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# **Roe Highway and Great Eastern Highway Bypass Grade Separation Interchange, Hazelmere WA (EPBC 2020/8784)**

EPBC Act Referral

# EPBC Act referral



Australian Government  
Department of Agriculture, Water and the Environment

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<b>Title of proposal</b>	<b>2020/8784 - Roe Highway and Great Eastern Highway Bypass Grade Separation Interchange, Hazelmere WA</b>
<b>Section 1</b>	
<b>Summary of your proposed action</b>	
<b>1.1 Project industry type</b>	Transport - Land
<b>1.2 Provide a detailed description of the proposed action, including all proposed activities</b>	
<p>The Commissioner of Main Roads Western Australia (Main Roads) is proposing to upgrade the Roe Highway and Great Eastern Highway (GEH) Bypass intersection. Roe Highway is a strategic freight route linking Kewdale to Perth's north-eastern and south-eastern suburbs. The Roe Highway and GEH Bypass intersection is one of the last remaining signalised intersections on Roe Highway. In recent years the intersection has become heavily congested. Main Roads proposes to improve safety and enhance freight efficiency through the construction of a grade separation at the intersection.</p> <p>The project scope includes:</p> <ul style="list-style-type: none"> <li>• grade separation at the intersection of Roe Highway and GEH Bypass – Roe Highway SLK 37.54</li> <li>• upgrade of Roe Hwy (between Kalamunda Road and Clayton St) including a duplication of the bridge over the Helena River</li> <li>• PSP connection south to Kalamunda Rd and 300m north of Clayton St.</li> </ul> <p>The development envelope (DE) is presented in Figure 1 and comprises approximately 80.05 hectares (ha).</p> <p>The project scope includes:</p> <ul style="list-style-type: none"> <li>• grade separation at the intersection of Roe Highway and Great Eastern Highway Bypass – Roe Highway SLK 37.54</li> <li>• upgrade of Roe Hwy (between Kalamunda Road and Clayton St) including a duplication of the bridge over the Helena River</li> <li>• PSP connection south to Kalamunda Rd and 300m north of Clayton St.</li> </ul> <p>The development envelope (DE) is presented in Figure 1 and comprises of approximately 80.62 hectares (ha).</p>	
<b>1.3 What is the extent and location of your proposed action?</b> See Appendix B	
<b>1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)</b>	
<p>The Development envelope (DE) traverses the City of Swan, City of Kalamunda and Shire of Mundaring Local Government Areas (LGA) on the Swan Coastal Plain in Western Australia. The most southern part of the DE is approximately 15 km east from the Perth Central Business District (CBD) and the most northern part of the DE is approximately 5 km east of Guildford. The total DE extends for approximately 4.8 km with an approximate total area of 80.05 ha (Figure 1).</p> <p>Land use adjacent to the Proposed Action includes:</p> <ul style="list-style-type: none"> <li>• predominately urban land uses to the southwest of the DE (south of Adelaide Street), and rural to the southeast of the DE (including the Hillview Public Golf Course)</li> <li>• predominately industrial and urban deferred to the west of the DE (Hazelmere), and rural, urban and parks and recreation to the east</li> <li>• predominantly industrial to the west of the most northern portion of the DE (Bellevue), and urban to the east.</li> </ul>	
<b>1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?</b>	
The Proposed Action DE is 80.05 ha.	
<b>1.7 Proposed action location</b>	
Other - Intersection of Roe Highway and Great Eastern Highway Bypass – Roe Highway SLK 37.54	
<b>1.8 Primary jurisdiction</b>	Western Australia



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**1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?**

Yes  No

**1.9.1 Provide detail**

The Proposal will receive Commonwealth (\$144 million) and State Government (\$36 million) funding.

**1.10 Is the proposed action subject to local government planning approval?**

Yes  No

<b>1.11 Provide an estimated start and estimated end date for the proposed action</b>	Start Date	01/10/2021
	End Date	30/09/2023

**1.12 Provide details of the context, planning framework and state and/or local Government requirements**

The Proposed Action will be referred to the Western Australian Environmental Protection Authority (EPA) under Part IV of the Environmental Protection Act 1986 (EP Act), concurrently with this EPBC Act referral. If the EPA decide to not formally assess the Proposed Action, then a clearing permit will be sought under Part V of the EP Act for clearing of native vegetation. The clearing permit application will be assessed by the Department of Water and Environmental Regulation (DWER).

The Proposed Action may require excavation below the water table and temporary dewatering during construction. Depending on the rate and volume of dewatering, a Section 5C licence to abstract groundwater may be required under the Rights in Water and Irrigation Act 1914 (RIWI Act). This licence application will be assessed by the DWER.

A Bed and Banks Permit under the RIWI Act (issued by DWER) will be required if there is any impact from duplication of the Roe Highway bridge (Number 1148) on the Helena River.

Approval from the Department of Biodiversity, Conservation and Attractions (DBCA) (Swan River Trust) will be required for any works that impact the Helena River. Authorisation to take (flora and fauna) and modify Threatened Ecological Communities (TECs) under the Biodiversity Conservation Act 2016 (BC Act) (administered by DBCA) may also be required.

There are five registered Aboriginal Heritage sites, as defined by the West Australian Aboriginal Heritage Act 1972, within the DE. As such, a Section 18 consent to disturb an Aboriginal Heritage site/s will be required.

Predicted traffic noise levels will be assessed against road traffic noise criteria established under State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP 5.4).

**1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders**

Main Roads has commenced liaison with relevant stakeholders regarding the Proposed Action. Initial consultation has been undertaken, and is ongoing, with Local Government representatives, Industry, Traditional Owners and residents

**1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project**

The Proposed Action will be referred to the EPA under Part IV of the EP Act, concurrently with this EPBC Act referral. The EPA referral supporting documentation provides an overview of the receiving environment, assessment of potential impacts and proposed mitigation and predicted outcome to environmental factors with consideration of environmental factor objectives and overarching environmental principles. The key preliminary environmental factors addressed by the referral include:

- flora and vegetation
- terrestrial fauna
- inland waters (including dewatering, acid sulfate soils, stormwater runoff)
- social surroundings (including visual amenity, noise, heritage).

If the EPA decide to not formally assess the Proposed Action, then a clearing permit will be sought under Part V of the EP Act for clearing of native vegetation. The clearing permit application will be assessed by DWER.



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**1.15 Is this action part of a staged development (or a component of a larger project)?**

Yes       No

**1.15.1 Provide information about the larger action and details of any interdependency between the stages/components and the larger action**

The Proposed Action is part of a larger project (the Great Eastern Highway Bypass Interchanges Project) that has been split into two areas. In addition to the area of the Proposed Action, the project includes another development to the west of the Proposed Action. The development includes grade separation of the GEH Bypass and Abernathy Road intersection, an upgrade to Abernathy Road and construction of the Lloyd Street Bridge over the Helena River.

**1.16 Is the proposed action related to other actions or proposals in the region?**

Yes       No



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## Section 2

### Matters of national environmental significance

2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?

Yes  No

2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?

Yes  No

2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?

Yes  No

2.4 Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes  No

### Species or threatened ecological community

Banksia Woodlands of the Swan Coastal Plain - Endangered

### Impact

The Proposed action will impact up to 18.9 ha of vegetation identified as Banksia Woodlands of the Swan Coastal Plain (Banksia Woodlands) TEC (Figure 4). The Banksia Woodlands TEC is a community largely restricted to the Swan Coastal Plain of southwest Western Australia and is characterised by a high endemism and considerable localised variation in species composition across its range (Threatened Species Scientific Committee (TSSC) 2016).

A preliminary assessment against the impact criteria for critically endangered and endangered ecological communities outlined in DAWE's Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DoE 2013) indicates:

- The Proposed Action will impact approximately 18.9 ha of vegetation identified as Banksia Woodlands TEC. It is estimated there is approximately 1,748 ha of the TEC within 10 km of the DE, therefore clearing as a result of the Proposed action will reduce the local extent by 1.1% (Figure 5).
- the Proposed Action may result in increased fragmentation, or a reduction in the quality or integrity of an occurrence of the TEC;
- the Proposed action will directly impact habitat critical to the survival of the TEC;
- the Conservation Advice defines all patches of TEC and a buffer of 20 - 50m, as critical for the survival of the TEC (TSSC 2016). The Proposed Action will impact on 18.9 ha of the TEC as well as buffers for adjacent TEC; and
- the Proposed Action will not substantially modify or destroy abiotic factors necessary for the survival of the TEC, including hydrology, nutrients or soil resources.

### Species or threatened ecological community

Westralunio carteri (Carter's Freshwater Mussel, Freshwater Mussel) - Vulnerable

### Impact

The Proposed action may result in direct and indirect impacts to this species. The species is patchily distributed in sandy, muddy sediments of freshwater lakes, rivers and streams with greatest densities associated with woody debris and overhanging riparian vegetation near stream banks and edges of lake and dams (Threatened Species Scientific Committee 2018). Previously recorded locations of this species occur within sheltered, slow-moving creek in the Helena River Reserve. The existing bridge that carries Roe Highway over the Helena River will require duplication to support traffic flow.



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The Department of Water and Environmental Regulation (2020) has surveyed nine sites within 2 km, both downstream and upstream of the Proposed action. These surveys have indicated that the species is likely distributed within the DE (Figure 10).

The Proposed action may result in the following impacts to the species:

- direct impact to individuals and habitat suitable for the species during bridge duplication works; and
- indirect impacts including clearing of riparian vegetation providing shading; accidental surface water contamination during construction.

### Species or threatened ecological community

*Calyptorhynchus baudinii* (Baudin's Cockatoo) – Endangered

### Impact

The Proposed Action is within the known distribution of Baudin's Cockatoo and will require the clearing of up to 35.12 ha of potential foraging habitat representing 43.6% of the total DE area (Figure 7). The EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC 2012) states that the following impacts have a high risk of a significant impact upon black cockatoos:

- clearing of any known nesting tree;
- clearing or degradation of any part of a vegetation community known to contain breeding habitat;
- clearing of more than 1 ha of Quality foraging habitat;
- clearing or degradation (including pruning the top canopy) of a known night roosting site; and
- creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).

In assessing the potential impact to Baudin's Cockatoo against the referral guidelines (DSEWPaC, 2012), the following information is provided:

- 35.12 ha of potential foraging habitat, suitable for Baudin's Cockatoo will be directly impacted by the Proposed action;
- the proposed action will potentially result in the removal of up to 222 suitable Diameter at Breast Height (DBH) trees, comprising of 76 Jarrah (*Eucalyptus marginata*), 79 Marri (*Corymbia calophylla*), 1 Tuart (*Eucalyptus gomphocephala*) and 66 Flooded Gum (*Eucalyptus rudis*) (Figure 7);
- within 6 km of the DE, approximately 2,966 ha of suitable habitat is present. Habitat calculations have been based on the latest DIPRD (2020) native vegetation extent dataset, clipped to the publicly available Carnaby's Cockatoo datasets (DBCA, 2020a & b). Clearing as a result of the Proposed action represents a reduction local habitat by 1.2% (Figure 8);
- of the 222 suitable DBH trees within the DE, seven were recorded to contain at least one hollow, however, all were deemed not suitable for breeding based on their size, location and/or presence of bees;
- Biota (2020) recorded a further 1419 trees immediately adjacent to the DE (Figure 7) comprising of 52 Marri, 26 Jarrah, 1,335 Rudis and 6 stags of unknown species, which are considered potential, or future potential breeding trees;
- Murdoch University identified, through GPS tracking data, three key roosting areas for Baudin's Cockatoo in the vicinity of the DE, the closest of which is located approximately 600 m southeast of the DE; and
- the proposed action will not create a gap of more than 4 km between patches of Black Cockatoo habitat.

### Species or threatened ecological community

*Calyptorhynchus latirostris* (Carnaby's Cockatoo) – Endangered

### Impact

The Proposed Action is within the known distribution of Carnaby's Cockatoo and will require the clearing of up to 35.12 ha of potential foraging habitat representing 43.6% of the total DE area (Figure 7). The EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC 2012) states that the following impacts have a high risk of a significant impact upon black cockatoos:

- clearing of any known nesting tree
- clearing or degradation of any part of a vegetation community known to contain breeding habitat
- clearing of more than 1 ha of Quality foraging habitat
- clearing or degradation (including pruning the top canopy) of a known night roosting site
- creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).

In assessing the potential impact to Carnaby's Cockatoo against the referral guidelines (DSEWPaC, 2012), the following information is provided:

- 35.12 ha of potential foraging habitat consisting of *Corymbia calophylla* (Marri), *Eucalyptus marginata* (Jarrah), *Eucalyptus rudis* (Flooded gum), *Banksia attenuata*, *Banksia menziesii* and *Xanthorrhoea preissii*, will be directly impact on by the Proposed action;



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- within 6 km of the DE, approximately 2,966 ha of suitable habitat is present. Habitat calculations have been based on the latest DIPRD (2020) native vegetation extent dataset, clipped to the publicly available Carnaby's Cockatoo datasets (DBCAs, 2018a & b). Clearing as a result of the Proposed action represents a reduction local habitat by 1.2% (Figure 8); the proposed action will potentially result in the removal of up to 222 suitable Diameter at Breast Height (DBH) trees, comprising of 76 Jarrah (*Eucalyptus marginata*), 79 Marri (*Corymbia calophylla*), 1 Tuart (*Eucalyptus gomphocephala*) and 66 Flooded Gum (*Eucalyptus rudis*) (Figure 7);
  - of the 222 suitable DBH trees within the DE, seven were recorded to contain at least one hollow, however, all were not deemed suitable for Black Cockatoo breeding based on their size, location and/or presence of bees;
  - Biota (2020) recorded a further 1419 trees immediately adjacent to the DE (Figure 7) comprising of 52 Marri, 26 Jarrah, 1,335 Rudis and 6 stags of unknown species, which are considered potential, or future potential breeding trees;
  - according to recent Great Cocky Count data (Peck et al, 2019), four roost sites for Carnaby's Cockatoo occur adjacent to the DE. Based on DBCA (2018c) spatial data there are 57 roosting sites within 12km of the DE, four of which occur within 2 km; and
  - the proposed action will not create a gap of more than 4 km between patches of Black Cockatoo habitat.

### Species or threatened ecological community

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

### Impact

The Proposed Action is within the known distribution of Forest Red-tailed Cockatoo (FRTBC) and will require the clearing of up to 35.12 ha of potential foraging habitat representing 43.6% of the total DE area (Figure 7). The EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC 2012) states that the following impacts have a high risk of a significant impact upon black cockatoos:

- clearing of any known nesting tree;
  - clearing or degradation of any part of a vegetation community known to contain breeding habitat;
  - clearing of more than 1 ha of Quality foraging habitat;
  - clearing or degradation (including pruning the top canopy) of a known night roosting site; and
  - creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).
- In assessing the potential impact to FRTBC against the referral guidelines, the following information is provided:
- 35.12 ha of potential foraging habitat consisting of *Corymbia calophylla* (Marri), *Eucalyptus marginata* (Jarrah), *Eucalyptus rudis* (Flooded gum), will be directly impacted by the Proposed action;
  - within 6 km of the DE, approximately 2,966 ha of suitable habitat is present. Clearing as a result of the Proposed action represents a reduction local habitat by 1.2% (Figure 8);
  - the proposed action will potentially result in the removal of up to 222 suitable Diameter at Breast Height (DBH) trees, comprising of 76 Jarrah (*Eucalyptus marginata*), 79 Marri (*Corymbia calophylla*), 1 Tuart (*Eucalyptus gomphocephala*) and 66 Flooded Gum (*Eucalyptus rudis*) (Figure 7);
  - of the 222 suitable DBH trees within the DE, seven were recorded to contain at least one hollow, however, were not deemed suitable for Black Cockatoo breeding based on their size, location and/or presence of bees;
  - Biota (2020) recorded a further 1419 trees immediately adjacent to the DE (Figure 7) comprising of 52 Marri, 26 Jarrah, 1,335 Flooded Gum and 6 stags of unknown species, which are considered potential, or future potential breeding trees;
  - according to recent Great Cocky Count data (Peck et al, 2019), no roost sites for FRTBC occur within or adjacent to the DE;
  - no evidence or observations of FRTBC roosting was recorded within the DE, therefore the proposed action will not result in any impact to FRTBC roosting habitat;
  - no known nesting trees were recorded within the DE and hence the proposed action will not impact upon any known nesting trees; and
  - the proposed action will not create a gap of more than 4 km between patches of Black Cockatoo habitat.

### Species or threatened ecological community

*Conospermum undulatum* (Wavy-leaved Smokebush) - Vulnerable

### Impact

The proposed action will result in the removal of up to 9 individuals of *Conospermum undulatum*. This species is an erect shrub to 1.5 meters tall with wavy leaves that taper to the base. It has woolly flowers with long white hairs and is typically multi-stemmed. The total known number of *C. undulatum* is approximately 11,400 (DEC 2009) from 28 populations. Immediately adjacent the DE, known populations occur to the east (25 individuals) and west (139 individuals), within private property and a Crown Reserve, respectively. Through the removal of up to 9 individuals, the Proposed action will reduce the total known



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population by 0.07%, and a reduction in the known local population by 5%.

The Proposed action will not further fragment the population as the clearing will remove isolated individuals located at the northern most extent of the distribution of the species (Figure 6). The removal of up 2 ha of habitat associated with the survival of the species will result from the Proposed action. The Recovery Plan (DEC 2009) defines habitat critical to the survival of the species as one that includes the area of occupancy of important populations, or areas of similar habitat surrounding important populations of *C. undulatum*.

**2.4.2 Do you consider this impact to be significant?**

Yes       No

**2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?**

Yes       No

**2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?**

Yes       No

**2.7 Is the proposed action likely to be taken on or near Commonwealth land?**

Yes       No

**2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?**

Yes       No

**2.9 Is the proposed action likely to have any direct or indirect impact on a water resource from coal seam gas or large coal mining development?**

Yes       No

**2.10 Is the proposed action a nuclear action?**

Yes       No

**2.11 Is the proposed action to be taken by a Commonwealth agency?**

Yes       No

**2.12 Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?**

Yes       No

**2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?**

Yes       No





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## Section 3

### Description of the project area

#### 3.1 Describe the flora and fauna relevant to the project area

An EPBC Protected Matters Search with a 5km buffer was undertaken as part of the desktop assessment. The search identified 20 flora species as likely or known to occur within 5km of the Proposed Action:

- *Acacia anomala* - Vulnerable
- *Acacia aphylla* – Endangered
- *Andersonia gracilis* – Endangered
- *Anthocercis gracilis* – Vulnerable
- *Caladenia huegelii* - Endangered
- *Conospermum undulatum* – Vulnerable
- *Darwinia apiculate* - Endangered
- *Diplolaena andrewsii* – Endangered
- *Diuris drummondii* – Vulnerable
- *Diuris micrantha* – Vulnerable
- *Diuris purdiei* – Endangered
- *Drakaea elastica* – Endangered
- *Eleocharis keigheryi* – Vulnerable
- *Eremophila glabra* subsp. *chlorella* – Endangered
- *Grevillea christineae* - Endangered
- *Lepidosperma rostratum* – Endangered
- *Macarthuria keigheryi* – Endangered
- *Synaphea* sp. Fairbridge Farm (D. Papenfus 696) – Critically Endangered
- *Thelymitra dedmaniarum* – Endangered
- *Thelymitra stellata* – Endangered.

Strategen, now Strategen-JBS&G, was commissioned by Main Roads WA in 2017 to undertake a desktop assessment and a detailed flora and vegetation survey to identify the extent of the Floristic Community Type (FCT) SCP20c in land surrounding the intersection of GEH Bypass and Roe Highway. This survey covered the southern portion of the DE from Adelaide Street to Bushmead Road/ Helena Valley Road. The survey recorded eighty-five native vascular plant taxa from 27 plant families and eight exotic taxa were recorded within the

Survey Area. No Declared Plant species pursuant to section 22 of the BAM Act were recorded within the Survey Area.

While no Threatened or Priority flora species were recorded during the Strategen survey, most recently, a survey undertaken by Biota (2020) recorded one species listed as Threatened under the EPBC Act and BC Act, and four Priority flora species within the DE.

- *C. undulatum* (T)
- *Johnsonia pubescens* subsp. *Cygnorum* (P2)
- *Isopogon drummondii* (P3)
- *Phlebocarya pilosissima* subsp. *Pilosissima* (P3)
- *Hypolaena robusta* (P4)

#### Fauna

A desktop assessment indicated that the following Threatened species are likely to occur in the vicinity of the DE:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo) - Endangered
- *Calyptorhynchus baudinii* (Baudin's Cockatoo) - Endangered
- *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) – Vulnerable.

In 2018, Strategen was commissioned by Main Roads to undertake a Black Cockatoo habitat assessment for the Kalamunda Road Roe Highway upgrade project. The survey area for this assessment included the southern portion of the DE for this referral, from the southern boundary to [just north of] Adelaide Street. This survey identified very high-quality foraging habitat for all three Black Cockatoo species.

A survey undertaken by Biota (2020) recorded 222 potential breeding trees for Black Cockatoos within the DE of a suitable species and diameter at breast height (DBH), however none of the trees recorded possessed suitable hollows for Black Cockatoo nesting. Suitable DBH trees recorded within the DE comprise of:

- 79 *Corymbia calophylla* (Marri);
- One *Eucalyptus gomphocephala* (Tuart);
- 76 *Eucalyptus marginata* (Jarrah); and



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- 66 *Eucalyptus rudis* (Flooded Gum).

### 3.2 Describe the hydrology relevant to the project area (including water flows)

Three layers of aquifer occur beneath the DE. The superficial Swan unconfirmed or superficial aquifer is the topmost layer and is usually accessed for groundwater abstraction. Beneath the superficial Swan aquifer lies the semi-confined Leederville aquifer, which overlies the confined Yarragadee North aquifer.

The superficial aquifer receives direct recharge from groundwater infiltration and surface water. There is limited interaction between the various aquifers, in terms of water exchange. Both the Yarragadee and the Leederville aquifer receive direct recharge where these formations outcrop (not within the Proposed Action). Groundwater movement and recharge is very slow in these confined aquifers.

Groundwater levels range from 7.0 m to 11.0 m Australian Height Datum (AHD) across the DE. The depth of the bottom of the superficial aquifer in the Proposed Action is approximately 22 m below ground level, and is expected to flow towards the Helena River (northwest in the southern portion of the DE and west to southwest in the northern portion of the DE).

The Proposed action intersects three geomorphic wetlands as shown in Figure 9, including:

- Conservation Category (UFI 15440), floodplain;
- Multiple Use 'Helena River Floodplain' (UFI 15266), palusplain; and
- Resource Enhancement (UFI 14230), palusplain.

Furthermore, the DE crosses the Helena River which is a tributary of the Swan River.

### 3.3 Describe the soil and vegetation characteristics relevant to the project area

#### Geology and Soils

The DE is located within the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region and Perth (SWA-2) IBRA subregion (Commonwealth of Australia 2012). The Swan Coastal Plain is a coastal plain consisting of low-lying, often swampy areas and sandhills with sandy soils or swamp deposits, as well as dissected country rising to the duricrusted Dandaragan Plateau on Mesozoics of mainly yellow sandy soils. The geology of the region is Mesozoic to recent sediments of the Perth Basin (Beard 1990). The Swan Coastal Plain comprises five major geomorphologic systems that lie parallel to the coast, namely (from west to east) the Quindalup Dunes, Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (Churchward & McArthur 1980; Gibson et al. 1994).

The DE occurs within the Bassendean and the Pinjarra Soil-Landscape Zones of the Swan Province. The Bassendean Zone is described as Mid-Pleistocene Bassendean sand and fixed dunes inland from the coastal dune zone, with non-calcareous sands and podsolised soils with low-lying wet areas. The Pinjarra Zone is characterised by alluvial deposits (early Pleistocene to Recent) between the Bassendean Dunes Zone and the Darling Scarp with colluvial and shelf deposits adjacent to the Darling Scarp in clayey to sandy alluvial soils with wet areas (Purdie et al. 2004).

#### Vegetation

The DE occurs within the Drummond Botanical Subdistrict, characterised by low *Banksia* woodlands on leached sands; *Melaleuca* swamps on poorly drained depressions; and *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) woodlands on less leached soils (Beard 1990).

The DE intersects two vegetation associations: Pinjarra 1009, described as medium woodland; marri and river gum, and Bassendean 1001, described as medium very sparse woodland; jarrah, with low woodland; banksia and casuarina (Beard 1990).

Vegetation complexes, as described by Heddle et al. (1980), within the DE include:

- Guildford Complex – A mixture of open forest to tall open forest of *Eucalyptus calophylla* – *E. wandoo* – *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis* – *Melaleuca raphiophylla*;
- Forrestfield Complex – Vegetation ranges from open forest of *Eucalyptus calophylla* – *E. wandoo* – *E. marginata* to open forest of *E. marginata* – *E. calophylla* – *Allocasuarina fraseriana* – *Banksia* spp. Fringing woodland of *E. rudis* in the gullies that dissect this landform;
- Southern River Complex – Open woodland of *Corymbia calophylla* (Marri) – *Eucalyptus marginata* (Jarrah) - *Banksia* species with fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca raphiophylla* (Swamp Paperbark) along creek beds; and
- Swan Complex - Fringing woodland of *Eucalyptus rudis* (Flooded Gum) – *Melaleuca raphiophylla* (Swamp Paperbark) with localised occurrence of low open forest of *Casuarina obesa* (Swamp Sheoak) and *Melaleuca cuticularis* (Saltwater Paperbark).



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The remaining pre-European extents of the Guildford, Forrestfield, Southern River, and Swan Complexes are 5.09%, 12.29%, 18.42, and 13.57%, respectively (GoWA 2019). The extent of the Guildford complex is currently below the 10% target for vegetation retention within constrained areas of the Swan Coastal Plain (EPA 2000).

The Flora and Vegetation Survey undertaken by Strategen (2018) and additional mapping completed in 2020 identified 16 vegetation units, including 14 that are representative of native remnant vegetation and two comprising planted or rehabilitated vegetation (Figure 2).

Overall, vegetation throughout the Survey Area showed a level of disturbance. Disturbance in vegetation immediately adjacent to both Great Eastern Highway Bypass and Roe Highway appeared to be related to both historical road construction and edge effects causing heavy weed infestation. However, vegetation around the GEH Bypass – Roe Highway intersection was classified as being in 'Very good', and 'Good to Very good' condition. Furthermore, the dominant vegetation type within the survey area was broadly described as woodland of *Banksia attenuata* and *Banksia menziesii* and low shrubland of *Adenanthos cygnorum*. Four patches of vegetation representing the Banksia Woodlands of the Swan Coastal Plain TEC were mapped within the survey area.

The survey identified two WA listed TECs within the DE: *Banksia attenuata* woodlands over species rich dense shrublands SCP20a (Endangered), and Shrublands and woodlands of the eastern side of the Swan Coastal Plain – SCP20c (Critically Endangered). These are demonstrative of the EPBC listed TEC Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered) and Shrublands and Woodlands of the eastern Swan Coastal Plain (Endangered), respectively.

**3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area**

Not Applicable.

**3.5 Describe the status of native vegetation relevant to the project area**

The DE contains approximately 43.7 ha of native vegetation which ranges in condition from 'Completely Degraded' to 'Very Good'. 18.17 ha of vegetation has been classified as in 'Good' to 'Very Good' condition, whilst 5.58 ha is in 'Good to Degraded' condition, and 19.91 ha is in 'Degraded' to 'Completely Degraded' condition (Figure 3).

The Flora and Vegetation Survey undertaken by Strategen (2018) concluded that vegetation unit VT9 (VT8 in this report) was representative of Shrublands and Woodlands of the eastern Swan Coastal Plain TEC. In addition, VT3, VT5, and VT10 (VT2, VT4 and VT9 in this report) were found to meet the diagnostic criteria of Banksia Woodlands of the Swan Coastal Plain TEC, comprising four patches.

The extent of SCP20c within the DE was defined through a combination of statistical analysis and qualitative assessment against diagnostic criteria (Strategen 2018). Within the DE, SCP20c occupies a total area of 3.80 ha to the southeast of the current intersection of GEH Bypass and Roe Highway.

Through an assessment against the key diagnostic criteria of Banksia Woodlands of the Swan Coastal Plain, four patches of vegetation consistent with the TEC were mapped by Strategen (2018). Within the DE, this TEC occupies a total of 18.93 ha to the northeast, southeast, and west of Roe Highway and the intersection with GEH Bypass.

The DE has been mapped as the Guildford, Forrestfield, Southern River, and Swan Complexes. All vegetation complexes present retain over 10% of their Pre-European extent, above the 10% target for retention of vegetation complexes within constrained areas of the Swan Coastal Plain (EPA 2000). However, the Guildford Complex which retains only 5.09% of Pre-European extent (GOWA 2019).

**3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area**

The gradient within the DE ranges from approximately 25 m Australian height datum (mAHD) in the southern portion of the DE to approximately 8 mAHD at the Helena River, and 24 mAHD at Clayton Street.

The Proposed Action may result in some localised changes to the existing gradient of the DE to facilitate the creation of new road infrastructure, including road embankments.

**3.7 Describe the current condition of the environment relevant to the project area**

Approximately 35.70 ha (44.27%) of the DE is already cleared, with the remainder of the DE containing remnant native vegetation (54.14%) and some that has been planted or rehabilitated (1.59%).

Vegetation condition within the DE was assessed by Strategen (2018) in accordance with the Keighery Scale (1994) and was found to range from 'Very Good' to 'Completely Degraded'. Within the DE, 44.3% of vegetation was comprised of



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already cleared land, 24.7% was in 'Degraded' to 'Completely Degraded' condition, 7.8% was in 'Degraded' to 'Good' condition, and 23.2% made up of vegetation in 'Good' to 'Very Good' condition. Vegetation condition within the DE is illustrated by Figure 3.

**3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project**

No Commonwealth Heritage listed places occur within or adjacent to the DE. One State Heritage listed place occurs immediately adjacent to the DE; Belle View Farm (Heritage Place No. 3836) (Figure 12). Belle View Primary School (Heritage Place No. 3512) is not listed as a State Heritage place but is recognised as a 'Municipal Inventory' Other Heritage listing by the City of Swan.

**3.9 Describe any Indigenous heritage values relevant to the project area**

The DE traverses five registered Aboriginal Heritage sites (site ID 3758, 3966, 3967, 3968 and 16110) (Figure 11). As such, a Section 18 consent to disturb an Aboriginal Heritage site/s will be required.

Eight (8) 'Other Heritage Places' (OHPs, stored data, not a site) exist within the DE (Place ID 3518, 3857, 3969, 3974, 4011, 4388, 17503 and 21313). Information has been received for another four (4) 'Other Heritage Places' (Place ID 18452, 18453) however these have not yet been assessed to determine if they meet the definition of an Aboriginal Heritage site, under the Aboriginal Heritage Act 1972.

**3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area**

The vast majority (93.61%) of the DE falls within land reserved for 'Primary Regional Roads', with the remainder being within land zoned for 'Rural' (2.99%), 'Urban' (1.94%), 'Parks and Recreation' (1.0%), 'Industrial' (0.43%), 'Railways' (0.01%), and 'Urban Deferred' (0.01%) land use.

Main Roads will undertake consultation with any affected land holders and will acquire all land required for the proposed action prior to commencement of the action through negotiated settlement, or under the WA Land Administration Act 1997.

**3.11 Describe any existing or any proposed uses relevant to the project area**

The DE is located within multiple land use zones under the Metropolitan Region Scheme including:

- Primary Regional Road;
- parks and recreation;
- urban;
- rural; and
- industrial.

The majority of the DE is zoned as Primary Regional Road and wholly contains the existing Great Eastern Highway Bypass and Roe Highway alignments. There are areas of native vegetation retention within the DE that will require additional planning approving. The Proposed Action is largely consistent with the existing land use within the DE.



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

## Section 4

### Measures to avoid or reduce impacts

#### 4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

The DE represents the maximum extent of disturbance, and where possible, vegetation and fauna habitat will be retained. The DE will be further refined during the detailed design phase to adjust the road alignment, where possible, to minimise the impact on Matters of National Environmental Significance. All opportunities will be considered at this phase to further reduce, including:

- steepening batter slopes;
- reducing median widths; and
- installation of safety barriers.

To further minimise the clearing footprint, all laydown areas, stockpiles and access tracks will be constructed within existing cleared areas or within the permanent footprint of the works. No native vegetation will be cleared for temporary works outside of the permanent footprint. The preliminary calculations for clearing are based on limited drainage design. The impacts of clearing for the proposed drainage are conservative given many of the basins will be located in areas already cleared.

Main Roads WA will also prepare and implement a Construction Environmental Management Plan (CEMP) will include measures to manage and minimise the significance resulting from both direct and indirect impacts.

#### 4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

- Loss of up to 3.8 ha of the Shrublands and Woodlands of the eastern Swan Coastal Plain TEC;
- Loss of up to 18.9 ha of Banksia Woodlands of the Swan Coastal Plain TEC;
- Loss of up to 35 ha of Black Cockatoo habitat and 222 potential breeding trees; and
- Prevention of the potential spread or introduction of threatening processes, including weeds and pathogens.
-



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

## Section 5

### Conclusion on the likelihood of significant impacts

#### 5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled action

- World Heritage properties
- National Heritage places
- Wetlands of international importance (declared Ramsar wetlands)
- Listed threatened species or any threatened ecological community
- Listed migratory species
- Marine environment outside Commonwealth marine areas
- Protection of the environment from actions involving Commonwealth land
- Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development
- Protection of the environment from nuclear actions
- Protection of the environment from Commonwealth actions
- Commonwealth Heritage places overseas
- Commonwealth marine areas

#### 5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action

Not applicable.



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

## Section 6

### Environmental record of the person proposing to take the action

#### 6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Main Roads is a State Government agency with an assured record of responsible environmental management and performance. Main Roads has a strong environmental compliance record, with regard to compliance with conditions of environmental approvals granted under the Environment Protection and Biodiversity Conservation Act 1999 and the Environmental Protection Act 1986 (WA).

Main Roads operations are undertaken in accordance with an Environmental Policy, which outlines Main Roads overarching objectives for environmental protection, sustainability and continual improvement in environmental performance.

The Environmental Policy is implemented through Main Roads international standard AS/NZS ISO 14001:2015-certified Environmental Management System (EMS). Main Roads EMS provides a formalised systematic approach to environmental management for all aspects of the operations (road planning, construction and maintenance).

#### 6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

Main Roads is not subject to any past or present proceedings under Commonwealth or State law for protection of the environment or conservation and sustainable use of natural resources.

#### 6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes  No

#### 6.3.1 If the person taking the action is a corporation, provide details of the corporation's environmental policy and planning framework

Main Roads will undertake the Proposal in accordance with their Environmental Policy and EMS. Main Roads' EMS is independently certified and audited and covers all processes and activities that have the potential to impact on the environment. The EMS ensures compliance with Main Roads' environment and heritage compliance obligations, providing the framework for driving environmental requirements throughout leadership, planning, support, operation, performance evaluation and improvement actions. The Proposed Action will be undertaken, monitored and measured in accordance with the Main Roads EMS..

Main Roads Environmental Policy commits to protecting and enhancing the natural environmental and social values in all Main Roads activities. Main Roads Environment Policy and EMS certificate is publicly accessible from Main Roads' website.

#### 6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes  No

#### 6.4.1 EPBC Act No and/or Name of Proposal

- EPBC 2020/8746: Great Eastern Highway Safety Improvements SLK 3118 to SLK 327 (decision pending)
- EPBC 2020/8725: Karratha - Tom Price Road Stage 4 (decision pending)
- EPBC 2019/8608: Tonkin Highway Extension – Thomas Road to South West Highway (Controlled Action)
- EPBC 2019/8545: Tonkin Highway Upgrade, Guildford Road to Great Eastern Highway (Not a Controlled Action)
- EPBC 2019/8529: Tonkin Highway Grade Separated Interchanges (Controlled Action)
- EPBC 2019/8471: Bunbury Outer Ring Road Northern and Central Section Project (decision pending)
- EPBC 2018/8367: Mitchell Freeway Extension and Wanneroo Road Upgrade
- EPBC 2018/8346: Indian Ocean Drive Widening, Gingin Shire (Not a Controlled Action)
- EPBC 2018/8316: Roe Highway and Kalamunda Road Interchange Upgrade (Controlled Action)
- EPBC 2018/8315: High Street Upgrade, Fremantle (Not a Controlled Action)
- EPBC 2018/8284: Armadale Road to North Lake Road Bridge Development, Jandakot (Not a Controlled Action)
- EPBC 2018/8279: South Coast Highway Road Widening SLK 14.1 to 18.3, Albany (Not a Controlled Action)
- EPBC 2018/8238: Northam Cranbrook Road Widening, Katanning (Not a Controlled Action)
- EPBC 2017/8110: Wanneroo Road / Ocean Reef Road Grade Separation, Pearsall (Not a Controlled Action)
- EPBC 2017/8035: Great Northern Highway-Bindoon Bypass (Controlled Action)
- EPBC 2017/8015: Upgrading Pinjarra Williams Road (M053) 24 -40 SLK (Not a Controlled Action)
- EPBC 2017/8009: South Coast Highway Widening 8.2-14.16 SLK, Albany (Not a Controlled Action)



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

- EPBC 2017/7972: Armadale Road Duplication - Tapper to Anstey Road (Not a Controlled Action)
- EPBC 2017/7934: Road widening Kojonup South SLK 254.9 to SLK 266 (Controlled Action)
- EPBC 2017/7907: Albany Highway Crossman Intersection Improvements (Not a Controlled Action)
- EPBC 2017/7884: Indian Ocean Drive Passing Lanes and Widening Works, 52-258 SLK (Not a Controlled Action)
- EPBC 2017/7864: Brand Highway Widening and Passing Lanes Project 34.83-164.3 SLK (Controlled Action)
- EPBC 2016/7811: South Western Highway Upgrade, Padbury Hill Stage 2 SLK 219.45-221.00, Balingup (Not a Controlled Action).





Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

## Section 7

### Information sources

#### Reference source

Beard, J. S. 1990. Plant life of Western Australia. Kangaroo Press, Perth.

#### Reliability

Reliable

#### Uncertainties

None

#### Reference source

Bureau of Rural Science. 1991. Digital Atlas of Australian Soils. GIS data layer.

#### Reliability

Reliable

#### Uncertainties

None

#### Reference source

Churchward, HM; McArthur, WM. Landforms and soils of the Darling System, Western Australia. In: Atlas of Natural Resources: Darling System, Western Australia: explanatory text. Perth, WA: Dept of Conservation and Environment; 1980

#### Reliability

Reliable

#### Uncertainties

None

#### Reference source

Department of Biodiversity, Conservation and Attractions (DBCAs). 2018. Carnabys Cockatoo Areas requiring investigation as feeding habitat in the Jarrah Forest IBRA Region. Western Australia. Online available from: <https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-unconfirmed-feed-areas-jf> accessed July 2020

#### Reliability

Reliable

#### Uncertainties

None

#### Reference source

Department of Biodiversity, Conservation and Attractions (DBCAs). 2018. Carnabys Cockatoo Areas requiring investigation as feeding habitat in the Swan Coastal Plain (SCP) IBRA Region. Online available from: <https://catalogue.data.wa.gov.au/dataset/carnabys-cockatoo-unconfirmed-feed-areas-jf> accessed July 2020

#### Reliability

Reliable

#### Uncertainties

None



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

<b>Reference source</b>
Department of Biodiversity, Conservation and Attractions (DBCA). 2019. Black Cockatoo Roosting Sites – Buffered. Online available from: <a href="https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered">https://catalogue.data.wa.gov.au/dataset/black-cockatoo-roosting-sites-buffered</a> . Accessed July 2020
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of the Environment (DoE). 2013. Matters of National Environmental Significance Significant impact guidelines 1.1 – Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of Environment and Conservation. (2009). Wavy-leaved smokebush ( <i>Conospermum undulatum</i> ) Recovery Plan. Commonwealth Department of the Environment, Water, Heritage and the Arts, Canberra.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of the Environment and Energy (2017). Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain. Canberra: Department of the Environment and Energy. Available from: <a href="http://www.environment.gov.au/biodiversity/threatened/communities/pubs/20-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/communities/pubs/20-conservation-advice.pdf</a> . In effect under the EPBC Act from 13-Jul-2017.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of the Environment and Energy (DoEE). 2020 EPBC Act Protected Matters Search Tool (PMST). Available from: <a href="http://www.environment.gov.au/epbc/pmst/index.html">http://www.environment.gov.au/epbc/pmst/index.html</a> . Accessed May 2020.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of Primary Industries and Regional Development (DPIRD). 2020. Current Extent of Native vegetation - Western Australia. Western Australia. Online, available: <a href="https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent">https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent</a> . Accessed August 2020.



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of Sustainability, Environment, Water, Populations and Communities DSEWPaC 2012. EPBC Act referral guidelines for three black cockatoo species, Carnaby's cockatoo ( <i>Calyptorhynchus latirostris</i> ), Baudin's cockatoo ( <i>Calyptorhynchus baudinii</i> ) and the forest red-tailed black cockatoo ( <i>Calyptorhynchus banksii naso</i> ). Available from <a href="https://www.environment.gov.au/system/files/resources/895d4094-af63-4dd3-8dff-ad2b9b943312/files/referral-guidelines-wa-black-cockatoo.pdf">https://www.environment.gov.au/system/files/resources/895d4094-af63-4dd3-8dff-ad2b9b943312/files/referral-guidelines-wa-black-cockatoo.pdf</a> . Accessed November 2019.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Department of Water and Environmental Regulation (DWER). 2020. Health Rivers Program, Species -Carter's freshwater mussel - <i>Westralunio carteri</i> . Available from <a href="https://rivers.dwer.wa.gov.au/species/westralunio-carteri/">https://rivers.dwer.wa.gov.au/species/westralunio-carteri/</a>
<b>Reliability</b>
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<b>Uncertainties</b>
None
<b>Reference source</b>
Environmental Protection Authority (EPA). 2000. Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation, with particular reference to the Agricultural Area. Position Statement No. 2. December 2000.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Geological Survey of Western Australia and Geoscience Australia. 2008. Surface Geology of Australia 1:1,000,000 Western Australia. GIS data layer.
<b>Reliability</b>
Reliable
<b>Uncertainties</b>
None
<b>Reference source</b>
Gibson, N., Keighery, B., Keighery, G., Burbidge, A and Lyons, M. (1994). A floristic survey of the Southern Swan Coastal Plain. Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.).
<b>Reliability</b>



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Reliable

**Uncertainties**

None

**Reference source**

Government of Australia 2009 Australia's bioregions (IBRA). Available from: <https://www.environment.gov.au/land/nrs/science/ibra>.

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

Government of Western Australia (GoWA). 2018. 2017 South West Vegetation Complex Statistics. Current as of October 2017. WA Department of Biodiversity, Conservation and Attractions, Perth. <https://catalogue.data.wa.gov.au/dataset/dbca>.

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

Heddl, E. M., O. W. Loneragan and J. J. Havel. 1980. Vegetation complexes of the Darling System in: Atlas of Natural Resources: Darling System, Western Australia. Department of Conservation and Environment, Perth.

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

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

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

Purdie, B R, Tille, P J, and Schoknecht, N R. (2004), Soil-landscape mapping in south-Western Australia : an overview of methodology and outputs. Department of Agriculture and Food, Western Australia, Perth. Report 280.

**Reliability**

Reliable

**Uncertainties**

None



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

**Reference source**

Threatened Species Scientific Committee (2016). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf>. In effect under the EPBC Act from 16-Sep-2016.

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

Threatened Species Scientific Committee (2018). Conservation Advice *Westralunio carteri* Carter's freshwater mussel. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/86266-conservation-advice-15022018.pdf>. In effect under the EPBC Act from 15-Feb-2018.

**Reliability**

Reliable

**Uncertainties**

None

**Reference source**

Strategen Environmental, (2018). GEH Bypass Flora and Vegetation Survey, January 2018", unpublished report for Main Roads Western Australia.

**Reliability**

Reliable

**Uncertainties**

None



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

## Section 8

### Proposed alternatives

Do you have any feasible alternatives to taking the proposed action?

Yes



No



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## Section 9

### Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?

Yes  No

#### Organisation

Organisation name MAIN ROADS  
 Business name  
 ABN 50860676021  
 ACN  
 Business address 1 Waterloo Crescent, East Perth, 6004, WA, Australia  
 Postal address  
 Main Phone number 138 138  
 Fax  
 Primary email address martine.scheltema@mainroads.wa.gov.au  
 Secondary email address

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Small business  
 Not applicable

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations \*

Yes  No

#### 9.1.3 Contact

First name Martine  
 Last name Scheltema  
 Job title Manager Environment  
 Phone 9323 4614  
 Mobile  
 Fax  
 Email martine.scheltema@mainroads.wa.gov.au  
 Primary address 1 Waterloo Crescent, East Perth, 6004, WA, Australia  
 Address

#### Declaration: Person proposing the action

I, Martine Scheltema of Main Roads Western Australia, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Signature: Martine Scheltema Date: 7/9/20

I, Martine Scheltema, the person proposing the action, consent to the designation of Main Roads Western Australia as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: Martine Scheltema Date: 7/9/20



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

### Proposed designated proponent

#### 9.2.1 Is the proposed designated proponent a member of an organisation?

Yes  No

#### Organisation

Organisation name	MAIN ROADS
Business name	
ABN	50860676021
ACN	
Business address	1 Waterloo Crescent, East Perth, 6004, WA, Australia
Postal address	
Main Phone number	138 138
Fax	
Primary email address	martine.scheltema@mainroads.wa.gov.au
Secondary email address	

#### 9.2.2 Contact

First name	Martine
Last name	Scheltema
Job title	Manager Environment
Phone	9323 4614
Mobile	
Fax	
Email	martine.scheltema@mainroads.wa.gov.au
Primary address	1 Waterloo Crescent, East Perth, 6004, WA, Australia
Address	

#### Declaration: Proposed Designated Proponent

I, Martine Scheltema of Main Roads Western Australia, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: Martine Scheltema Date: 7/9/2020





Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

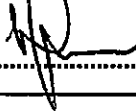
**Referring party (person preparing the information)**

9.3.1 Is the referring party (person preparing the information) a member of an organisation?  
 Yes       No

**Organisation**  
**Organisation name** MAIN ROADS  
**Business name**  
**ABN** 50860676021  
**ACN**  
**Business address** 1 Waterloo Crescent, East Perth, 6004, WA, Australia  
**Postal address**  
**Main Phone number** 138 138  
**Fax**  
**Primary email address** wayne.ennor@mainroads.wa.gov.au  
**Secondary email address**

9.3.2 Contact  
**First name** Wayne  
**Last name** Ennor  
**Job title** Environment Officer  
**Phone** 9323 6497  
**Mobile**  
**Fax**  
**Email** wayne.ennor@mainroads.wa.gov.au  
**Primary address** 1 Waterloo Crescent, East Perth, 6004, WA, Australia  
**Address**

**Declaration: Referring party (person preparing the information)**  
 I, WAYNE ENNOR, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature:  ..... Date: 07/09/2020 .....



Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

<b>Appendix A</b>	
<b>Attachment</b>	
<b>Document Type</b>	<b>File Name</b>
action_area_images	59018_01_SiteOverview.pdf
supporting_tech_reports	59018_07_BCHabitat.pdf
supporting_tech_reports	59018_08_RegionalBCHabitat.pdf
supporting_tech_reports	59018_09_Wetlands.pdf
supporting_tech_reports	59018_10_CartersMussel.pdf
supporting_tech_reports	59018_11_AboriginalHeritage.pdf
supporting_tech_reports	59018_12_EuropeanHeritage.pdf
flora_fauna_investigation	59018_02_VegComunities.pdf
flora_fauna_investigation	59018_03_VegCond.pdf
flora_fauna_investigation	59018_04_TEC.pdf
flora_fauna_investigation	59018_05_TEC_10km.pdf
flora_fauna_investigation	59018_06_TPFL.pdf

<b>Appendix B</b>
<b>Coordinates</b>
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-31.917006054885,116.00843340987
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-31.925607423688,116.01603255709
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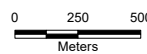
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-31.91815884636,116.00817387759



**Legend**  
 Proposal area  
 Roads (MRWA)

Scale 1:30,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 30-Jul-2020

Drawn By: hsullivan

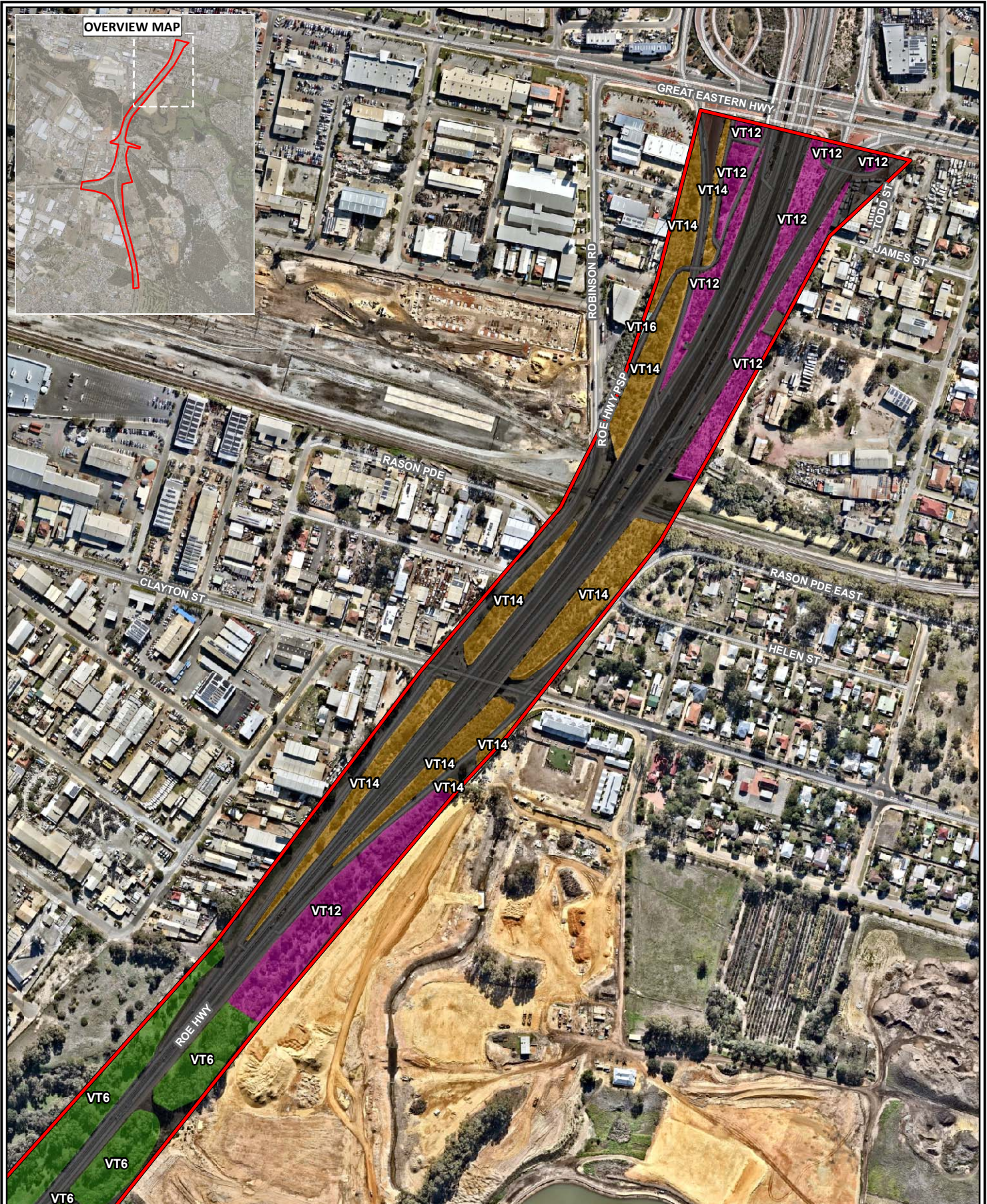
Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**SITE OVERVIEW**

**FIGURE 1**

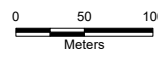




**Legend**

- Proposal area
- Roads (MRWA)
- Vegetation type VT6
- Vegetation type VT12
- Vegetation type VT14
- Vegetation type VT16
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

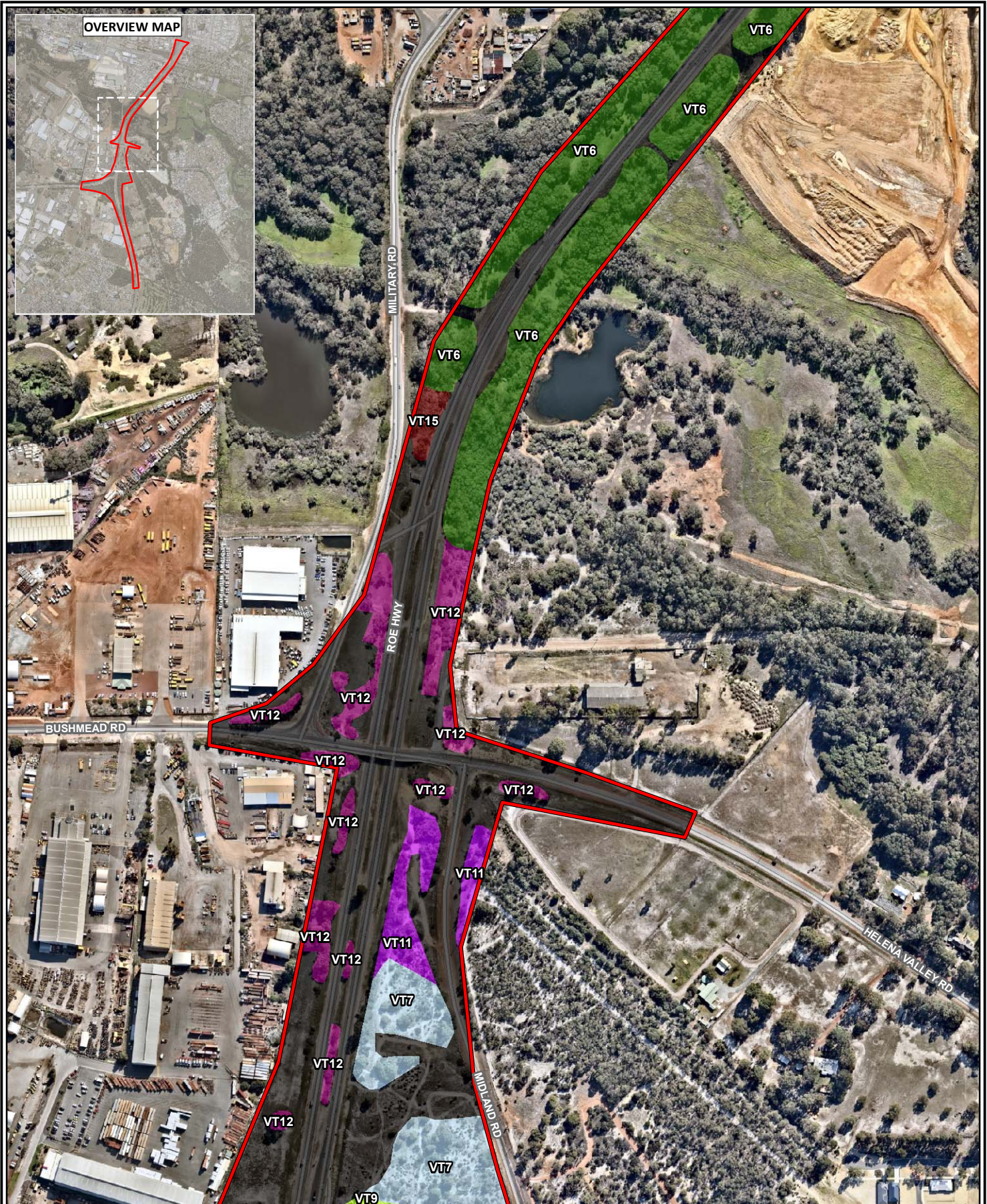
**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**VEGETATION COMMUNITY TYPES**

**FIGURE 2**

**PAGE 1 of 4**

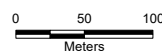




**Legend**

- Proposal area
- Roads (MRWA)
- Vegetation type VT6
- VT7
- VT9
- VT11
- VT12
- VT15
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

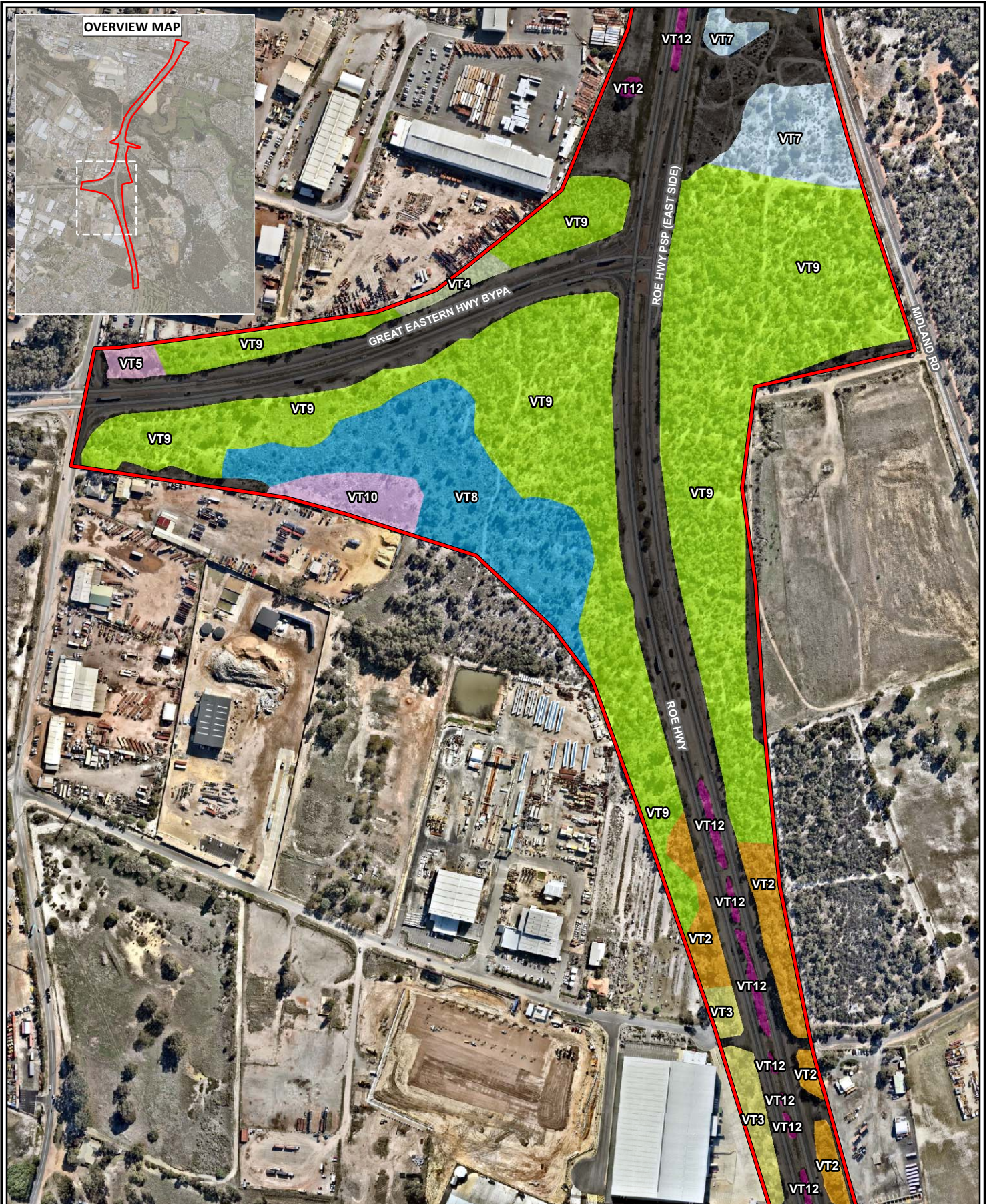
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**VEGETATION COMMUNITY TYPES**

**FIGURE 2**

**PAGE 2 of 4**

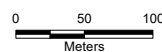




**Legend**

- Proposal area
- Roads (MRWA)
- Vegetation type**
- VT2
- VT3
- VT4
- VT5
- VT7
- VT8
- VT9
- VT10
- VT12
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**VEGETATION COMMUNITY TYPES**

**FIGURE 2**

**PAGE 3 of 4**







<b>Legend</b>		
Proposal area	Vegetation type VT1	VT12
Roads (MRWA)	VT2	VT13
	VT3	Cleared

Scale 1:5,500 at A4

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 59018

Client: Main Roads

Version: A Date: 30-Jul-2020

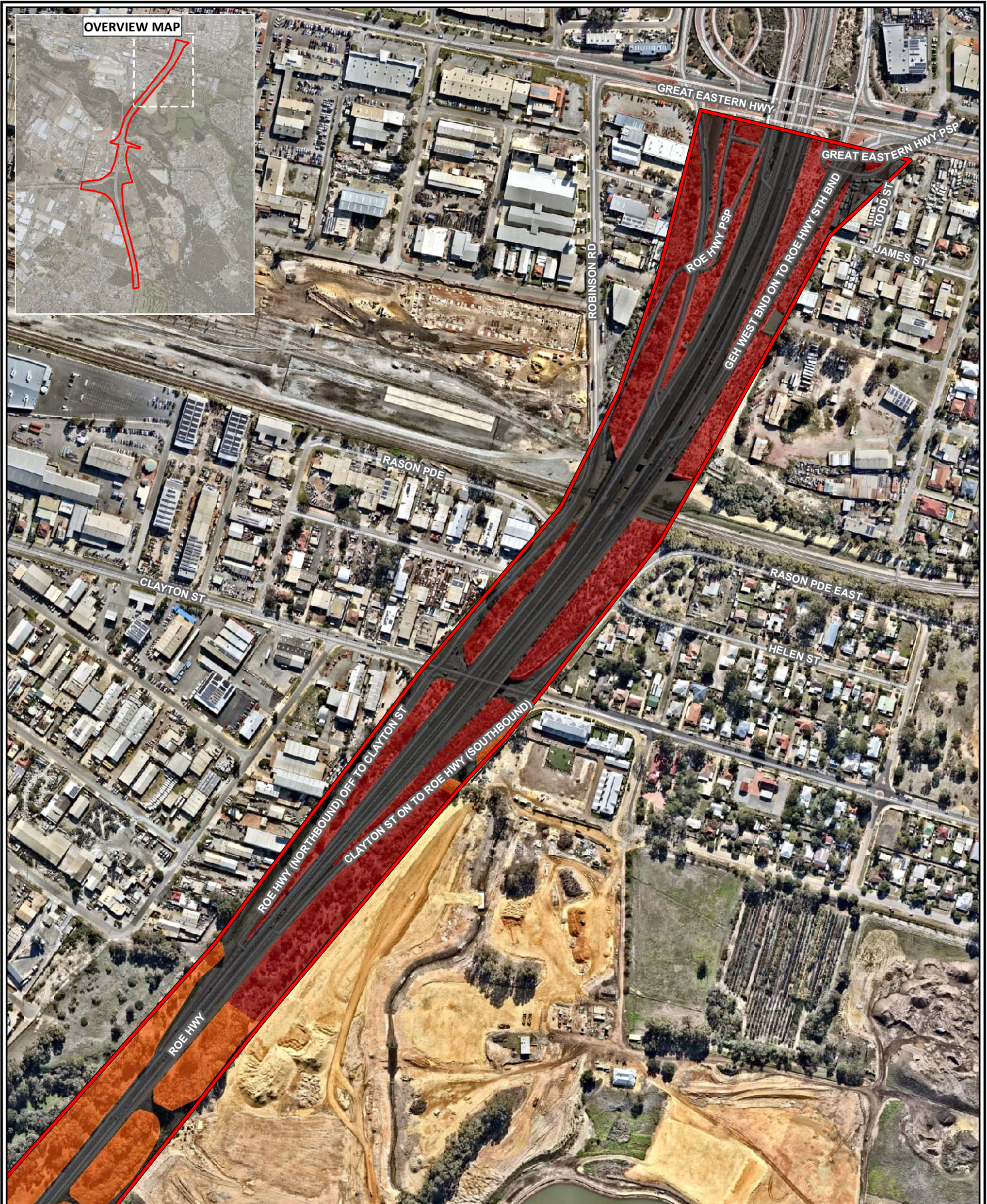
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**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**VEGETATION COMMUNITY TYPES**

**FIGURE 2 PAGE 4 of 4**

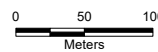




**Legend**

- Proposal area
- Roads (MRWA)
- Vegetation condition  
Degraded
- Completely degraded
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

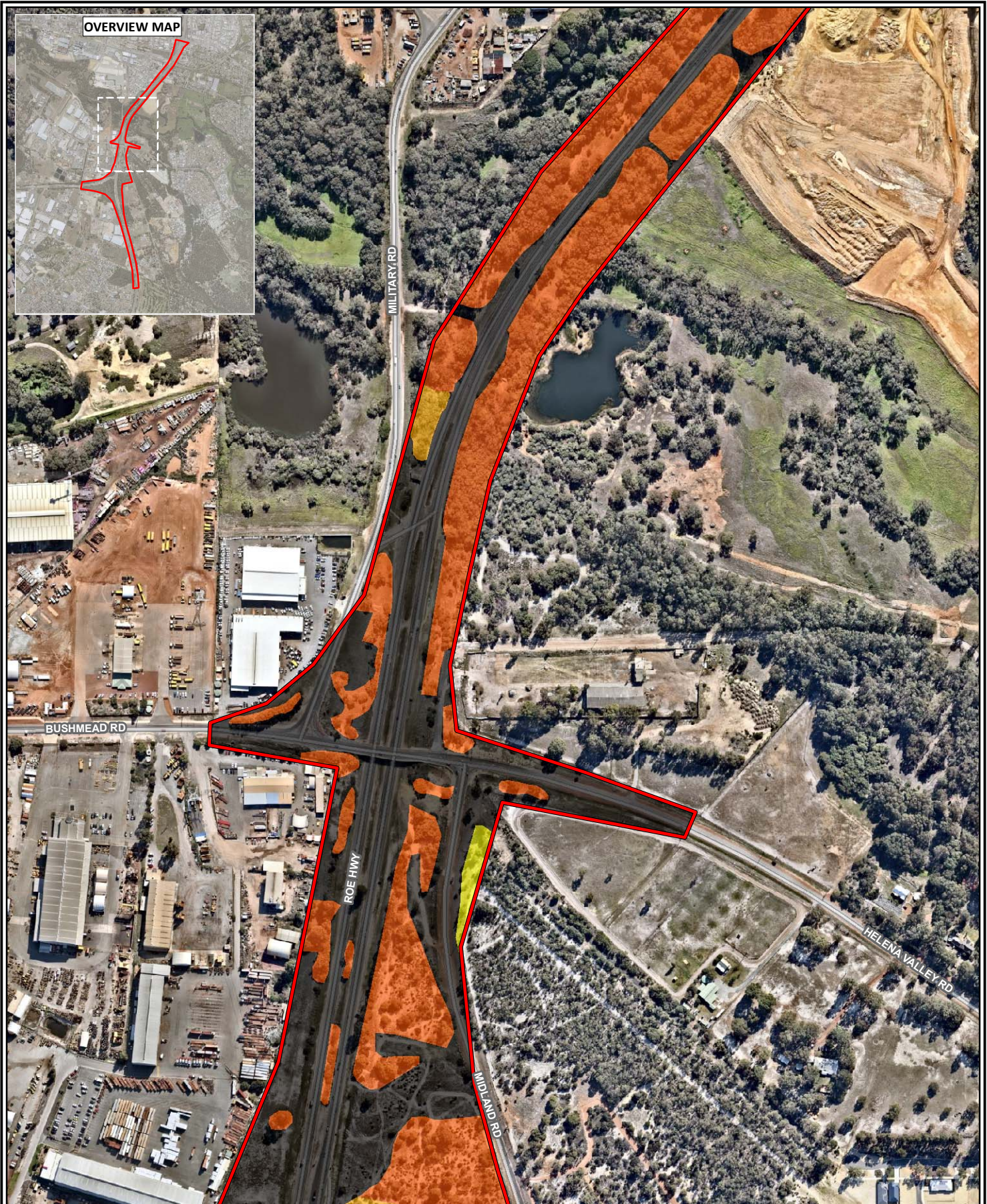
**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**VEGETATION CONDITION**

**FIGURE 3**

**PAGE 1 of 4**

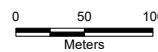




**Legend**

- Proposal area
- Roads (MRWA)
- Vegetation condition**
- Good
- Degraded - Good
- Degraded
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

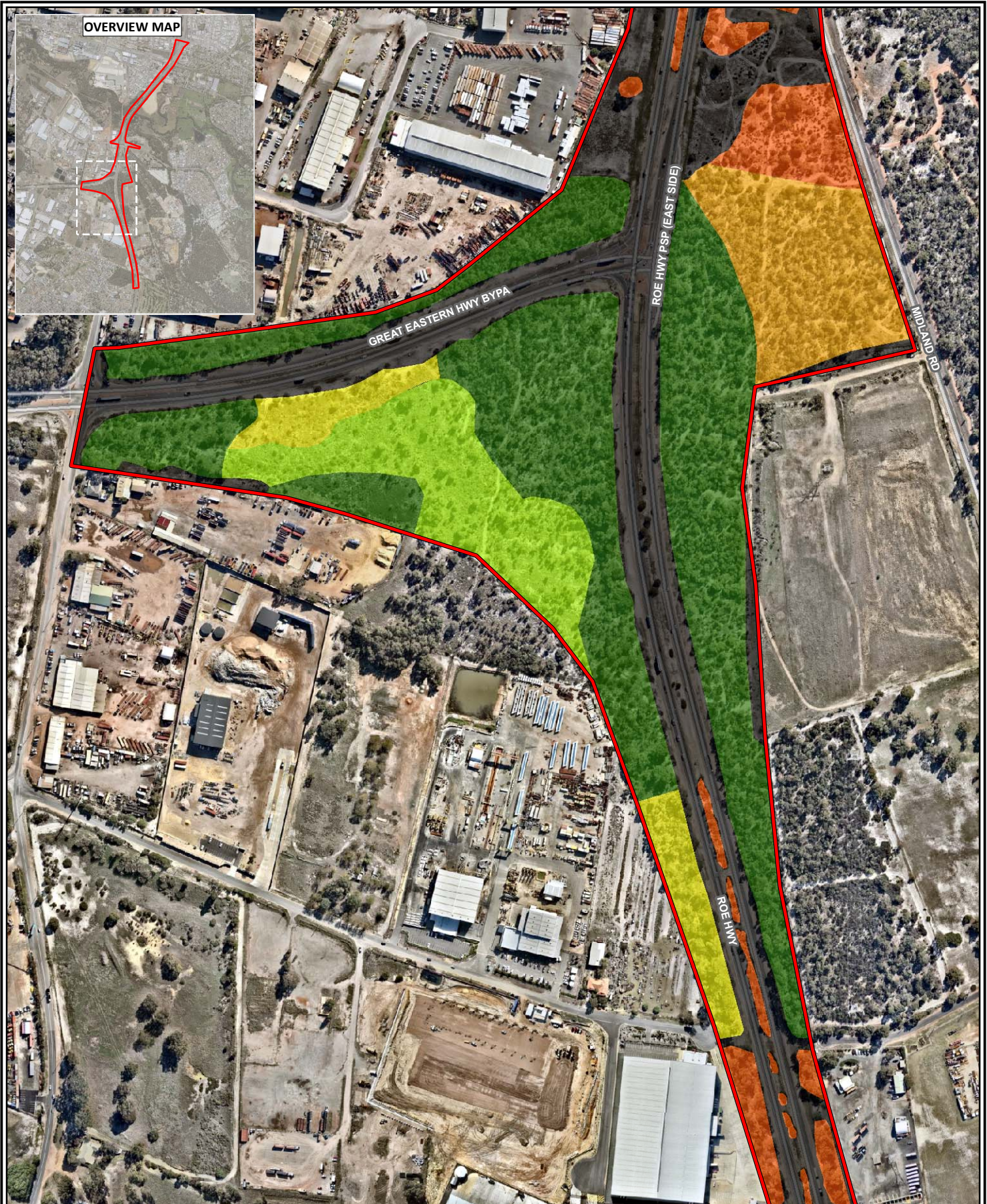
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**VEGETATION CONDITION**

**FIGURE 3**

**PAGE 2 of 4**

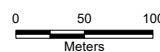




**Legend**

- Proposal area
- Roads (MRWA)
- Very good
- Good - Very good
- Good
- Degraded - Good
- Degraded
- Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

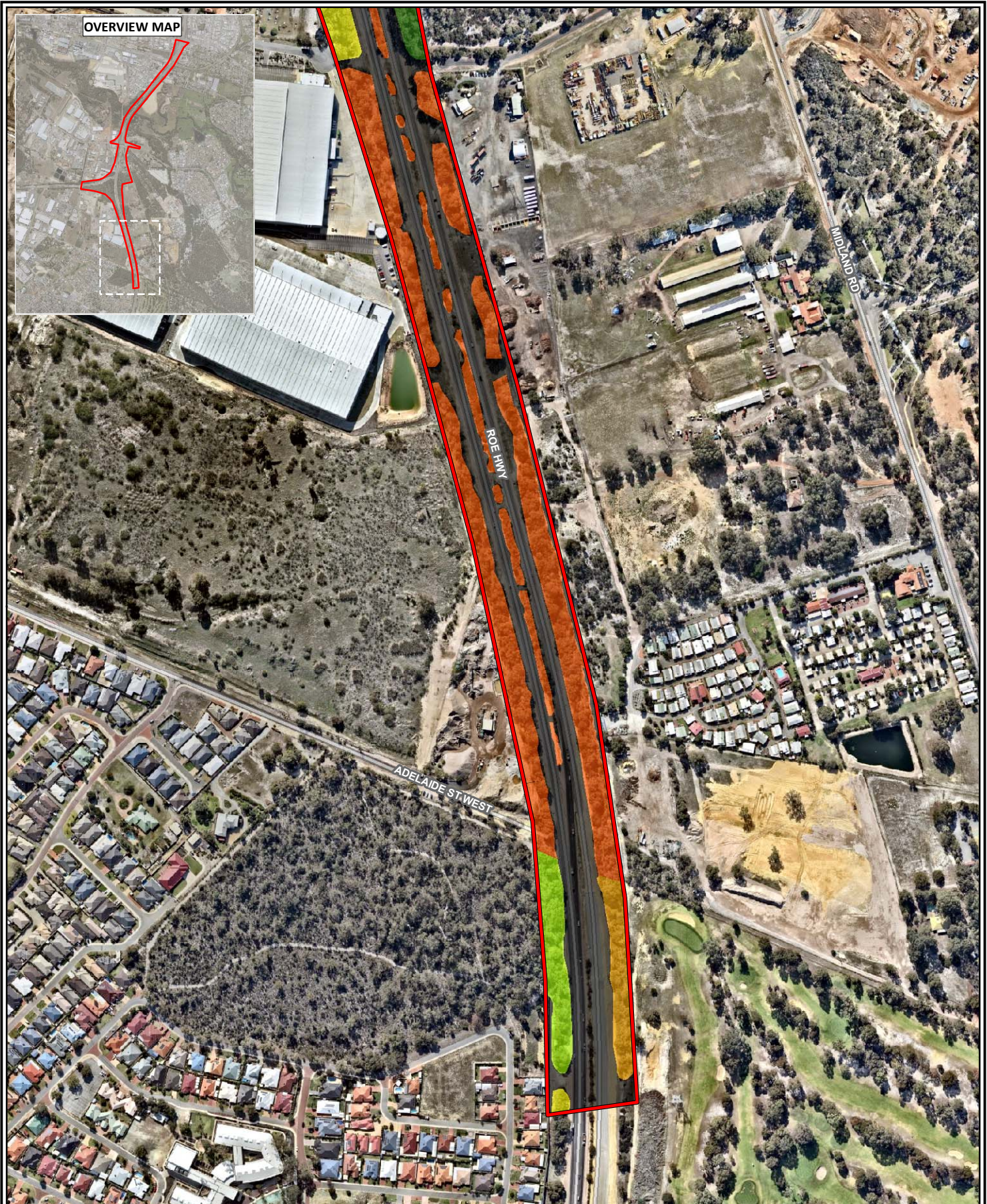
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**VEGETATION CONDITION**

**FIGURE 3**

**PAGE 3 of 4**



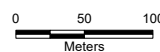


**Legend**

- Proposal area
- Roads (MRWA)

- Vegetation condition**
- Very good
  - Good - Very good
  - Good
  - Degraded - Good
  - Degraded
  - Cleared

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Drawn By: hsullivan

Date: 30-Jul-2020

Checked By: CT

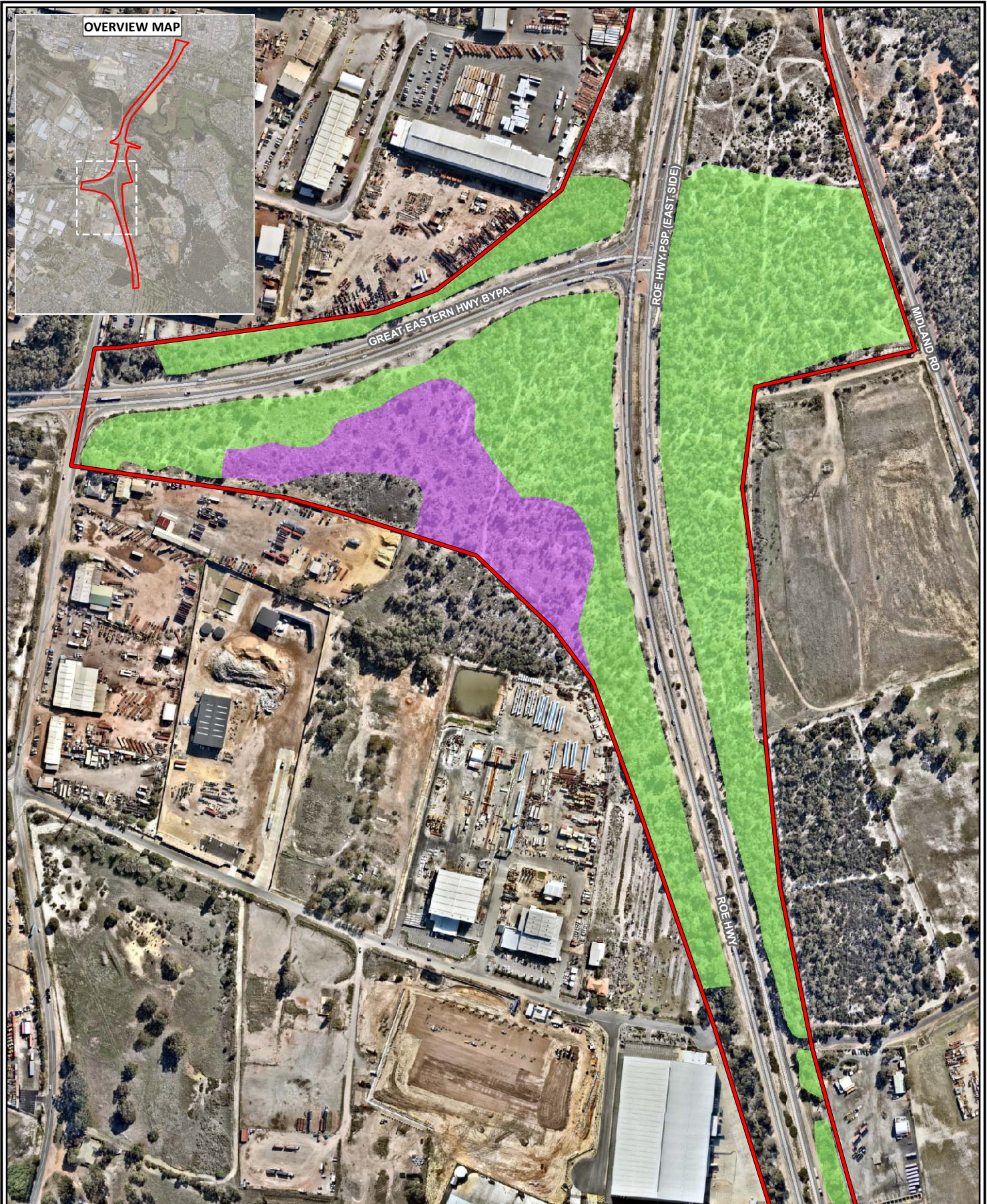
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**VEGETATION CONDITION**

**FIGURE 3**

**PAGE 4 of 4**

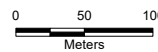




**Legend**

- Proposal area
- Roads (MRWA)
- Threatened ecological community
  - Banksia Woodlands of the Swan Coastal Plain TEC
  - Shrublands and Woodlands of the eastern side of the Swan Coastal Plain

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 30-Jul-2020

Drawn By: hsullivan

Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**THREATENED ECOLOGICAL COMMUNITIES**

**FIGURE 4**

**PAGE 1 of 2**

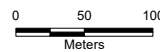




**Legend**

- Proposal area
- Roads (MRWA)
- Threatened ecological community
  - Banksia Woodlands of the Swan Coastal Plain TEC

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 30-Jul-2020

Drawn By: hsullivan

Checked By: CT

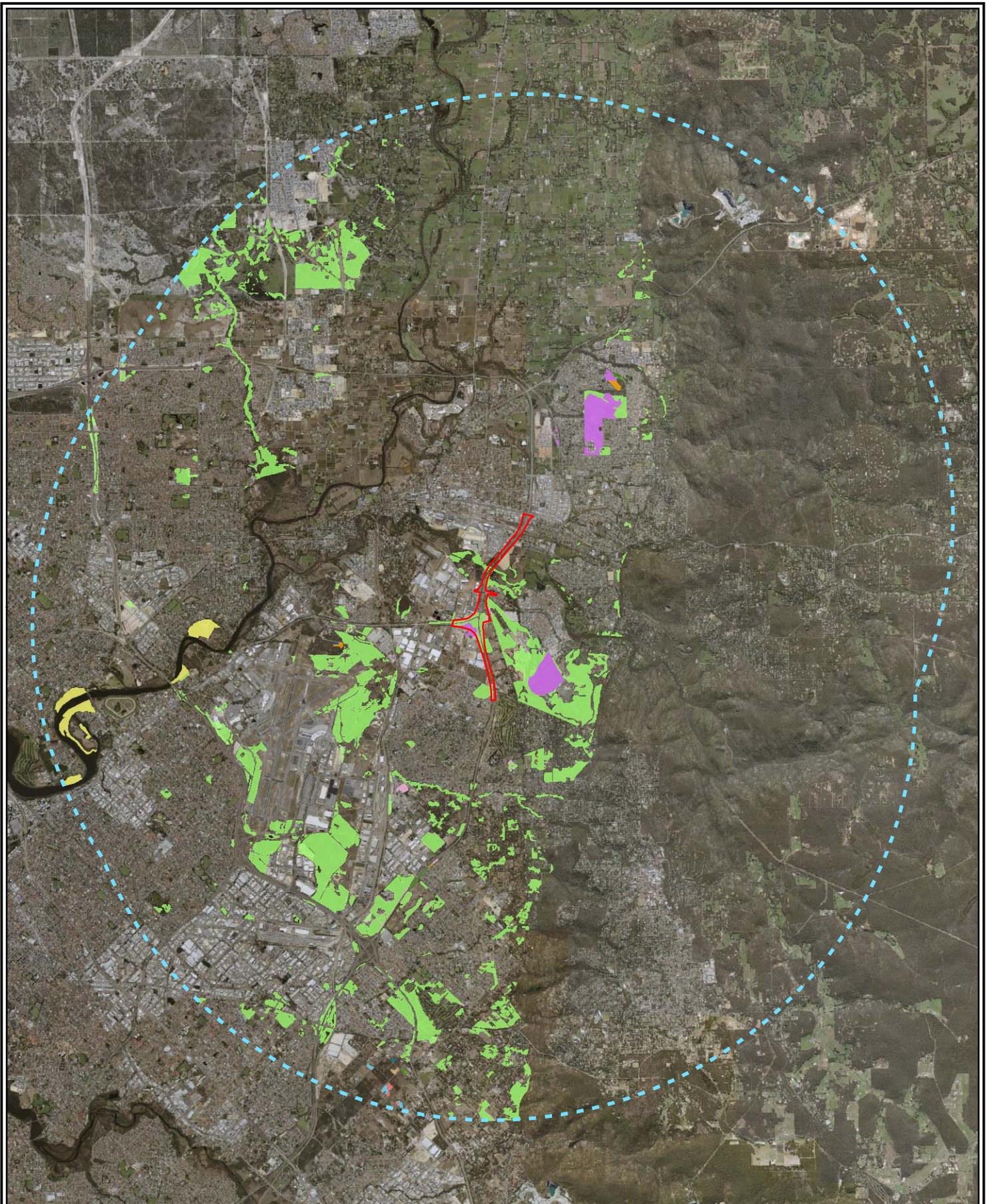
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**THREATENED ECOLOGICAL COMMUNITIES**

**FIGURE 4**

**PAGE 2 of 2**

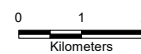




**Legend**

- Proposal area
- 10 km radius
- Threatened Ecological Communities**
- Banksia Woodlands of the Swan Coastal Plain
- Coastal Saltmarsh
- Muchea Limestone
- SCP07
- SCP08
- SCP10a
- SCP20a
- SCP20b
- SCP20c
- SCP3a

Scale 1:120,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 05-Aug-2020

Drawn By: hsullivan

Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA**

**THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES WITHIN A 10KM RADIUS**

**FIGURE 5**



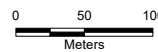




**Legend**

- Proposal area
- Roads (MRWA)
- Threatened and priority flora species
- *Conospermum undulatum*

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

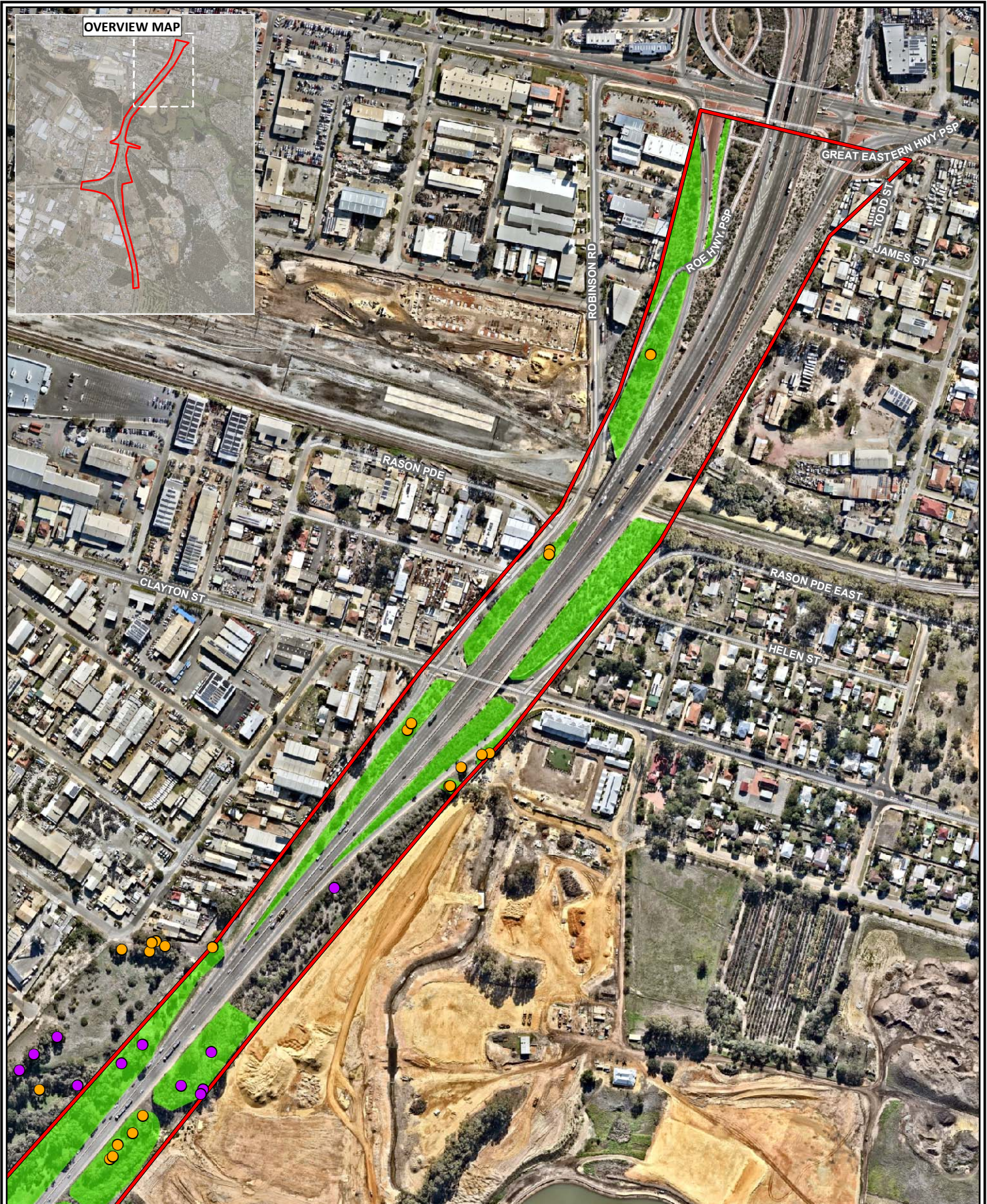
Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**THREATENED AND PRIORITY FLORA**

**FIGURE 6**





**Legend**

- Proposal area
- Potential Black Cockatoo foraging habitat
- Potential Black Cockatoo habitat trees
- *Corymbia calophylla*
- *Eucalyptus rudis*

Scale 1:5,500 at A4 0 50 100  
Meters

Coord. Sys. GDA 1994 MGA Zone 50 ↑

Job No: 59018

Client: Main Roads

Version: A Date: 04-Aug-2020

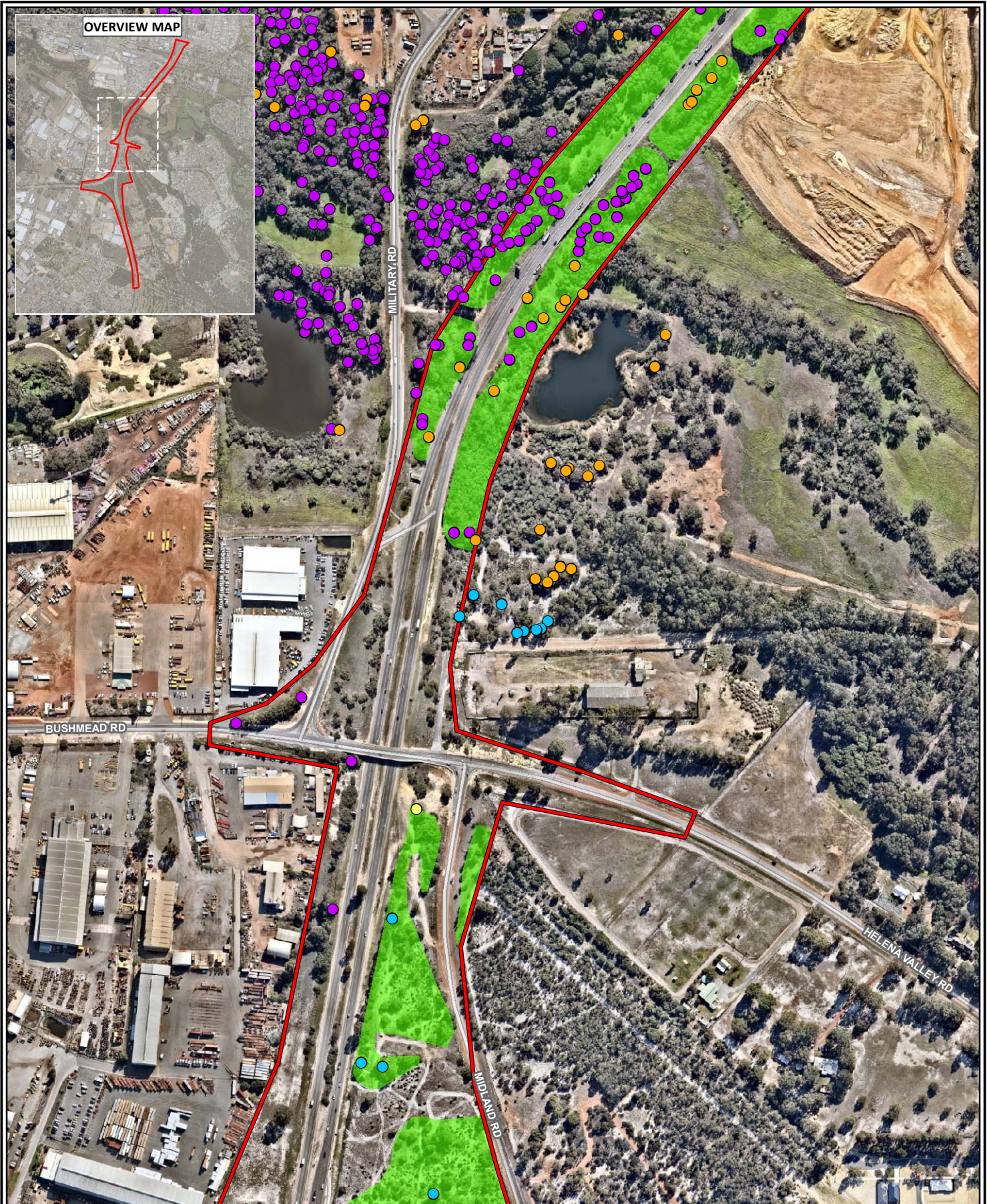
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**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**BLACK COCKATOO HABITAT**



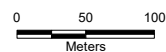
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Image Reference: www.nearmap.com © - Imagery Date: 3 May 2020.



**Legend**

- Proposal area
- Potential Black Cockatoo foraging habitat
- Potential Black Cockatoo habitat trees
  - *Corymbia calophylla*
  - *Eucalyptus gomphocephala*
  - *Eucalyptus marginata*
  - *Eucalyptus rudis*
  - Dead stag (unknown species)

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

Checked By: CT

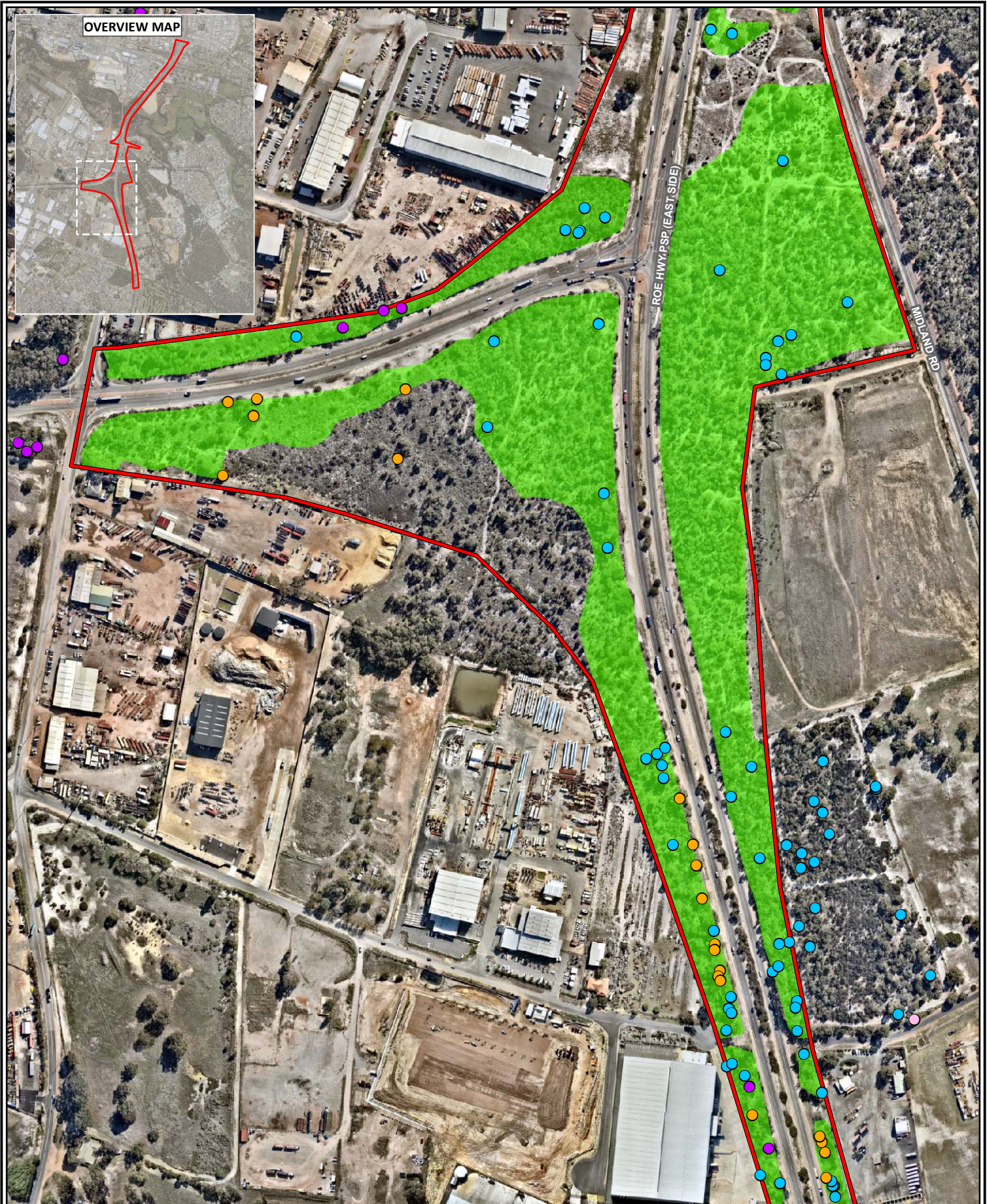
**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**BLACK COCKATOO HABITAT**

**FIGURE 7**

**PAGE 2 of 4**





**Legend**

- Proposal area
- Potential Black Cockatoo foraging habitat
- Potential Black Cockatoo habitat trees**
- *Corymbia calophylla*
- *Eucalyptus marginata*
- *Eucalyptus rudis*
- Dead stag (unknown species)

Scale 1:5,500 at A4 0 50 100  
Meters

Coord. Sys. GDA 1994 MGA Zone 50 ↑

Job No: 59018

Client: Main Roads

Version: A Date: 04-Aug-2020

Drawn By: hsullivan Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA EPBC Referral**

**BLACK COCKATOO HABITAT**

**FIGURE 7** **PAGE 3 of 4**

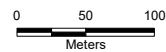




**Legend**

- Proposal area
- Potential Black Cockatoo foraging habitat
- Potential Black Cockatoo habitat trees
  - *Corymbia calophylla*
  - *Eucalyptus marginata*
  - *Eucalyptus rudis*
  - Dead stag (unknown species)

Scale 1:5,500 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

Checked By: CT

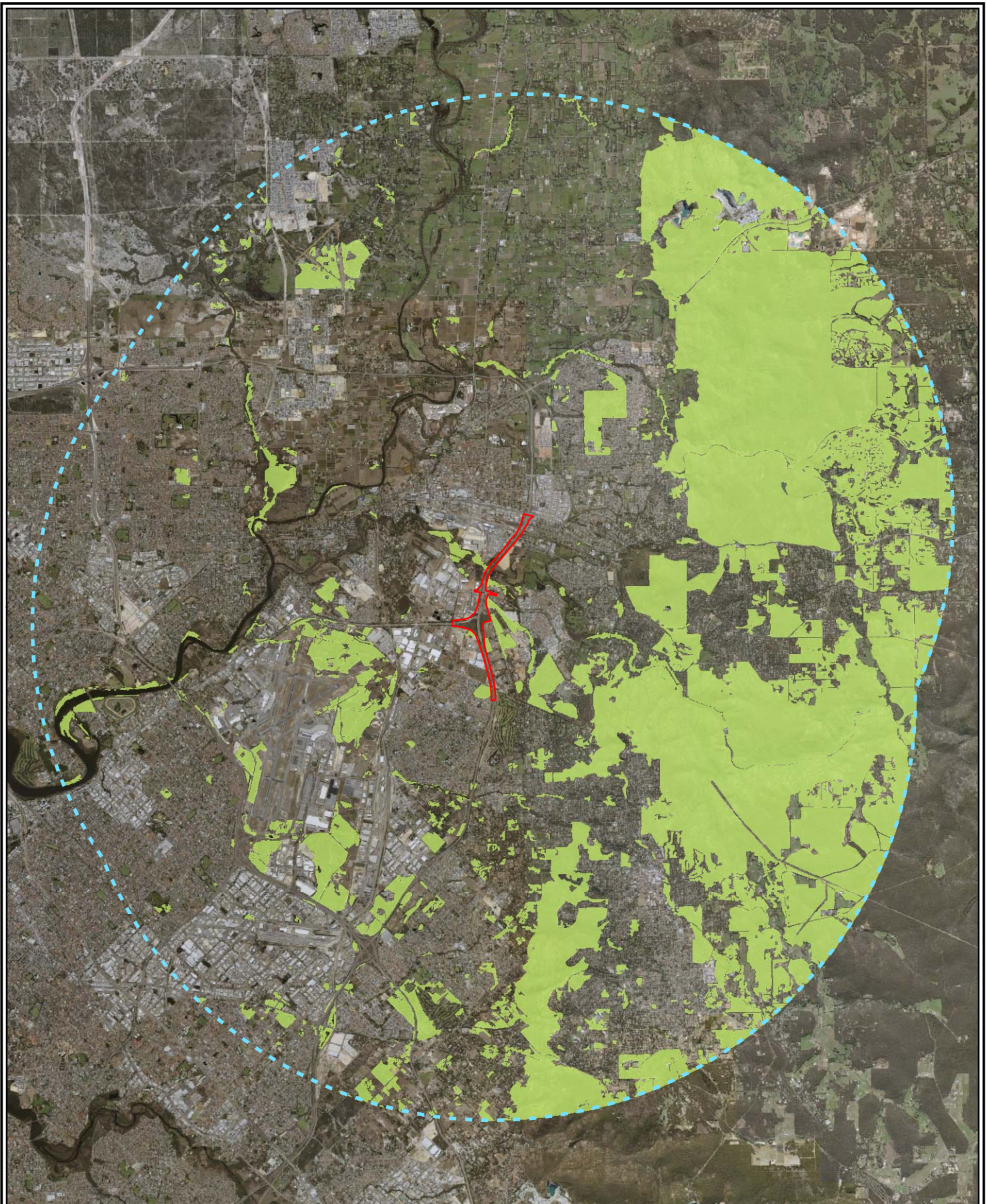
**Roe Highway and Great Eastern Highway Bypass, WA  
EPBC Referral**

**BLACK COCKATOO HABITAT**

**FIGURE 7**

**PAGE 4 of 4**

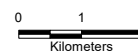




**Legend**

- Proposal area
- 10 km radius
- Potential Black Cockatoo foraging habitat within 10 km radius

Scale 1:120,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 30-Jul-2020

Drawn By: hsullivan

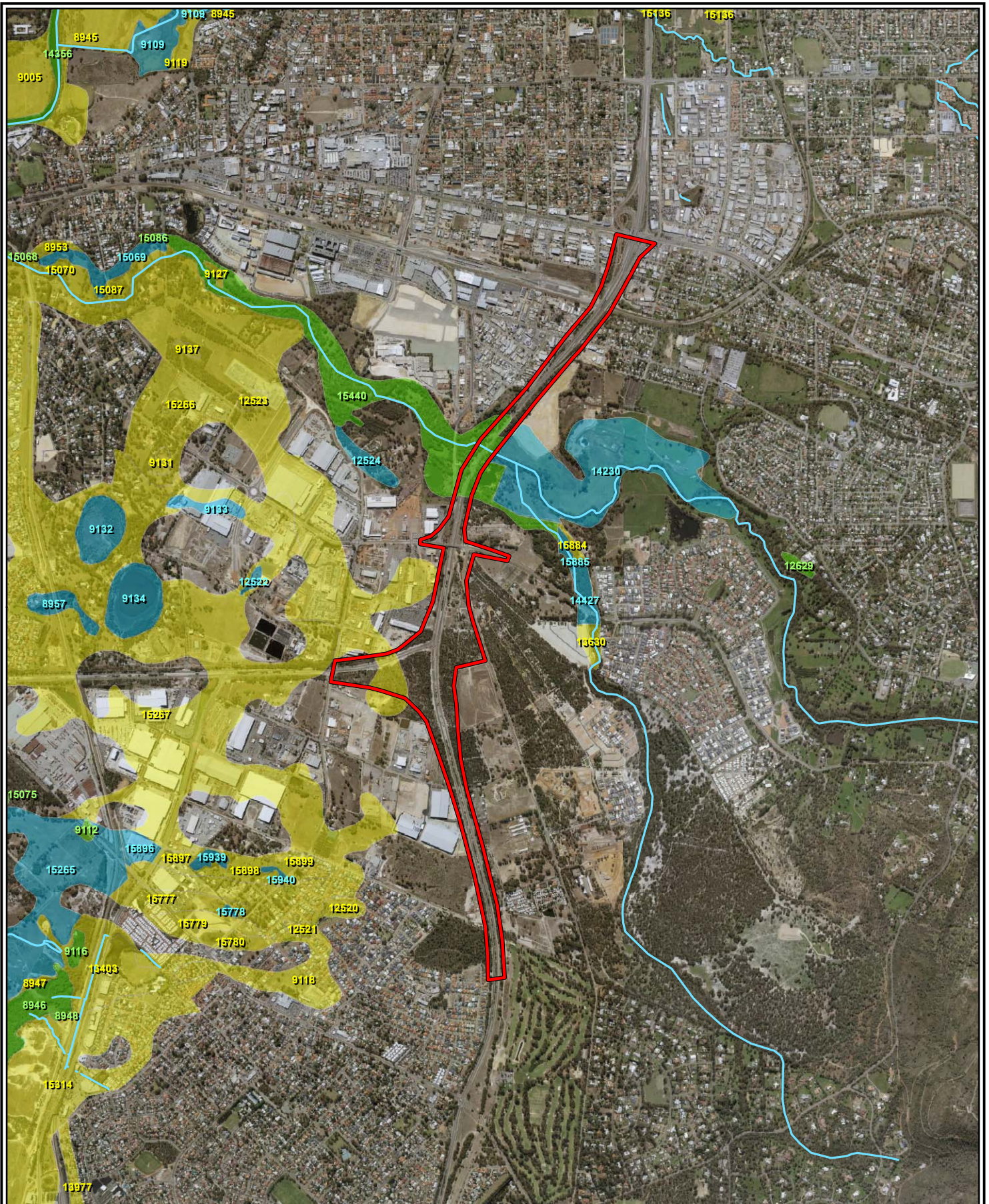
Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA**

**BLACK COCKATOO REGIONAL CONTEXT**

**FIGURE 8**

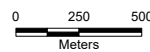




**Legend**

- Proposal area
- Watercourses
- Geomorphic Wetlands (DBCAs)
  - Conservation
  - Resource Enhancement
  - Multiple Use

Scale 1:30,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

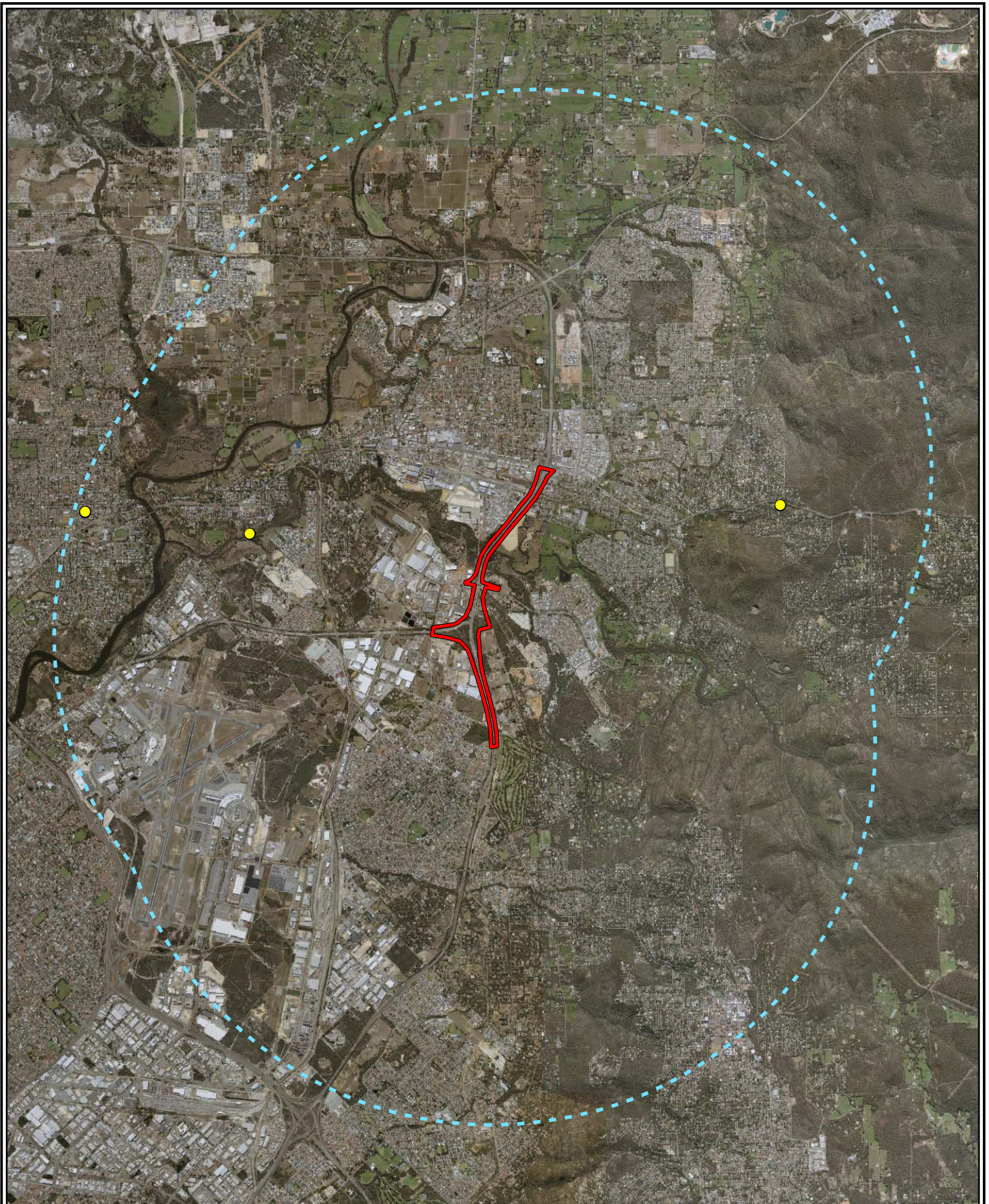
Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA**

**WATERCOURSES AND WETLANDS**

**FIGURE 9**

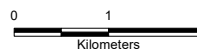




**Legend**

- Proposal area
- 6 km radius
- Carter's Freshwater Mussel observation

Scale 1:80,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 30-Jul-2020

Drawn By: hsullivan

Checked By: CT

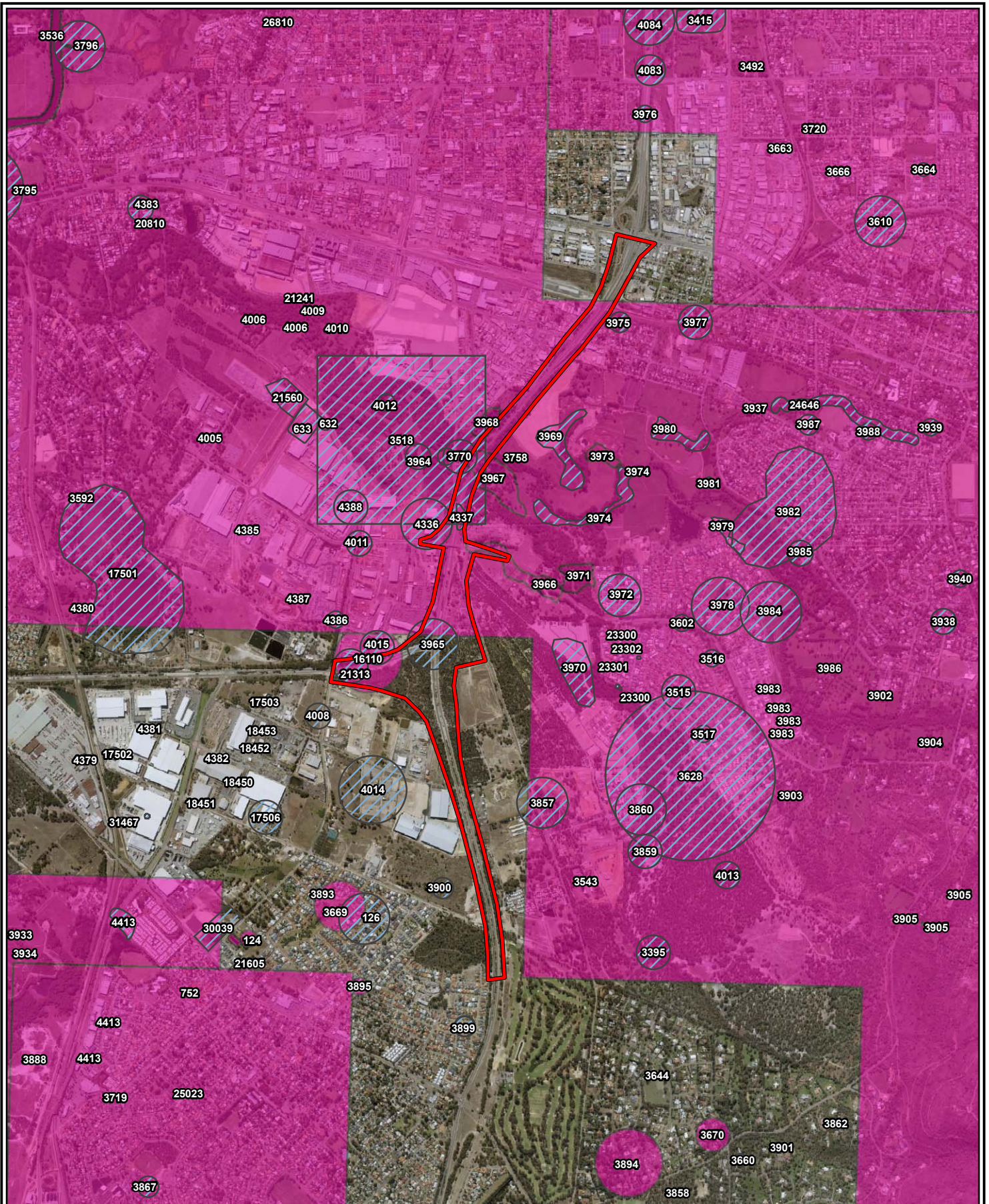
**Roe Highway and Great Eastern Highway Bypass, WA**

**CARTER'S FRESHWATER MUSSEL DISTRIBUTION**

**FIGURE 10**

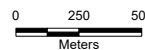






- Legend**
- Proposal area
  - Aboriginal Heritage Places (DAA-001)
    - Registered Site
    - Other Heritage Place

Scale 1:30,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

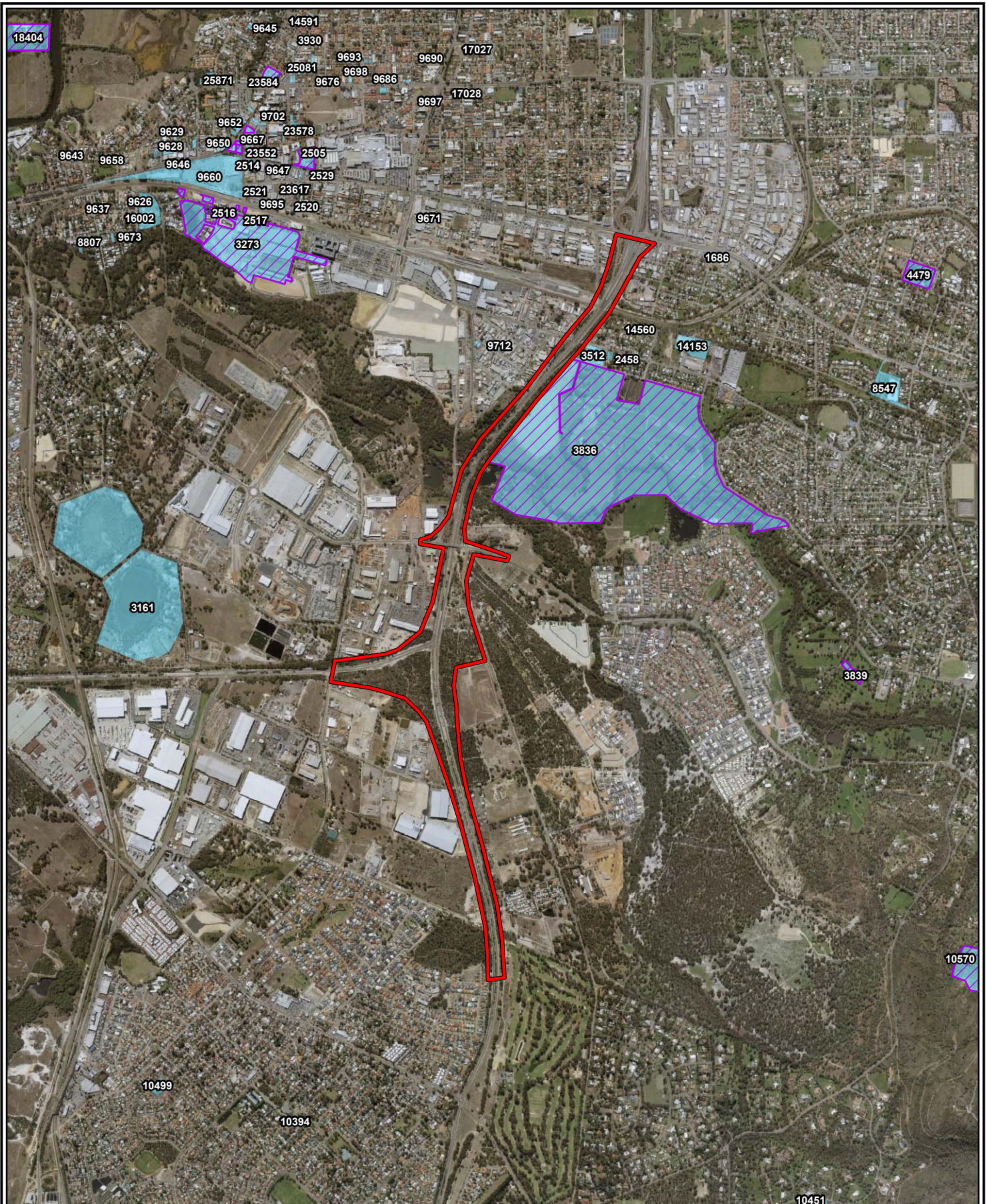
Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA**

**ABORIGINAL HERITAGE**

**FIGURE 11**

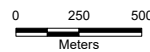




**Legend**

- Proposal area
- Municipal inventory
- Heritage Council WA Stage Register

Scale 1:30,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59018

Client: Main Roads

Version: A

Date: 04-Aug-2020

Drawn By: hsullivan

Checked By: CT

**Roe Highway and Great Eastern Highway Bypass, WA**

EUROPEAN HERITAGE

**FIGURE 12**

