was to provide wider, local and a regional context to the WRP habitat found within the Proposal Area. The Study Area targeted the Down Road Nature Reserve (777.3 ha), areas of suitable habitat within the Proposal Area (92.2 ha) and areas mapped as suitable habitat around Albany in the Albany Regional Vegetation Survey (124,415 ha).	Provides detailed information on WRP habitat and abundance in the Proposal Area. Provides regional context of WRP habitat and abundance.
Biota (2019a)	Biota completed a targeted Black Cockatoo Habitat Assessment where a total of 572 Suitable DBH Trees were assessed (254 from within the Proposal Area). From these trees, all hollows with entrance diameters of 10 cm or greater were investigated during a dedicated hollow assessment. The assessment included the use of a remotely piloted aircraft (RPA) mounted with a camera. Potential foraging habitat within the Study Area was also assessed using existing detailed vegetation mapping and aerial imagery.	Provides detailed information on Black Cockatoo breeding and foraging habitat in the Proposal Area. Provides regional context of foraging habitat.



Proposal area
Cleared areas

Vegetation association

- *Hakea* spp Shrubland/Woodland Complex
- Jarrah/Marri/Sheoak Laterite Forest
- Jarrah/Sheoak/*E.staeri* Sandy Woodland Marri/Jarrah Forest/ Peppermint Woodland
- *Homalospermum firmum/Callistemon glaucus* Peat Thicket
- *Evandra aristata* Sedgeland
- *Melaleuca preissiana* Low Woodland
- *Taxandria juniperina* Closed Forest

- Woody Weeds (Victorian Tea Tree, Taylorina, Sydney Wattle, Kangaroo Acacia or Bamboo with isolated native plants)
- Other Weeds (Watsonia, Bracken Fern or Blackberry with isolated native plants)
- Mature Planted Trees (Iron Barks, Blue Gum, Tuart, other Eucalypts and Peppermint generally > 10 years old)
- Isolated Plants (Pasture and herbaceous weeds with isolated native plants)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
***ENVIRONMENTAL PROTECTION ACT* REFERRAL**

VEGETATION ASSOCIATIONS WITHIN THE PROPOSAL AREA

FIGURE 4 PAGE 1 OF 3

mainroads WESTERN AUSTRALIA

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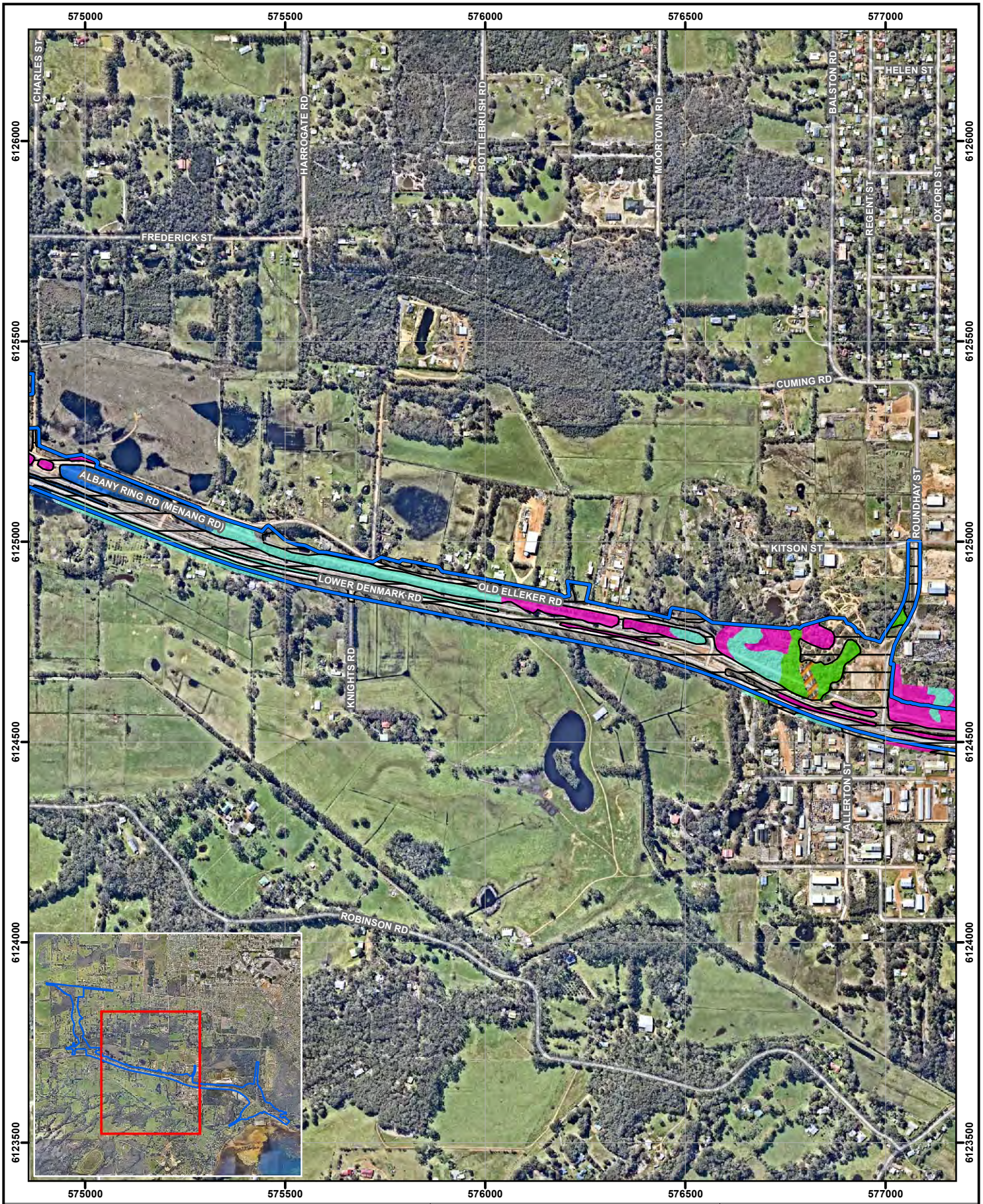

Proposal area
Cleared areas

Vegetation association

- Marri/Jarrah Forest/Peppermint Woodland
- *Homalospermum firmum/Callistemon glaucus* Peat Thicket
- *Evandra aristata* Sedgeland
- *Melaleuca preissiana* Low Woodland
- *Taxandria juniperina* Closed Forest
- Mosaic T. marginata/Leucopogon assimilis Granite Shrubland; Taxandria marginata Granite Shrubland
- Woody Weeds (Victorian Tea Tree, Taylorina, Sydney Wattle, Kangaroo Acacia or Bamboo with isolated native plants)
- Mature Planted Trees (Iron Barks, Blue Gum, Tuart, other Eucalypts and Peppermint generally > 10 years old)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

VEGETATION ASSOCIATIONS WITHIN THE PROPOSAL AREA

FIGURE 4 PAGE 2 OF 3

mainroads WESTERN AUSTRALIA

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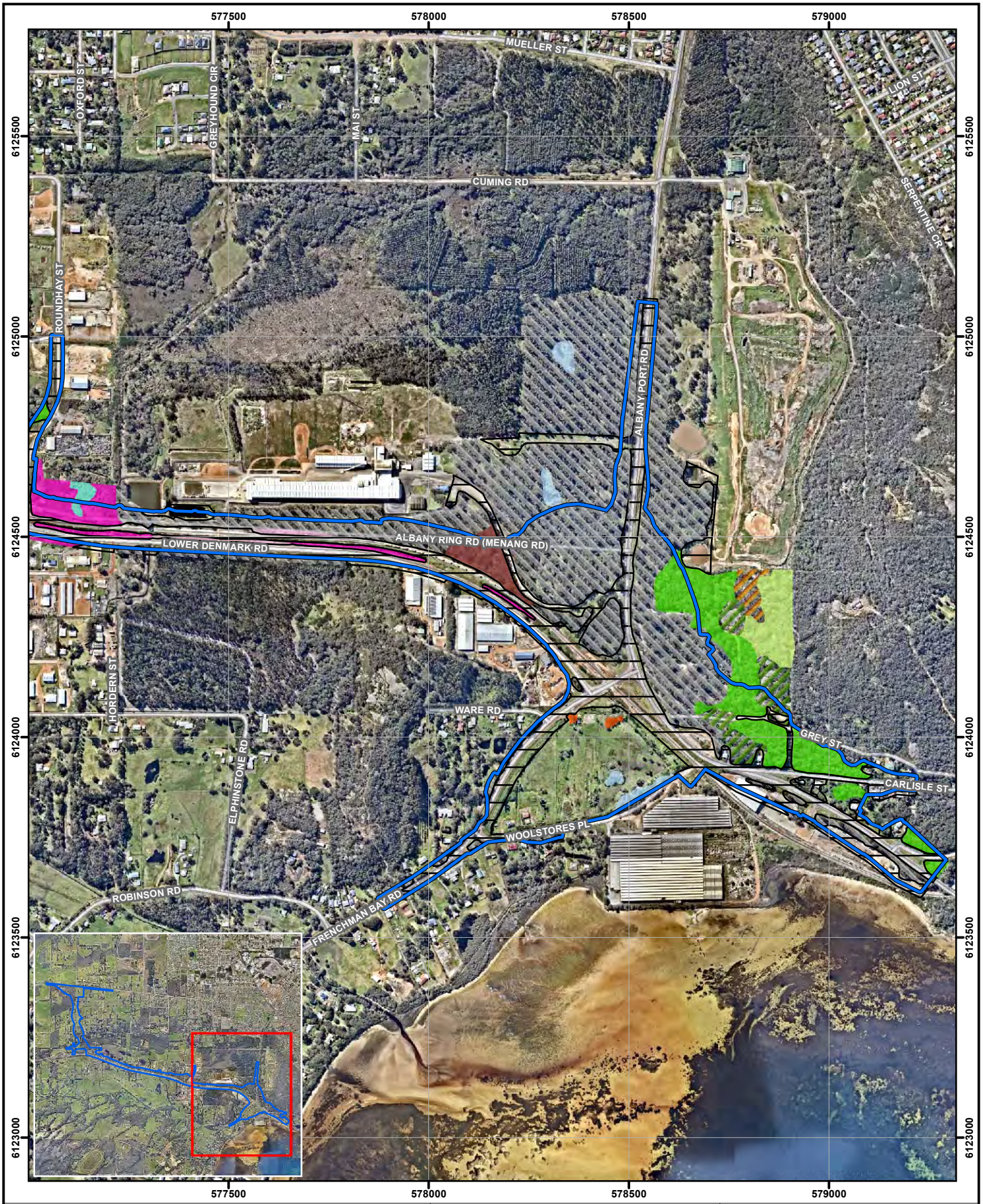

Proposal area
Cleared areas

Vegetation association

- Marri/Jarrah Forest/Peppermint Woodland
- Marri/Jarrah Coastal Hills Forest
- Yate Woodland
- Peppermint Low Forest
- *Melaleuca preissiana* Low Woodland
- *Taxandria juniperina* Closed Forest
- Mosaic *T. marginata/Gastrolobium bilobum* Granite Shrubland/Yate Woodland
- Mosaic T. marginata/Leucopogon assimilis Granite Shrubland; Taxandria marginata Granite Shrubland
- Woody Weeds (Victorian Tea Tree, Taylorina, Sydney Wattle, Kangaroo Acacia or Bamboo with isolated native plants)
- Other Weeds (Watsonia, Bracken Fern or Blackberry with isolated native plants)
- Mature Planted Trees (Iron Barks, Blue Gum, Tuart, other Eucalypts and Peppermint generally > 10 years old)
- Isolated Plants (Pasture and herbaceous weeds with isolated native plants)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
***ENVIRONMENTAL PROTECTION ACT* REFERRAL**

VEGETATION ASSOCIATIONS WITHIN THE PROPOSAL AREA

FIGURE 4 PAGE 3 OF 3

mainroads WESTERN AUSTRALIA

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Vegetation condition within the Proposal Area

Vegetation condition in the Proposal Area ranges from Excellent to Completely Degraded (Southern Ecology 2020). Historical clearing and aggressive weed species have influenced the structure and composition of the native vegetation and a high proportion of the vegetation present.

Less than 10 per cent of the Proposal Area contains vegetation in Good or better condition. A summary of vegetation condition within the Proposal Area is in Table 12 and shown in Figure 5

Table 12: Extent of Vegetation Condition Ratings Mapped within the Proposal Area

VEGETATION CONDITION	EXTENT IN THE PROPOSAL AREA (HA)
Excellent	5.8
Very Good	7.1
Good	1.1
Degraded	8.1
Completely Degraded*	7.3
Not applicable (cleared or non-native vegetation)	108.3
Total	**137.7**

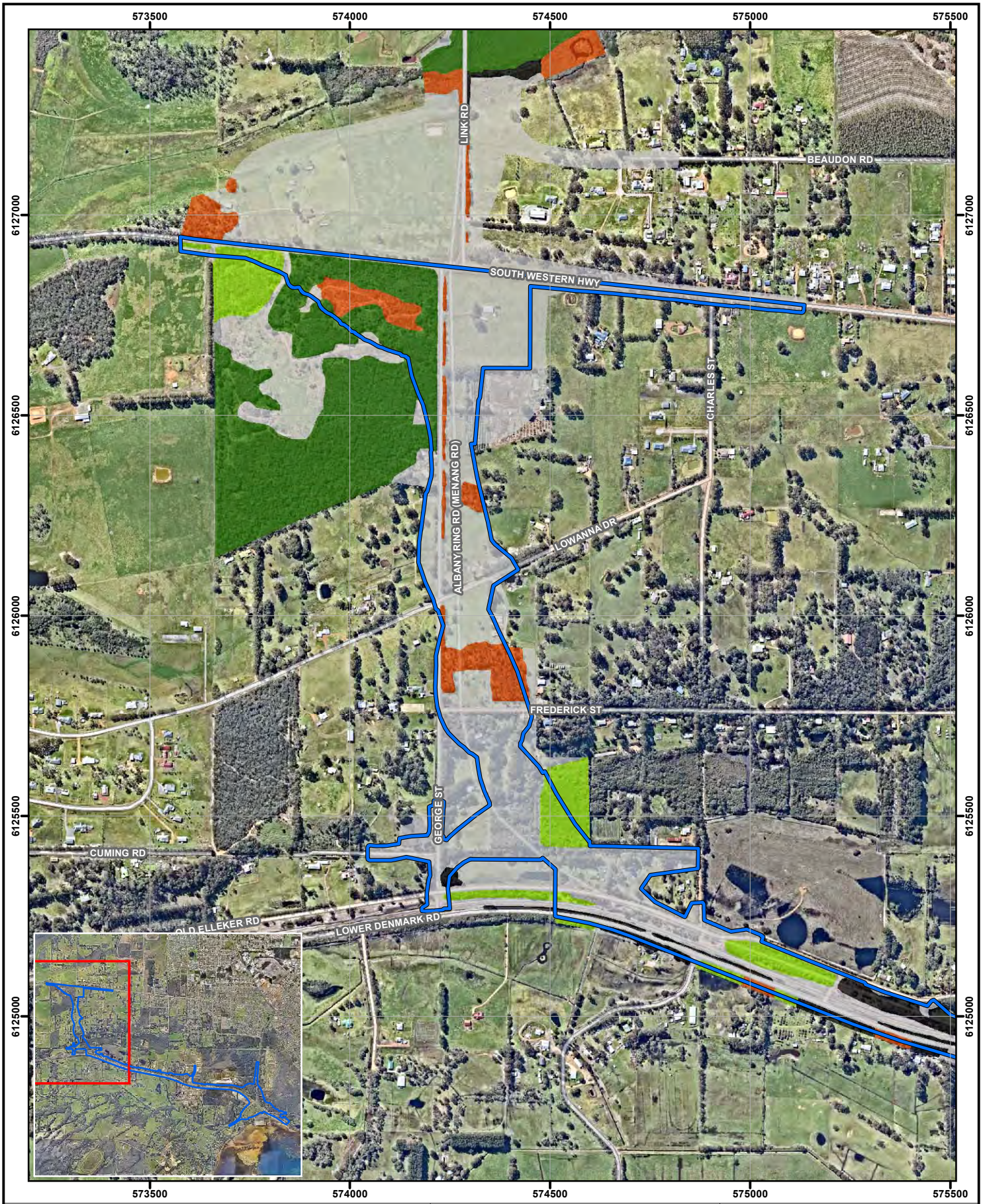
Threatened and Priority Ecological Communities

Southern Ecology (2020) did not identify any Threatened Ecological Communities (TECs) listed under the Commonwealth EPBC Act or *State Biodiversity Conservation Act 2016* (BC Act), or Priority Ecological Communities (PECs) listed by DBCA within their survey area. Two TECs and four PECs occur in the vicinity of the Proposal Area and include (Southern Ecology, 2020):

- Subtropical and Temperate Coastal Saltmarsh TEC (Vulnerable) occurs over 4 km from the Proposal Area on the margin of Princess Royal Harbour and is confined to marine saline habitats.
- The Proposal Area falls outside (approximately 6km) the South East Coastal Botanical Provence; therefore, the Proteaceae Dominated Kwongan Shrubland TEC (Endangered) is not applicable.
- Four PECs are known from nearby locations, *Banksia coccinea* Thicket (P1), Coastal *Melaleuca incana, Taxandria juniperina* (P1), *Banksia littoralis, Melaleuca incana* (P1) have distinctive dominant species that are absent from the survey area. *Astartea scoparia* Swamp Thicket (priority 1 PEC) may have previously occurred in the wetland areas on Lower Denmark Road, however this area is now obscured by a high level of disturbance and altered drainage.

Other significant vegetation

The EPA (2016a) identifies criteria for other significant vegetation of which four wetland vegetation types in the Proposal Area meet this criteria and are representative of riparian vegetation. The two granite units in the area are also considered as other significant vegetation due to their restricted distribution, high number of conservation significant taxa and their ability to act as climatic refugia (Southern Ecology, 2020).



Legend:

- Proposal area

Vegetation condition

- Excellent
- Very Good
- Degraded
- Completely Degraded
- N/A (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

VEGETATION CONDITION WITHIN THE PROPOSAL AREA

FIGURE 5 PAGE 1 OF 3

mainroads WESTERN AUSTRALIA

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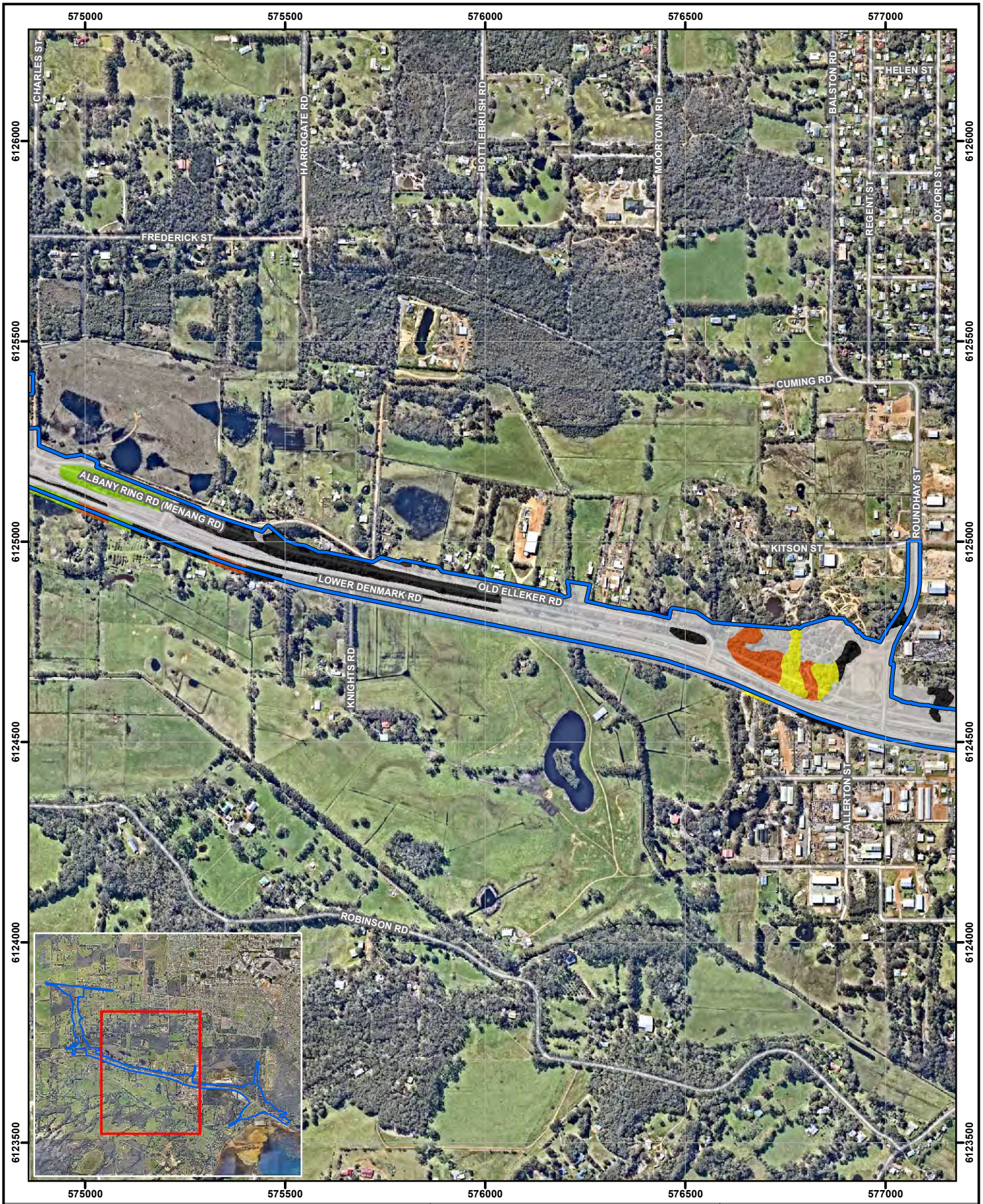

Legend:

- Proposal area

Vegetation condition

- Very Good
- Good
- Degraded
- Completely Degraded
- N/A (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
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VEGETATION CONDITION WITHIN THE PROPOSAL AREA

FIGURE 5 PAGE 2 OF 3

mainroads WESTERN AUSTRALIA

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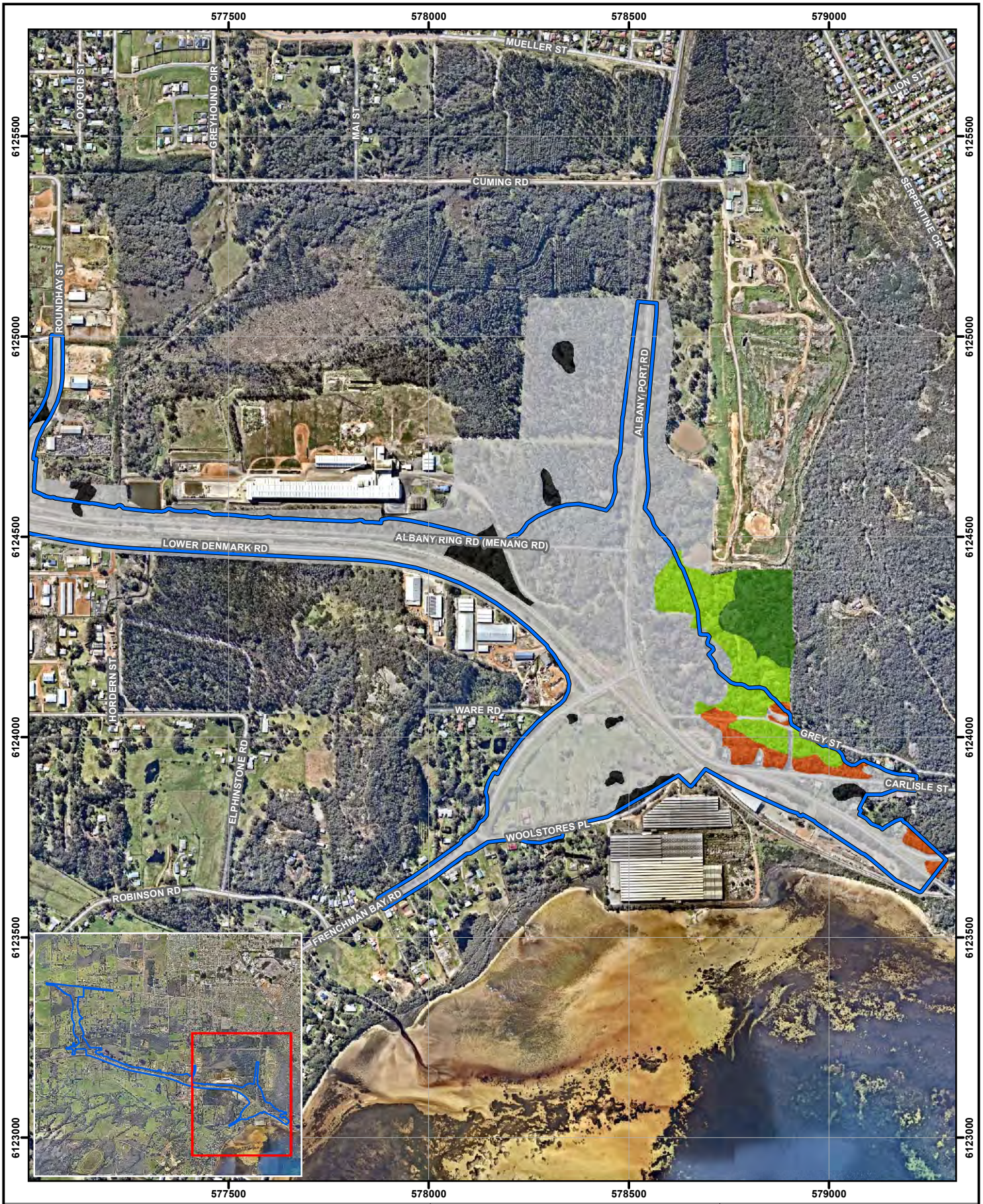

Legend:

- Proposal area

Vegetation condition

- Excellent
- Very Good
- Degraded
- Completely Degraded
- N/A (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

VEGETATION CONDITION WITHIN THE PROPOSAL AREA

FIGURE 5 PAGE 3 OF 3

mainroads WESTERN AUSTRALIA

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The extent of other significant vegetation within the Proposal includes:

- Wetlands or riparian: 9.4 ha.
- Granites: 1.5 ha within Stage 2 (Figure 4).

A Naturemap database search (DBCA, 2019) identified 1,343 native flora taxa and 321 naturalised (introduced) taxa within the Proposal Area and immediate surrounds, including the remainder of the Albany Ring Road Proposal (Stage 2 and Stage 3b). Southern Ecology (2020) identified 337 flora taxa from 65 families, including 60 weeds. The plant families most represented were Myrtaceae (40 taxa), Fabaceae (37 taxa), Cyperaceae (27 taxa) and Proteaceae (25 taxa).

The diversity of the Proposal Area is significantly less than that of the surrounding area, with more than 78 per cent of the Proposal Area being cleared land, plantation or revegetation and woody weeds (Figure 5).

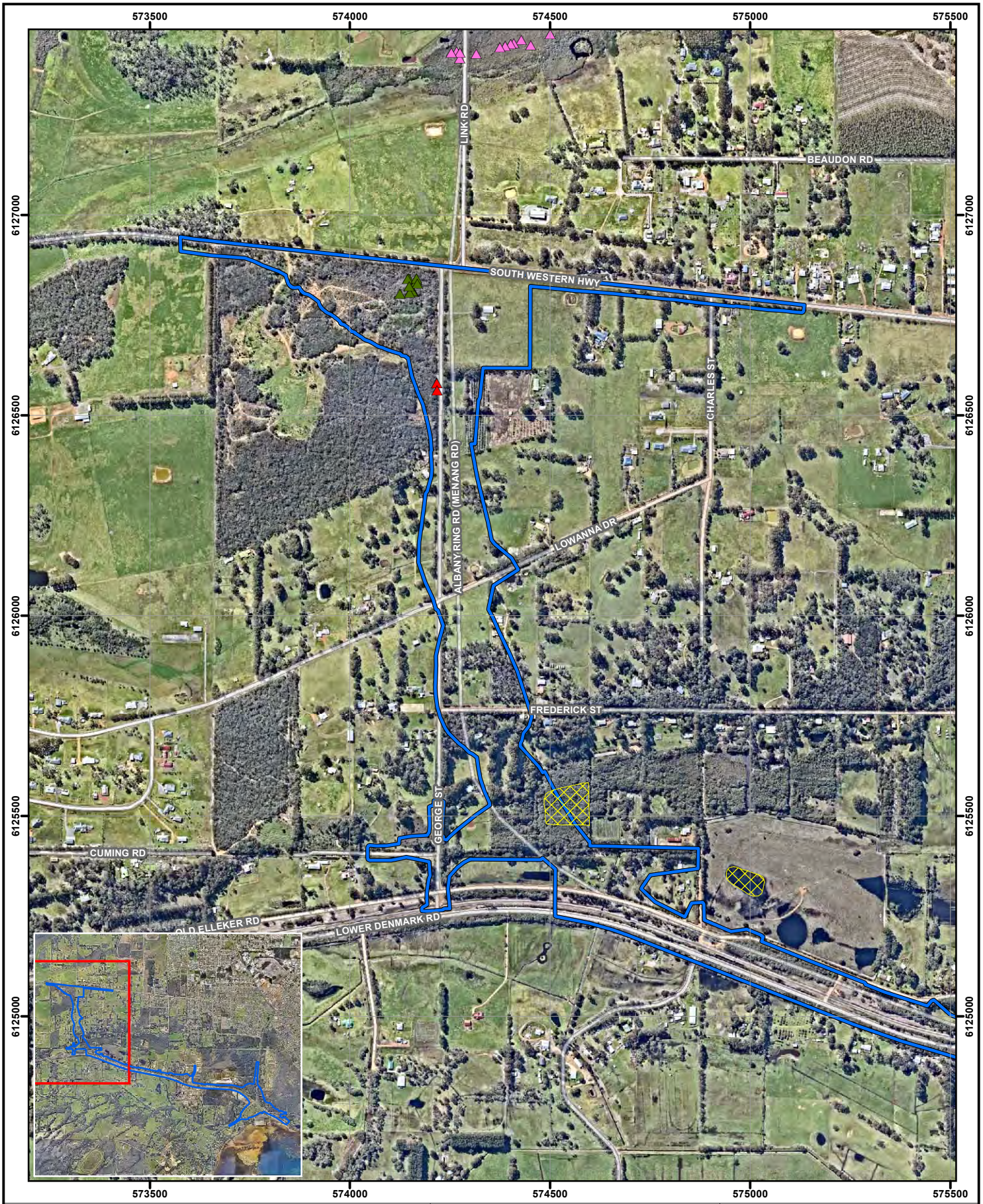
Significant flora

Southern Ecology (2020) also completed a likelihood of occurrence assessment for conservation significant plant species (taxa) identified in their desktop searches. This survey area assessment identified 69 species, with 35 considered likely or possible to occur and were considered during the field assessments:

- Six Threatened flora under the EPBC Act and or BC Act: *Banksia goodii, Caladenia harringtoniae, Chordifex abortivus, Drakaea micrantha, Isopogon uncinatus* and *Verticordia fimbrilepis subsp. Australis.*
- Two priority 1 species: *Thomasia multiflora and Thomasia purpurea x solanacea*.
- Seven priority 2 species: *Conospermum quadripetalum, Isopogon buxifolius var. buxifolius, Leucopogon bracteolaris, Leucopogon cymbiformis*, *Schoenus sp.* Grassy (E. Gude & J. Harvey 250), *Thelymitra variegata* and *Stylidium falcatum*.
- Ten priority 3 species: *Acacia ataxiphylla subsp. ataxiphylla, Andersonia auriculata, Andersonia setifolia, Chorizema carinatum, Corybas abditus, Juncus meianthus, Leucopogon alternifolius, Leucopogon interruptus, Synaphea preissii* and *Verticordia endlicheriana* var. *angustifolia.*
- Ten priority 4 species: *Banksia seneciifolia, Banksia serra, Drosera fimbriata, Gahnia sclerioides, Gonocarpus pusillus, Gonocarpus simplex, Lysinema lasianthum, Microtis pulchella, Microtis quadrata* and *Spyridium spadiceum.*

The presence of five conservation significant plant species and the only known habitat for a fifth species were confirmed by Southern Ecology (2020) during their field surveys of the Study Area (Appendix A and Figure 6):

- *Prasophyllum paulinae* (priority 1) - historical records exist from a private property within the survey area, with the precise location unknown. Targeted surveys of potential habitat were undertaken and no individuals were recorded, however it appears this species may require fire to emerge.
- *Synaphea incurva* (priority 3) - two populations, totalling eight individuals were recorded on road verges in the survey area.
- *Boronia crassipes* (priority 3) - associated with *Homalospermum firmum and Empodisma gracillimum* on peat and sand. Several large populations are known within the vicinity of Albany.
- *Andersonia sp. Jamesii* (J. Liddelow 84) (priority 4) - one population of 22 individuals was recorded in the large City of Albany Reserve on George Street, one individual was recorded on Albany Highway.
- *Thysanotus isantherus* (priority 4) - two individuals were recorded within the Study Area on the western slopes of Mt Melville.



Legend:

- Proposal area
- *Prasophyllum paulinae* (P1) habitat

Priority flora species

- *Synaphea incurva* (P1)
- *Boronia crassipes* (P3)
- *Andersonia* sp. Jamesii (J. Liddelow 84) (P4)

Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

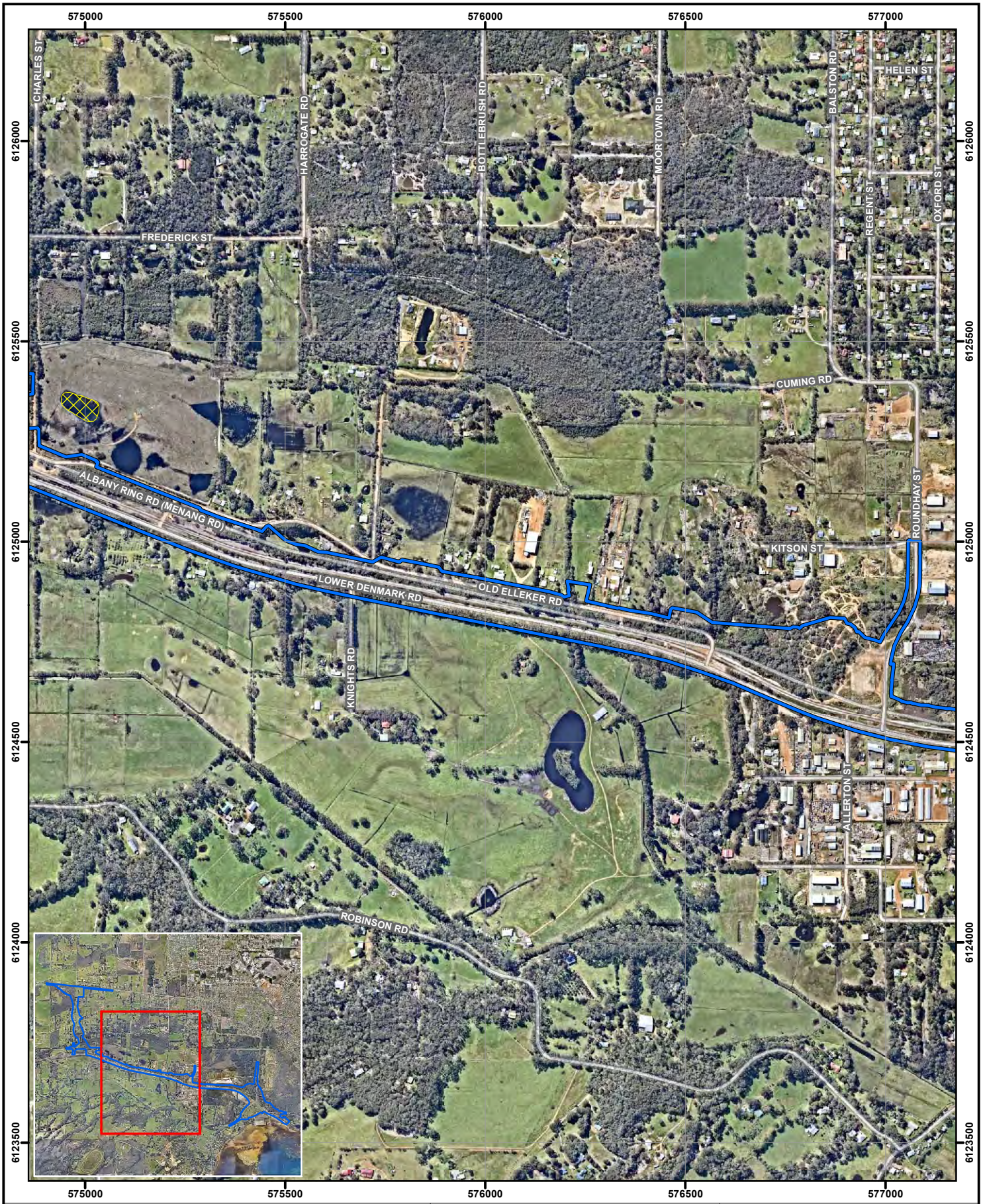
MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

PRIORITY FLORA AND PRIORITY FLORA HABITAT LOCATED WITHIN THE PROPOSAL AREA

FIGURE 6 PAGE 1 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_06_TPFL.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.



Legend:

- Proposal area
- *Prasophyllum paulinae* (P1) habitat
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

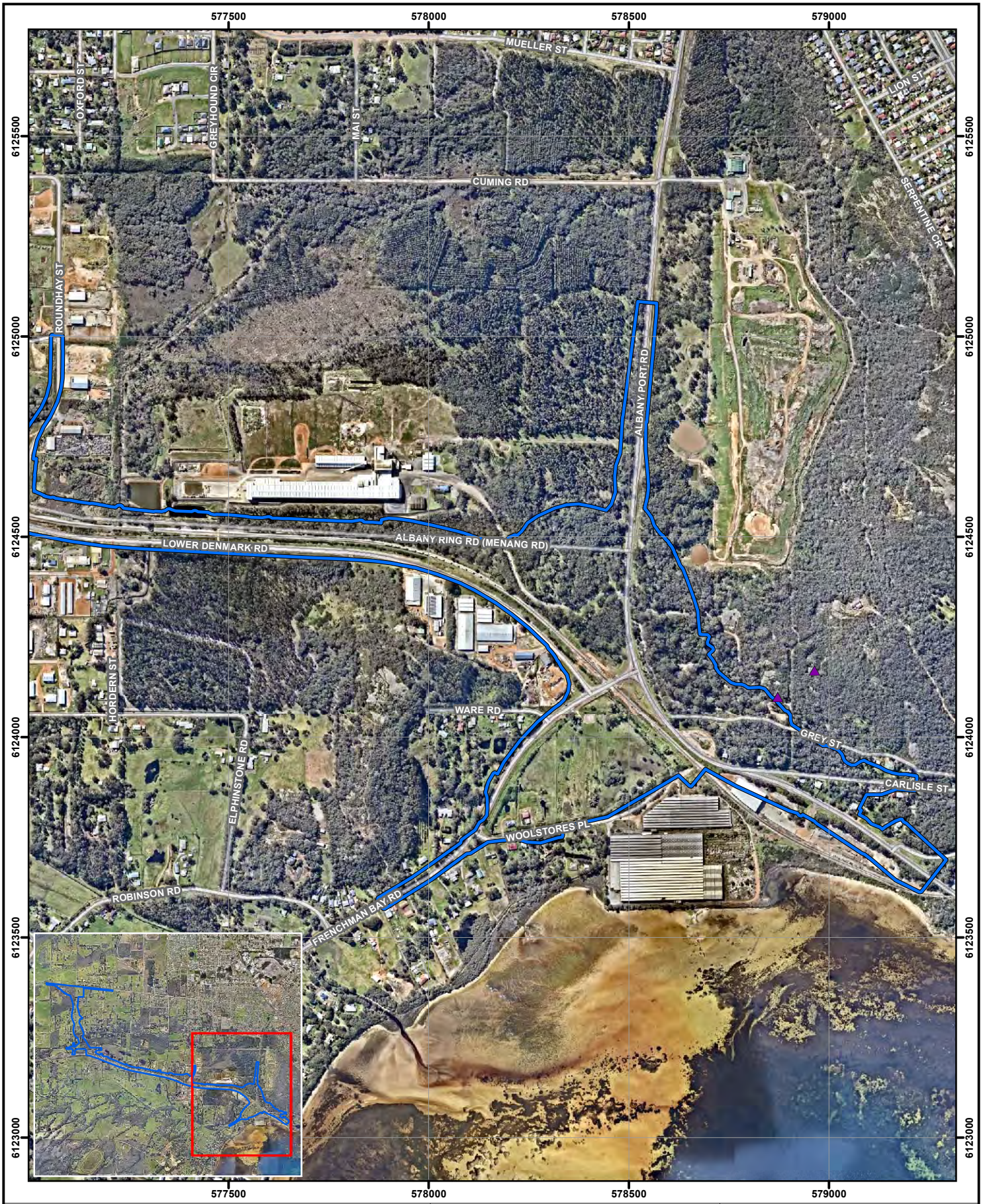
MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

PRIORITY FLORA AND PRIORITY FLORA HABITAT LOCATED WITHIN THE PROPOSAL AREA

FIGURE 6 PAGE 2 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_06_TPFL.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.



Legend:

- Proposal area
- Priority flora species
  - ▲ *Thysanotus isantherus* (P4)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

PRIORITY FLORA AND PRIORITY FLORA HABITAT LOCATED WITHIN THE PROPOSAL AREA

FIGURE 6 PAGE 3 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_06_TPFL.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.

Of these, *Synaphea incurva* and *Andersonia sp. Jamesii* were recorded in the Proposal Area. In addition, there is one *Thysanotus isantherus* located within 10m of the development envelope. Habitat suitable for *Prasophyllum paulinae* also occurs in the Proposal Area, although no individual plants were recorded.

No threatened flora species listed under Commonwealth or State legislation were recorded in the Study Area.

Environmentally Sensitive Areas

No Environmentally Sensitive Areas (ESAs) have been identify during investigations and surveys of the Proposal Area. It is considered unlikely that any ESAs will be impacted as a result of the Proposal.

Introduced and invasive species

Southern Ecology (2020) recorded 60 weeds species within the survey area. Of which, five were listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* and Weeds of National Significance (WONS):

- Blackberry (**Rubus species*).
- Bridal creeper (**Asparagus asparagoides*).
- Gorse (**Ulex europaeus*).
- Arum Lily (**Zantedeschia aethiopica*).
- Lantana (**Lantana camara*).

Dieback

The Proposal is in a dieback susceptible region, based on rainfall (within the 600 – 800 mm rainfall zone (CALM, 2003)), soils, drainage and vegetation.

Dieback surveys undertaken by Southern Ecology (2020) identified the majority of the Proposal Area as excluded or uninterpretable, typically due to existing road and agricultural disturbance, as well as lack of indicator species that could be impacted by the pathogen. The south west side of South Coast Highway was mapped as infested, as was vegetation to the west of Roundhay Street and east side of Hanrahan Road intersection (see Appendix F and Figure 7).

4.3.4 Potential Impacts

The Proposal Area is predominantly cleared, with approximately 58.3 ha (42.3 per cent) cleared, 29.4 ha (21.4 per cent) of native vegetation and 34.3 ha (36.3 per cent) of revegetation or planted species. Key impacts to native vegetation are summarised below.

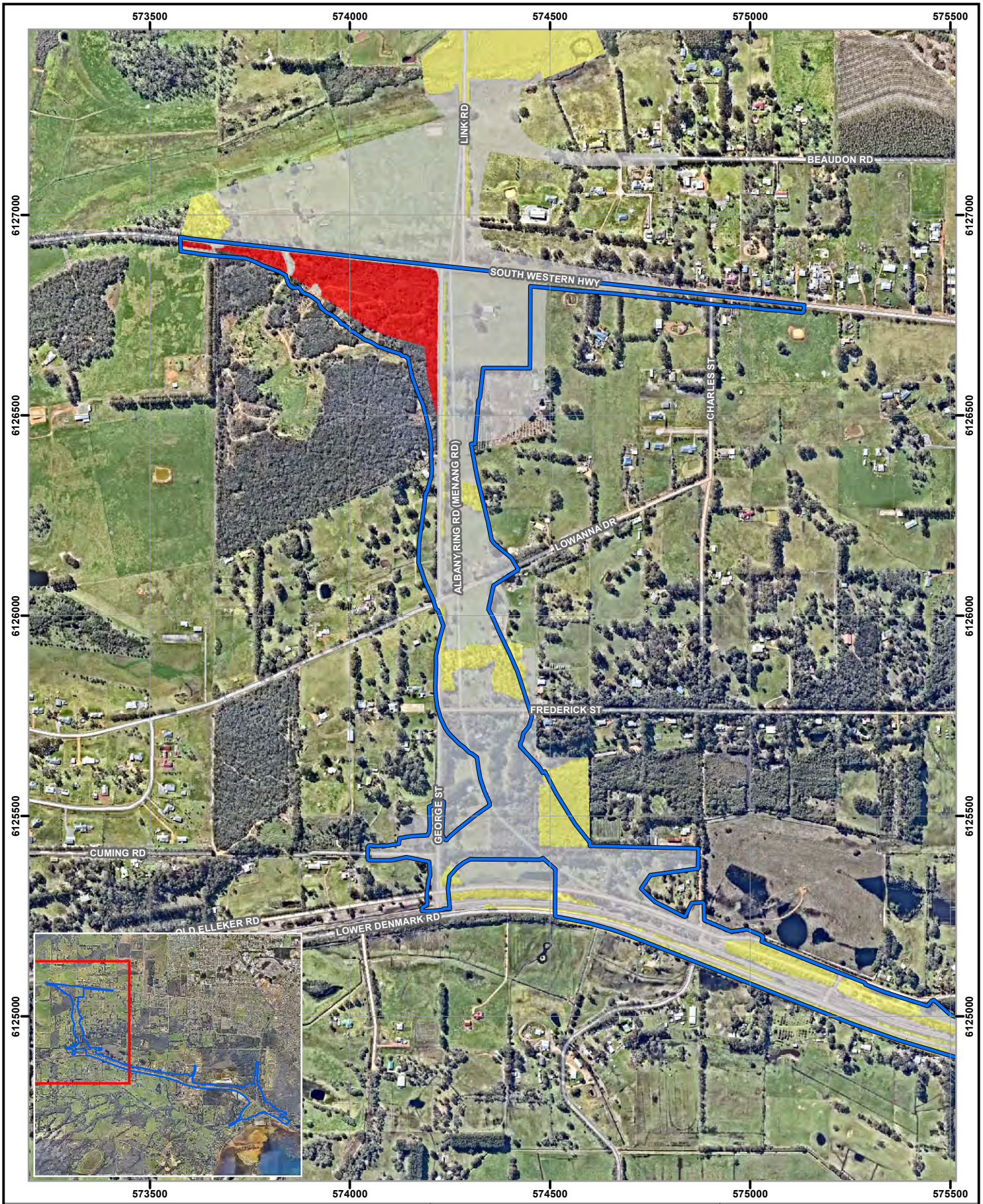
Areas of native vegetation in excellent condition make up 4.2 per cent of the Proposal Area represented by the following vegetation types:

- 2.5 ha of *Hakea spp* Shrubland, Woodland Complex.
- 0.1 ha Jarrah, Sheoak, E,staeri Sandy Woodland
- 3.2 ha Jarrah, Marri, Sheoak Laterite Forest (12a).

Areas of native vegetation in very good condition make up approximately five per cent of the Proposal Area represented by the following vegetation types:

- 0.6 ha of *Evandra aristata* Sedgeland.
- 0.9 ha of *Homalospermum firmum, Callistemon glaucus* Peat Thicket.
- 0.7 ha of Jarrah, Marri, Sheoak Laterite Forest.
- 3.3 ha of Jarrah, Marri, Peppermint Woodland.

- 0.2 ha of Mosaic *Taxandria marginata* Granite Shrubland, Yate Woodland.
- 0.1 ha of Melaleuca preissiana Low Woodland
- 1.3 ha of Taxandria juniperina Closed Forest



Legend:

- Proposal area

Phytophthora cinnamomi Dieback status

- Infested
- Uninterpretable
- Uninterpretable (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

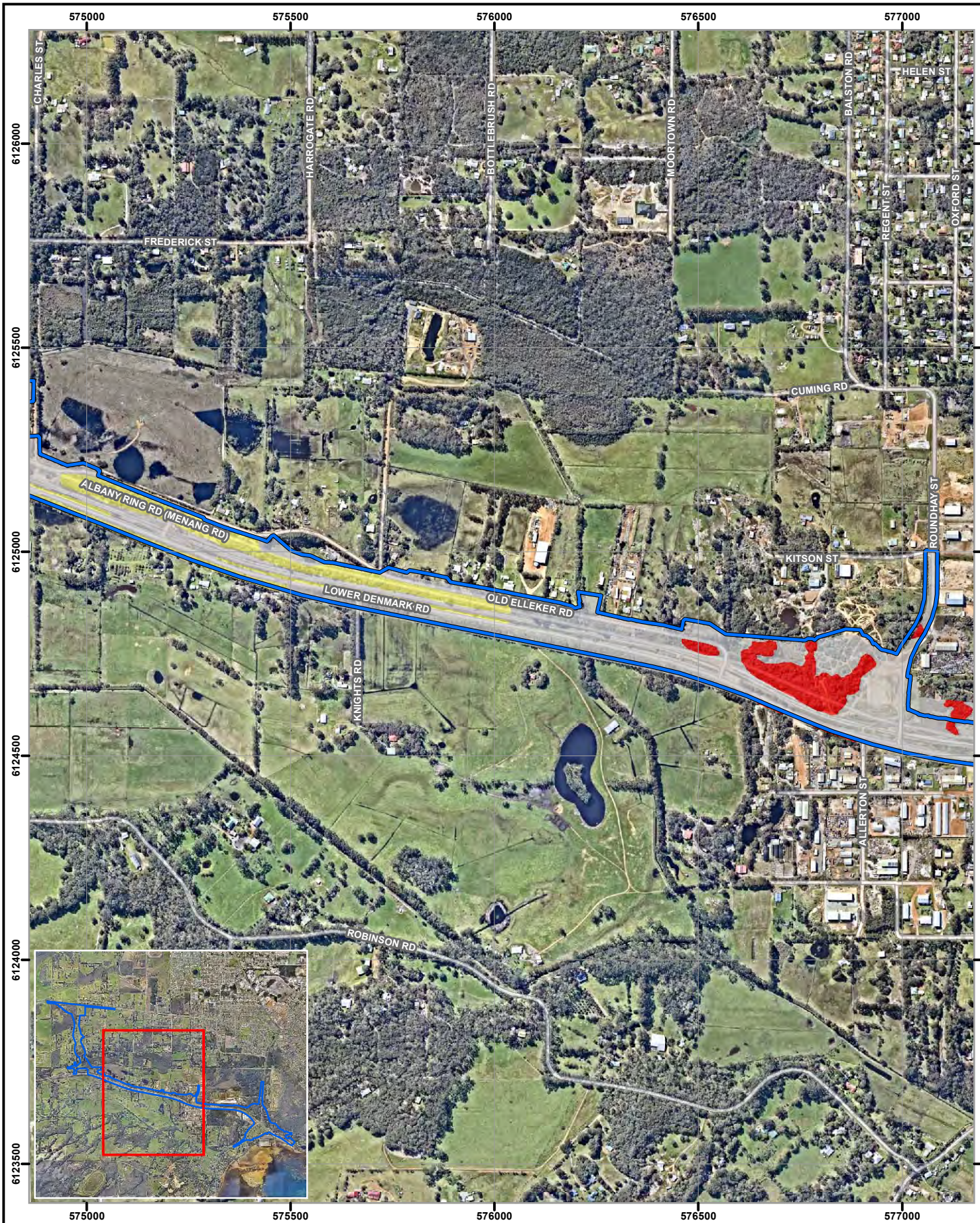
MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT
REFERRAL

PHYTOPHTHORA DIEBACK WITHIN THE PROPOSAL AREA

FIGURE 7 PAGE 1 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_07_Dieback.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.



Legend:

- Proposal area

Phytophthora cinnamomi Dieback status

- Infested
- Uninterpretable
- Uninterpretable (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT REFERRAL

PHYTOPHTHORA DIEBACK WITHIN THE PROPOSAL AREA

FIGURE 7 PAGE 2 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_07_Dieback.mxd
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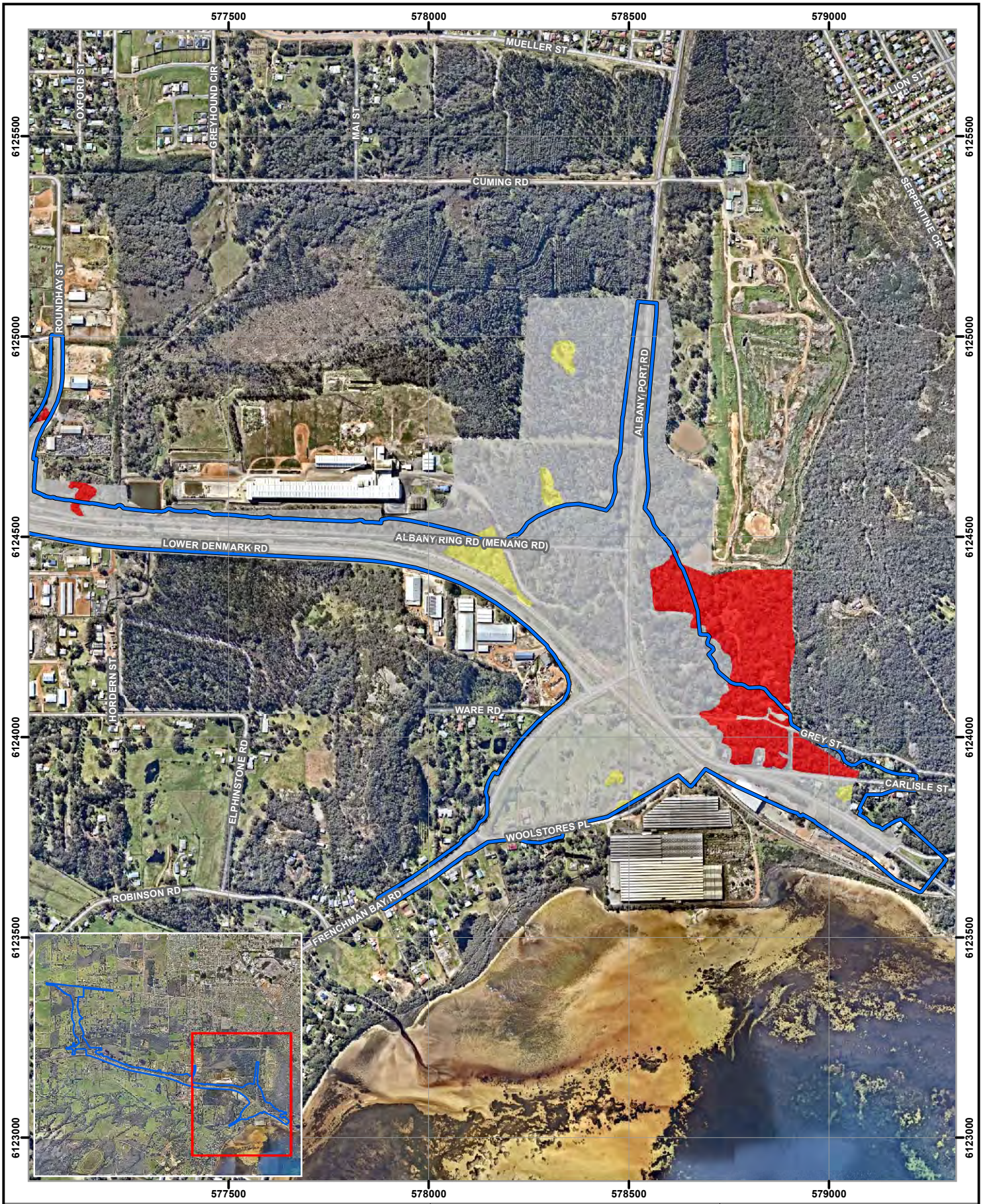

Legend:

- Proposal area

Phytophthora cinnamomi Dieback status

- Infested
- Uninterpretable
- Uninterpretable (non-native vegetation)
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

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MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT REFERRAL

PHYTOPHTHORA DIEBACK WITHIN THE PROPOSAL AREA

FIGURE 7 PAGE 3 OF 3

mainroads WESTERN AUSTRALIA

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Main Roads\2019\58273 - MRWA GIS Support IDD\GIS\Maps\EIA_Stage2_3b\58273_07_Dieback.mxd
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.

Areas of native vegetation in good vegetation make up 1.1 per cent of the Proposal Area represented by the following vegetation type:

- 1.1 ha of Marri, Jarrah Forest, Peppermint Woodland.

A breakdown of the percentage native vegetation to be cleared based upon the condition type is summarised in Table 13.

Table 13: Condition of Native Vegetation to be Cleared

VEGETATION CONDITION	EXTENT IN THE PROPOSAL AREA (HA)	PER CENT OF TOTAL VEGETATION TO BE CLEARED
Excellent	5.8	4.2
Very Good	7.1	5.2
Good	1.1	0.8
Degraded	8.1	5.9
Completely Degraded	7.3	5.3
Not applicable	108.3	78.6
Total	137.7	100

Within the 137.7 ha Proposal Area, the potential impacts to native vegetation include:

- 9.3 ha of riparian vegetation (growing in association with a wetland or watercourse).
- The removal of four *Synaphea incurva* (priority 3) individuals, estimated to impact less than 1 per cent of the known population.
- The removal of 21 *Andersonia sp. Jamesii* (J. Liddelow 84) (priority 3) individuals, estimated to impact upon one per cent of the known population.
- Clearing within 10m of one *Thysanotus isantherus* (priority 4) plant, estimated to impact upon 0.9 per cent of the known population.
- 6.2 ha of *Taxandria juniperina* Closed Forest (ARVS Unit 59) and 2.0 ha *Homalospermum firmum, Callistemon glaucus* Peat Thicket (ARVS Unit 47) being suitable habitat for *P. paulineae* .

The Proposal may also result in the following indirect impacts to vegetation and flora:

- Possible introduction or spread of dieback and weeds to adjacent native vegetation (to be managed through Hygiene Management Plan).
- Changes to vegetation structure and floristic composition in surrounding areas through altered surface water drainage patterns and flows (to be managed through Drainage Strategy).
- Damage to surrounding vegetation through accidental bushfire (to be managed through a CEMP).

4.3.5 Assessment of the impacts

Broad scale pre-European (Beard) vegetation associations

The EPA aims to retain ecological communities at a minimum of 30 per cent of the pre-clearing extent of that community in each bioregion to meet the National Objectives and Targets for Biodiversity Conservation 2001- 2005 (Commonwealth of Australia, 2001; EPA, 2016a).

A vegetation type is considered under represented if there is less than 30 per cent of its original distribution remaining. From a purely biodiversity perspective (not taking into account any other land degradation issues) there are several key criteria now being applied to vegetation (EPA, 2016a).

The threshold level below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at 30 per cent of the pre-European or pre -1750 extent of the vegetation type.

The vegetation associations that occur within the Proposal Area retain more than the recommended 30 per cent threshold (Table 14).

Table 14: Extent of Vegetation Associations Mapped within the Proposal Area (GOVERNMENT OF WESTERN AUSTRALIA, 2019b)

PRE-EUROPEAN VEGETATION ASSOCIATION	SCALE:	PRE–EUROPEAN (HA)	CURRENT EXTENT (HA)	PERCENTAGE REMAINING	PERCENTAGE REMAINING IN DBCA RESERVES	PERCENTAGE OF CURRENT EXTENT WITHIN THE PROPOSAL AREA
Veg Assoc No. 3 (77.19 ha).	*Statewide*	2,661,405	1,803,437	67.76	81.50	<0.006
	IBRA Bio region *Jarrah Forest*	2,390,592	1,604,102	67.10	81.00	<0. 0001
	I*BRA Sub-region* *Southern Jarrah Forest*	1,482,492	880,656	59.40	78.50	<0.01
	Local Government Authority *City of Albany*	50,509	16,025	31.73	38.24	<0.69
Veg Assoc No. 978 (18.95 ha)	*Statewide*	53,230.64	18,855.77	35.42	9.47	<0.13
	IBRA Bio region *Jarrah Forest*	53,016.57	18,751.03	35.37	9.48	<0.59
	IBRA Sub-region *Southern Jarrah Forest*	53,016.57	18,751.03	35.37	9.48	<0.13
	Local Government Authority *City of Albany*	52,154.39	18,719.90	35.89	9.67	<0.13

Key: < = less than

Local scale assessment

Assessment of the local scale impacts has been determined through using Department of Primary Industries and Regional Development (DPIRD) Native Vegetation Extent data (GoWA 2019a) for a 10 km buffer surrounding the Proposal Area (Study Area). This shows that the Study Area (which is 35,250 ha excludes areas that are marine) contains 14,335 ha native vegetation which represents approximately 40.7 per cent of the area. The Study Area includes 42.65 ha of DPIRD mapped native vegetation, the loss of which would result in a 0.3 per cent reduction in the extent of native vegetation within the Study Area, reducing the native vegetation remaining within Study Area to 40.55 per cent of the total area.

Threatened and Priority Ecological Communities

There have been no TECs or PECs recorded to date within the Proposal Area. On this basis, impacts to any of these communities are considered unlikely.

Priority flora

An assessment of the cumulative impacts upon priority flora have been assessed against the DBCA's (2012) Rare Flora and WA Herbarium Database. Table 15 summarises the estimated impact upon the three priority flora species recorded within the Proposal Area. Table 16 summarises suitable habitat recorded in the Proposal Area for priorty one species, *Prasophyllum paulinae* although no individuals were recorded by the survey. The potential impacts on priority flora affected by the Proposal are not considered significant.

Southern Ecology conducted a targeted survey to assess the impacts and concluded that *P. paulinae* is most likely associated with recently burnt vegetation that aligns with two ARVS Mapping Units: *Taxandria juniperina* Closed Forest (ARVS Unit 59) and *Homalospermum firmum, Callistemon glaucus* Peat Thicket (ARVS Unit 47) of which 8.2 ha occur in the Proposal Area.

Based on desktop searches and habitats present, Southern Ecology (2020) considered the following six threatened flora as possibly occurring:

- *Banksia goodii.*
- *Caladenia harringtoniae.*
- *Chordifex abortivus.*
- *Drakaea micrantha.*
- *Isopogon uncinatus.*
- *Verticordia fimbrilepis subsp. Australis.*

Table 15: Significant flora species recorded within the Survey Area

SPECIES	STATUS	STUDY AREA (SOUTHERN ECOLOGY 2018)	NUMBER OF PLANTS		KNOWN POPULATION ESTIMATE*	ESTIMATED IMPACT ON KNOWN POPULATION (PER CENT)
			Stg 2	Stg 3b		
Synaphea incurva	Priority 3	Two populations – four plants	0	4	6 records – 500 plants	0.8
Andersonia sp. Jamesii (J. Liddelow 84)	Priority 4	One population – 21 plants	0	21	20 records – 1764 plants	1.2
Thysanotus isantherus.	Priority 4	Two plants	1	0	105	0.9

Table 16: Significant flora habitat within the Survey Area

SPECIES	STATUS	SURVEY AREA (SOUTHERN ECOLOGY 2018)	KNOWN POPULATION ESTIMATE*	ESTIMATED IMPACT ON HABITAT (PER CENT)
Prasophyllum paulinae	Priority 1	8.2 ha of suitable habitat within the Proposal Area	4 records with two known locations. 2,164.4 ha of *Homalospermum firmum, Callistemon glaucus* Peat Thicket and 801.2 ha *Taxandria juniperina* Closed Forest occur within the ARVS area	0.03 of suitable habitat

4.3.6 Mitigation

Impacts to flora and vegetation will be minimised through the following measures:

- Selecting an alignment that fulfils safety objectives with the smallest practicable construction footprint.
- Minimising clearing through the detailed design process.
- Rehabilitation and revegetation using suitable native species in any areas disturbed during construction but not required for road and associated infrastructure.
- Development of a CEMP to define techniques to minimise risks to the surrounding environment and provide monitoring during construction including:
- Measures to minimise the risk of over clearing, such as clear demarcation of clearing areas and the implementation of an internal clearing permit system.
- Measures to minimise the risk of impacting adjacent vegetation, such as temporary fencing and adherence to fire restrictions.
- Development of a Hygiene Management Plan to ensure that dieback and weeds are not introduced or spread to adjacent vegetation. The management plan will include procedures such as machinery and vehicle clean down, weed treatments and restrictions on vehicle and machinery movements.
- Development of a Topsoil Management Plan, to ensure topsoil health for re-use and to mitigate the risk of introducing weeds into the Proposal Area and surrounds. The management plan will include the development and implementation of a system to allow for traceability of disposed weed infested topsoil, predetermined stockpile locations and instructions on topsoil management procedures.
- Development of a Landscape Management Plan to ensure that roadsides and medians will be vegetated and capable of acting as a biological filter for run-off to mitigate the risk of impact to adjacent vegetation.

4.3.7 Predicted outcome

By selecting an alignment that minimises impacts to flora and vegetation, as well as implementing mitigation measures to address potential impacts, it is expected that the EPA's objective (for the factor Flora and Vegetation) to protect flora and vegetation so that biological diversity and ecological integrity are maintained, will be met. A summary of the key residual potential impacts by the Proposal to flora and vegetation are provided in Table 17.

As outlined previously, the extent of clearing associated with the Proposal will be refined through detailed design and the actual amount of clearing will be less than current estimates.

Table 17: Predicted Residual Impact to Flora and Vegetation

SCALE	SUMMARY DISCUSSION OF RESIDUAL / CUMULATIVE IMPACTS
Proposal Area	Loss of approximately 29.4 ha of native vegetation comprised of: • Approximately 14 ha (10.2 per cent) of Good or better quality vegetation. • Approximately 15.4 ha (11.2 per cent) of Degraded or Completely Degraded vegetation.
Other significant vegetation	Loss of up to 9.4 ha of riparian vegetation associated with a sedge land, peat thicket wetland comprising of closed forest and minor non-perennial watercourse and *Melaleuca preissiana* Low Woodland.
Priority Flora	Loss of three priority flora species consisting of: Four *Synaphea incurva (P3)* individuals, estimated to represent less than 0.8 per cent of the known population.

SCALE	SUMMARY DISCUSSION OF RESIDUAL / CUMULATIVE IMPACTS
	21 *Andersonia* sp. Jamesii (J. Liddelow 84) (P3) individuals, estimated to represent one per cent of the known population. Clearing within 10m of one *Thysanotus isantherus* (P4) individuals estimated to represent 0.9 per cent of the known population.
Priority Flora Habitat	Loss of 8.2 ha of suitable habitat or equivalent of 0.03 per cent of the suitable habitat associated with *Homalospermum firmum/Callistemon glaucus* Peat Thicket and *Taxandria juniperina* Closed Forest which are well represented in the ARVS area.

4.4 Key Environmental Factor – Terrestrial Fauna

4.4.1 EPA Objective

The EPA's objective for terrestrial fauna is 'to protect terrestrial fauna so that biological diversity and ecological integrity are maintained' (EPA, 2016c).

4.4.2 Policy and Guidance

Applicable guidance and regulations employed in the assessment of fauna included:

- Environmental Factor Guideline 'Terrestrial Fauna' (EPA, 2016d).
- Technical Guidance 'Sampling Methods for Terrestrial Vertebrate Fauna' (EPA, 2016i).
- Technical Guidance 'Terrestrial Fauna Surveys' (EPA, 2016c).

4.4.3 Receiving Environment

Fauna Studies

Several fauna surveys have been completed during the ten years of planning for the project. Reports by Southern Ecology (2020) and Biota (2018, 2019a) have been used as primary references for assessment of impact on fauna. Surveys have included the Proposal Area, and the associated habitats that occur within the broader Study Area (Figure 2.).

Table 18 summarises the fauna surveys undertaken with the Study Area between 2018 and 2019.

Table 18: Fauna investigations undertaken for the purpose of this Proposal

YEAR SURVEY COMPLETED	CONSULTANT	SURVEY NAME
2018	Southern Ecology	Albany Ring Road Biological Survey
2018	Biota	Albany Ring Road WRP Assessment
2019	Biota	Albany Ring Road Black Cockatoo Habitat Assessment
2019	Southern Ecology	Draft Memorandum: Defining habitat categories for WRPs in the South Coast population.
2020	Southern Ecology	Albany Ring Road Biological Survey (updated report to include 2018 and 2019 survey results)
2020	Southern Ecology	Final Memorandum: Defining habitat categories for WRPs in the South Coast population

The Southern Ecology fauna surveys (Southern Ecology, 2020) focused on general fauna habitat assessment for the entire Proposal Area for Stage 2 and Stage 3. These included targeted species survey for Black Cockatoos and WRPs. The survey area was 185 ha and includes the Proposal

Area of 137.7 ha (Biota 2019a) (Figure 2 and Figure 3). Results of the survey by Southern Ecology identified 'five conservation significant fauna species including: Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (T-EN), Baudin's Cockatoo (*Calyptorhynchus baudinii*) (T-EN), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (T-VN), WRP (*Pseudocheirus occidentalis*) (T-CR), and Southern Brown Bandicoot (*Isoodon obesulus* subsp. *fusciventer*) (P4) (Southern Ecology 2020). WRPs scats were observed widely across the survey area, in multiple habitats of varying conditions. Core and supporting habitats and potential habitat linkages were identified, providing a preliminary guide to assessing impacts on the South Coast population. Foraging, potential breeding and roosting habitat for three Black Cockatoo species occurred throughout the survey area, in all the Eucalypt Woodland and Forest habitats. Large areas of potential roosting sites were identified in both native and introduced tree species. Potential breeding hollows for Black Cockatoo were observed in 117 trees, from a total of 664 Suitable DBH Trees (Southern Ecology, 2020).

Biota (2019a) used existing vegetation mapping to estimate and score the amount of Black Cockatoo foraging habitat impacted by the Proposal (Figure 4 and Figure 5). This survey also included the inspection of all Suitable DBH Trees and all hollows with an entrance diameter of more than 10 cm using drone and camera technology. As a result of the detailed habitat assessment, the amount of vegetation considered suitable foraging habitat for Black Cockatoo species was refined.

Results of the targeted Black Cockatoo assessment by Biota (2019a) recorded 516 Suitable DBH Trees within the survey area (Biota, 2019a). A total of 48 hollows with entrance diameters of 10 cm or greater were recorded, 37 of which were considered to warrant further investigation during a dedicated hollow assessment. This follow-up hollow assessment included the use of a Remote Piloted Aircraft (RPA) with a camera mounted to take photographs of the hollows (Biota, 2019a). This assessment indicated that none of the hollows were suitable for black-cockatoo breeding, primarily due to inadequate chamber size (Biota, 2019a). Biota (2019a) concluded that the hollow entrances and caverns inside were too small to support nesting (Biota 2019a). Potential foraging habitat within the survey area was assessed using the detailed vegetation mapping (Biota, 2019a). This comprised 17.4 ha of predominantly Jarrah and/or Marri woodland with varying mid- and under-storeys, in some places included foraging plants (Biota, 2019a). Individual planted *Pinus radiata* were also recorded throughout the survey area and represent foraging plants for white-tailed black-cockatoos (Biota, 2019a). Biota (2019a) assessed the availability of foraging habitat surrounding the Proposal Area based upon a 12 km radius. This distance represents the 'typical maximum distance that black-cockatoos will fly from roosting locations to forage, under the hypothetical premise that cockatoos were roosting within the survey area (Biota, 2019a). Biota concluded that the same vegetation foraging units occur within the Albany Mounts and in the crown reserve south-west of the intersection of South Coast Highway and George Street. Larger swathes of these same vegetation units are found within the Stirling Range National Park, Down Road Nature Reserve and Bakers Junction Nature Reserve (Biota, 2019a).

Estimates used by Biota (2019a) accurately reflect the actual amount of Black Cockatoo foraging habitat and have been used to determine the scale of impacts by the Proposal.

Following the Southern Ecology fauna survey, Biota (2020) undertook a targeted WRP assessment to provide greater local and regional context on the possum habitat within the Albany Ring Road Proposal Area (Figure 11). This study compared the estimated abundance from distance sampling in the adjacent Down Road Nature Reserve (Biota 2018), included abundance estimates derived for Bakers Junction Nature Reserve, Mt Melville, Mt Clarence and Mt Adelaide and extrapolated the density estimates for the Albany Regional Vegetation Survey. This information was used to extrapolate density estimates for the population around Albany. The calculation of density included the estimation of abundance and the area occupied by the animals (Biota 2018). The assessment encompassed isolated habitat trees, remnant vegetation strips, larger isolated or contiguous remnant vegetation and larger areas of remnant vegetation (Biota 2018). Approximately 16.2 km of transects resulted in 13 observations (Biota 2018). The estimated number of individuals identified

in habitat area of 92.2 ha was '20 to 37 individual and included the Old Tip Site and the CSBP site; equivalent to a density of ± 0.22 to ±0.4 per ha (Biota 2018). Downs Road Nature Reserve was estimated to support 452 ± 85 (95 per cent CI 312 – 656) individuals, derived from the density estimate of 1.246 ± 0.234 WRPs per ha' (Biota 2018). At a regional scale, further distance sampling effort has been applied to three other remnant habitat sites, including the Bakers Junction Nature Reserve, Mt Melville, Mt Clarence and Mt Adelaide where a combined estimate of 1,480 (95 per cent CI 894 – 2,465) WRPs in an area of 4,400 ha was calculated (Biota 2018).

Additional work to categorise habitat for the South Coast population was recently completed by Southern Ecology (2020) and includes input from Biota, the University of Western Australia, and the DBCA. Southern Ecology considered that the South Coast WRP population ecology is different from populations of the same species on the Swan Coastal Plain' (Sandra Gilfillan pers comm, 2020). Gilfillan used the areas defined in EPBC Act Significant Impact Guidelines for the Swan Coastal Plain to define Core Habitat, Primary Corridors and Supporting Habitat for the South Coast Population and identify where these occur in the South Coast population.

Terrestrial fauna habitats

The fauna habitat assessment completed by Southern Ecology (2018) primarily focused on the identification of fauna habitat based on vegetation type. For the purposes of this assessment, it was assumed that the fauna habitats broadly align with vegetation communities (see Section 4.3.3, Table 11). However, as discussed, subsequent targeted species investigations for Black Cockatoos and WRP habitat led to minor adjustments in the type, quality and amount of habitat estimated in the Proposal Area. Targeted fauna assessments also provided regional context to enable holistic assessment of the impacts by the Proposal in relation to the surrounding area (Biota 2018; Biota 2019a). A significant study involving the categorisation of the WRP habitat by Southern Ecology (2019b) was completed as described above.

Approximately 42 per cent of the Proposal Area is cleared. Of the remainder, 22 per cent is native vegetation of varying condition where approximately 11 per cent of the area is Completely Degraded or Degraded.

The desktop fauna survey work undertaken by Southern Ecology (2018) identified the following general findings on the five fauna habitats found within the Proposal Area:

- The *Hakea spp*. Shrubland/Woodland Complex offers potential foraging habitat for Carnaby's Cockatoos and offers habitat for WRPs.
- The Jarrah/Marri/Sheoak Laterite Forest offers potential foraging, breeding and roosting habitat for all three Black Cockatoo species, provides potential suitable habitat for WRP, Quenda and may provide potential habitat for the South-Western Brush-tailed Phascogale, Masked Owl and Fork-tailed Swift.
- The *Homalospermum firmum, Callistemon glaucus* Peat Thicket offers potential foraging and roosting habitat for Carnaby's Cockatoos, WRPs, Quenda and may offer habitat for the Fort-tailed Swift.
- Non-native planted vegetation offers potential roosting habitat for all three Black Cockatoo species, habitat for Quenda and the Fort-tailed Swift.
- Non-native areas where invasive weeds comprise >75 per cent of the vegetation offer potential habitat for Quenda and may offer habitat for the Fort-tailed Swift (Southern Ecology, 2020).

Ecological Linkages

The Proposal Area is located within a regional linkage corridor known as the Coastal Corridor, which is a Priority 1 Corridor defined as one that links two or more very high nature conservation value areas (Forest Region and Two People Bay Nature Reserve). On a local scale the Proposal Area falls within Strategic Zone B of the Coastal Corridor. Zone B contains areas of woody vegetation where polygons greater than 30 ha in size are spaced no greater than 1 km apart and potentially form the most strategic link between major protected areas (Wilkins *et al,* 2006).

The Proposal Area contains a number of potential and/or possible linkage areas that provide or aid fauna movement on a small scale, particularly for WRPs. These areas are discussed in more detail in the below WRP sub-section.

Fauna diversity

The NatureMap database search (DBCA, 2019) identified 730 fauna species previously recorded within 10 km of the Proposal Area, Stage 3b and Stage 2 (referred hereafter as the Southern Ecology Study Area). This total comprised 262 birds, 37 reptiles, 52 mammals, 12 amphibians, and 148 invertebrates and 219 fish. Of the 730 fauna species previously recorded, 714 were native species and 16 were naturalised (introduced) species.

Conservation significant fauna

Searches of the EPBC Act Protected Matters database, DBCA NatureMap database and previous studies identified the presence or potential presence of conservation significant fauna species within 10 km of the Southern Ecology Study Area (Figure 8). The desktop searches undertaken by Southern Ecology (2018) recorded:

- 22 species listed under the EPBC Act and/or the BC Act that could occur within the Proposal Area.
- 19 migratory bird species protected under international agreement.
- 7 DBCA priority listed species.

Field assessments confirmed that habitats within the Proposal are currently being utilised by five conservation significant fauna species recorded during desktop searches. These included:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (T-EN).
- Baudin's Cockatoo (*Calyptorhynchus baudinii)* (T-EN).
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (T-VN).
- WRP (*Pseudocheirus occidentalis*) (T-CR).
- Southern Brown Bandicoot (*Isoodon obesulus* subsp. *fusciventer*) (P4).

Threatened Fauna observations within the Proposal Area and contextual sites are shown in Figure 8). In addition to the above species, seven conservation significant fauna species listed under state legislation were considered to possibly occur in the Proposal Area despite not being recorded during field investigations:

- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) (CD).
- Masked Owl (*Tyto novaehollandiae* subsp. *novaehollandiae*) (P3).
- Short-nosed Snake (*Elapognathus minor*) (P2).
- Fork-tailed Swift (*Apus pacificus*) (IA).
- Woollybush bee (*Hylaeus globuliferus*) (P3).
- Water-rat, Rakali (*Hydromys chrysogaster*) (P4).
- Peregrine Falcon (*Falco peregrinus*) (OS).

The results of the likelihood of occurrence assessment completed by Southern Ecology (2018) are presented in Table 19.

Legend:

- Proposal area

Other Conservation Significant fauna species

- Peregrine Falcon (*Falco peregrinus*) (OS)
- Fork-tailed Swift (*Apus pacificus*) (IA)
- Masked Owl (*Tyto novaehollandiae novaehollandiae*) (P3)
- Short-nosed Snake (*Elapognathus minor*) (P2)
- Water-rat, Rakali (*Hydromys chrysogaster*) (P4)
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*)
- Woolybush bee (*Hylaeus globuliferus*)
- Regional roads

Scale 1:170,000 at A4

0 1 2
Kilometers

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

MAIN ROADS WESTERN AUSTRALIA
ALBANY RING ROAD PROJECT
STAGES 2 AND 3B
ENVIRONMENTAL PROTECTION ACT REFERRAL

OTHER CONSERVATION SIGNIFICANT FAUNA

FIGURE 8

mainroads WESTERN AUSTRALIA

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Image Reference: SLIP Public Services Locate 2020.

Table 19: Significant Fauna Species Likely, Possibly or Known to Occur within the Proposal Area (Southern Ecology, 2020)

SPECIES	STATUS		LIKELIHOOD ASSESSMENT AND OBSERVATIONS (SOUTHERN ECOLOGY 2018)
	EPBC Act	WA	
Birds			
Carnaby's Cockatoo (*Calyptorhynchus latirostris*)	En	En, S2	**Known -** Located within the known distribution and predicted breeding range. No direct observations but feeding evidence observed by Southern Ecology. Foraging and potential breeding habitat present (see further details in text below).
Baudin's Cockatoo (*Calyptorhynchus baudinii*)	En	En, S2	**Known** - Located within the known distribution and known breeding range. No direct observations but feeding evidence observed by Southern Ecology. Foraging and potential breeding habitat present (see further details in text below).
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*)	Vu	Vu, S3	**Known -** Located within the known distribution range for the Forest Red-tailed Cockatoo. No direct observations but feeding evidence observed by Southern Ecology. Foraging and potential breeding habitat present (see further details in text below).
Masked Owl (*Tyto novaehollandiae* subsp. *novaehollandiae*)		P3	**Possible** - Hollows suitable for nesting are present and abundant terrestrial mammals (Quenda) as prey are also present.
Fork-tailed Swift, Pacific Swift (*Apus pacificus*)*	Mi	IA	**Possible** - The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. Does not breed in Australia.
Mammals			
Western Ringtail Possum (*Pseudocheirus occidentalis)*	CE	CE, S1	**Known -** Observed by (Southern Ecology and Biota). Habitat present and signs of use recorded (see further details in text below).
South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*)		CD	**Possible** – A confirmed record of South-western Brush-tailed Phascogale in Mira Mar (an Albany suburb) from March 2017 indicates the species possibly occur within the Albany area. Suitable habitat exists within Marri and Jarrah Woodland and Forest within the Proposal Area. Trees with potential hollows with entrance sizes suitable for this species were recorded. This species is difficult to detect by signs.
Southern Brown Bandicoot (*Isoodon obesulus* subsp. *fusciventer)*		P4	**Known -** Southern Ecology recorded characteristic diggings particularly abundant in areas with thick groundcover, for example in the *Evandra arista* dominated sedgeland. One roadkill was observed on the Old Denmark Road, near the corner of George St

SPECIES	STATUS		LIKELIHOOD ASSESSMENT AND OBSERVATIONS (SOUTHERN ECOLOGY 2018)
	EPBC Act	WA	
			and a skull and lower jaw bones were found in the small roadside remnants west of Albany Hwy.
Reptiles			
Short-nosed Snake (*Elapognathus minor*)		P2	**Possible** - As the habitat is not well known, suitable habitat may exist within the survey area.
Invertebrate			
Woollybush bee (*Hylaeus globuliferus*)		P3	**Possible** - Only the type specimen (1929) is known from the Albany area. Potential habitat is not known, therefore the species may occur.

Black Cockatoos

The Proposal Area provides a total of 24.1 ha of native vegetation suitable habitat for all three Black Cockatoo species. 13.4 ha of which is high quality habitat foraging, roosting and potential breeding. 5.4 ha native vegetation is low quality roosting habitat and 2.9ha is considered to be low quality foraging habitat. In addition to this 33.5ha of planted vegetation is suitable for roosting habitat (Figure 9).

Suitable foraging and potential breeding habitat was identified in the Jarrah/Marri/Sheoak Laterite Forest, Jarrah/Sheoak/*E.staeri* Sandy Woodland, *Hakea spp* Shrubland/Woodland Complex, Marri/Jarrah Forest/Peppermint Woodland and various planted trees including *Pinus radiata*, Marri and Jarrah (Biota 2018). During the survey, any tall tree was considered as suitable roosting, especially the scattered marri and introduced Eucalypts recorded throughout the Proposal Area.

No known roosting trees were recorded within the Proposal Area.

Black Cockatoo breeding habitat, as defined in the Commonwealth referral guidelines (DEE 2012), includes:

- Relevant tree species with a suitable DBH to develop a nest hollow, where DBH is greater than or equal to 500 mm (referred to as 'Suitable DBH Trees').
- Trees with a hollow that meets the DAWE's (2012) depth, width and angle criteria for nesting by Black Cockatoos, referred to a 'Trees with a Suitable Nest Hollow.
- Known Nesting Trees are those trees that have secondary evidence of nesting (i.e. feathers, eggs/ shells etc).

During a targeted Black Cockatoo habitat assessment completed by Biota (2019a), 294 Suitable DBH Trees were identified in the Proposal Area. Of these trees, 22 had at least one hollow. Biota (2019a) applied the following risk assessment criteria to all trees with hollows in order to determine whether hollows were suitable for breeding or showed signs of recent cockatoo use:

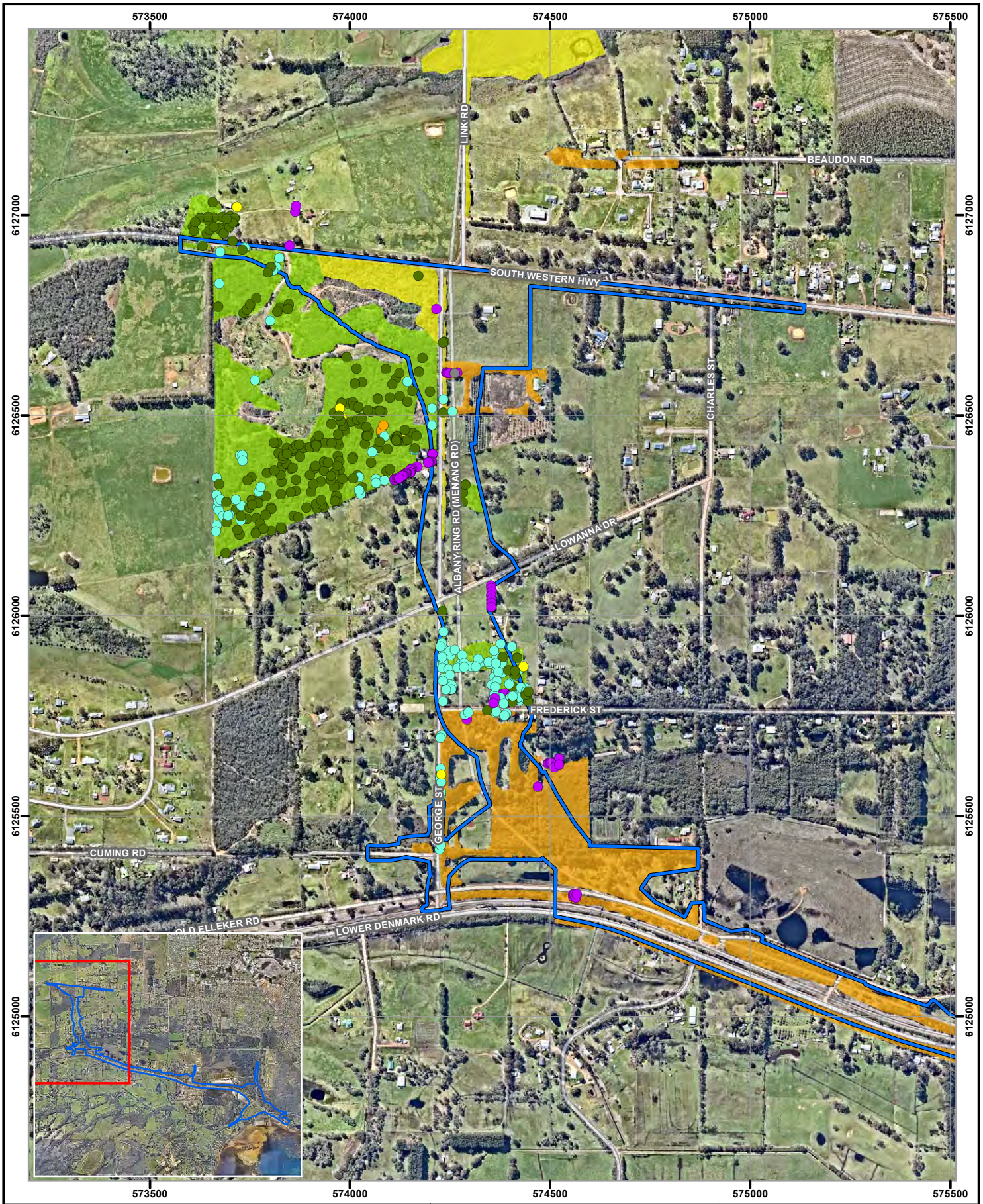
1. Hollow was suitably open for access (i.e. not covered by branches).
2. Orientation of hollow is suitable for access (i.e. horizontal to upright downward-facing hollows being unsuitable).
3. Location of hollow allows for the formation of a nesting cavity (e.g. if a spout branch, was the branch large enough to support a nesting cavity).
4. Signs of cockatoo use (including wear around hollows, nut chews, scarring, scratch marks on trunks and branches, secondary evidence of feeding sites and moulted.

Any hollow with an entrance dimension of approximately 10 cm that met items 1 to 3, or item 4, was inspected using a RPA.

Following inspection, no hollows were recorded as suitable for breeding by Black Cockatoo species.

An initial assessment for each of the Black Cockatoo species was completed by Southern Ecology during 2018. A summary of this assessment is provided in Table 20. In 2019, Biota (2019a) reviewed the amount of foraging habitat using Southern Ecology's detailed vegetation mapping, targeted field survey, observations and aerial imagery and determined that there is 16.3 ha of foraging habitat within the Proposal Area. Biota considered foraging habitat in the context of wider availability using meso-scale mapping of concordant vegetation available from the Albany Regional Vegetation Survey (Sandiford and Barrett, 2010 in Biota, 2019a). Biota (2019a) used the four vegetation types found within the Proposal Area that provide suitable foraging habitat for Black Cockatoos to obtain a conservative estimate of the amount of habitat available to Black Cockatoos within a 12 km radius (Figure 10). Based on these vegetation types alone, it is estimated that approximately 8,515 ha of foraging habitat is located within 12 km of the Proposal Area. It is reasonable to assume that these areas also contain potential breeding and roosting habitat. Potential roosting habitat occurs

throughout the survey area for all three Black Cockatoos with numerous water sources comprising of dams, man-made pools and farm water troughs (Southern Ecology, 2020).



Legend:

- Proposal area

Black Cockatoo habitat
- Roosting, foraging & breeding
- Roosting
- Foraging

Significant fauna habitat trees
- *Eucalyptus marginata*
- *Eucalyptus staeri*
- *Eucalyptus gomphocephala*
- *Corymbia calophylla*
- Dead *Eucalyptus/Corymbia* sp.
- *Pinus radiata*

Local and regional roads

Scale 1:12,500 at A4

0 100 200 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

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STAGES 2 AND 3B
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DISTRIBUTION OF BLACK COCKATOO HABITAT WITHIN THE PROPOSAL AREA

FIGURE 9 PAGE 1 OF 3

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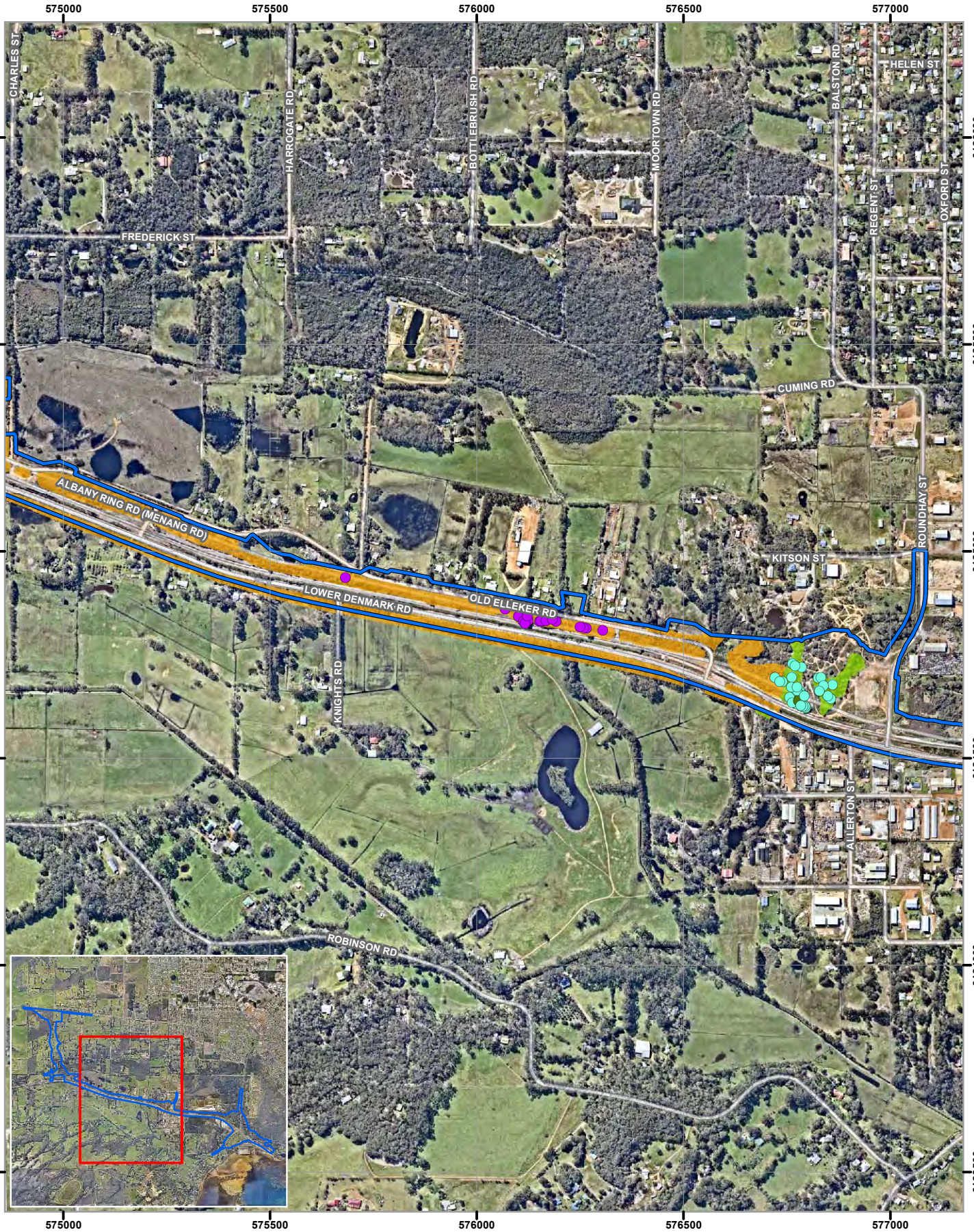
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.



Legend:

- Proposal area
- Black Cockatoo habitat
  - Roosting, foraging & breeding
  - Roosting
- Significant fauna habitat trees
  - *Eucalyptus marginata*
  - *Corymbia calophylla*
  - *Pinus radiata*
- Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

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MAIN ROADS WESTERN AUSTRALIA
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DISTRIBUTION OF BLACK COCKATOO HABITAT WITHIN THE PROPOSAL AREA

FIGURE 9 PAGE 2 OF 3

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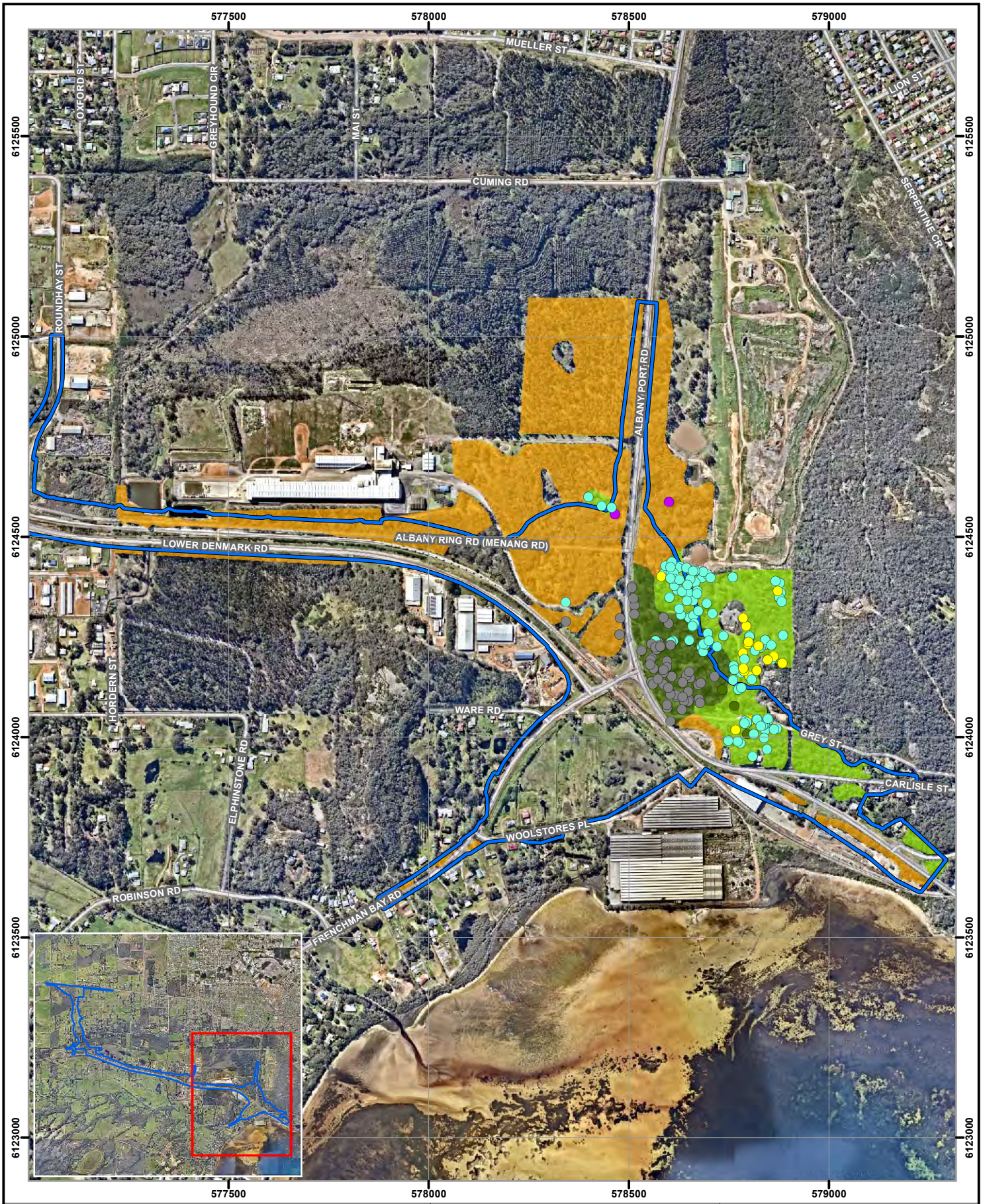
Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.



Legend:

- Proposal area

Black Cockatoo habitat
- Roosting, foraging & breeding
- Roosting
- Breeding

Significant fauna habitat trees
- *Eucalyptus marginata*
- *Eucalyptus gomphocephala*
- *Corymbia calophylla*
- Dead *Eucalyptus/Corymbia* sp.
- *Pinus radiata*

Local and regional roads

Scale 1:12,500 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50

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MAIN ROADS WESTERN AUSTRALIA
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STAGES 2 AND 3B
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DISTRIBUTION OF BLACK COCKATOO HABITAT WITHIN THE PROPOSAL AREA

FIGURE 9 PAGE 3 OF 3

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Image Reference: www.nearmap.com© - Imagery Date: 6 September 2019.

Legend

- Proposal area
- 12km radius of development area

Suitable foraging habitat

- Hakea spp Shrubland/Woodland Complex
- Jarrah/Marri/Sheoak Laterite Forest
- Marri/Jarrah Forest/Peppermint Woodland

Scale 1:150,000 at A4

0 1 2
Kilometers

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 57273

Version: A

Date: 04-May-2020

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BLACK COCKATOO FORAGING HABITAT

FIGURE 10

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Image Reference: SLIP Public Services 2020.