5. FLORA AND FAUNA IN THE OMR / E6 ROW BOUNDARY

This section describes the flora and fauna of the OMR / E6 ROW Boundary based on the review of existing information. Native vegetation is considered first, followed by information on the occurrence and likelihood of occurrence of threatened flora and fauna.

5.1. Native Vegetation

Information on the extent of native vegetation within the OMR / E6 ROW Boundary is presented in regards only to remnant patch vegetation as this data is available from multiple sources, and comprehensively covers the whole of the OMR / E6 ROW Boundary. Scattered tree data has not been considered at this early stage of the project as this data is only available from GAA field survey data, and does not provide comprehensive coverage of the study area. Furthermore, net gain assessments provided in Section 6 only consider impacts to remnant patch vegetation.

A total of 765.82 hectares of native vegetation was found to occur within the OMR ROW Boundary (Table 7). Native vegetation represents 26% of the OMR ROW Boundary and includes vegetation from 12 different Ecological Vegetation Classes (EVCs) across 2488 habitat zones (Figures 3 – 8).

Table 7: Native Vegetation within the OMR ROW Boundary

OMR				
EVC No.	Ecological Vegetation Class	No. of Habitat Zones within OMR ROW	Area of EVC within OMR ROW (ha)	Average Habitat Score (out of 100)
55	Plains Grassy Woodland	653	83.25	31
56	Floodplain Riparian Woodland	3	1.23	47
68	Creekline Grassy Woodland	20	3.22	35
104	Lignum Swamp	24	9.43	36
125	Plains Grassy Wetland	67	8.41	39
126	Swampy Riparian Complex	7	0.19	41
132	Plains Grassland	1618	645.83	40
175	Grassy Woodland	44	7.99	31
641	Riparian Woodland	1	0.05	28
649	Stony Knoll Shrubland	1	0.24	57
851	Stream Bank Shrubland	45	5.29	33
895	Escarpment Shrubland	5	0.68	29
Totals		2488	765.82	N/A

A total of 128.65 hectares of native vegetation was found to occur within the E6 ROW Boundary (Table 8). Native vegetation represents 25% of the E6 ROW Boundary and includes vegetation from eight (8) different Ecological Vegetation Classes (EVCs) across 1682 habitat zones (Figures 8 - 10).

Table 8: Native Vegetation within the E6 ROW Boundary

E6				
EVC No.	Ecological Vegetation Class	No. of Habitat Zones within E6 ROW	Area of EVC within E6 ROW (ha)	Average Habitat Score (out of 100)
17	Riparian Scrub/Swampy Riparian Woodland Complex	34	3.07	33
47	Valley Grassy Forest	14	4.09	39
55	Plains Grassy Woodland	1411	100.80	27
68	Creekline Grassy Woodland	30	1.36	26
124	Grey Clay Drainage-line Aggregate	51	4.40	32
125	Plains Grassy Wetland	50	2.74	24
132	Plains Grassland	72	10.28	37
175	Grassy Woodland	20	1.91	27
Totals		1682	128.65	N/A

5.1.1. Ecological Vegetation Classes

Pre–European EVC mapping (DSE 2008a) indicates that the study area and surrounds would have mostly supported Plains Grassland (EVC 132) and Plains Grassy Woodland (EVC 55) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

On ground evidence and DSE EVC mapping (DSE 2008a) suggested that Plains Grassland was the dominant vegetation type within the OMR ROW Boundary, primarily occurring in the southern section from the Princes Freeway west of Werribee to the Calder Freeway.

Department of Sustainability and Environment EVC mapping (DSE 2008a) showed Plains Grassy Woodland to be the dominant vegetation type in the E6 ROW Boundary, with patchy occurrences from the intersection of Donnybrook Road and Epping Road to Findon Road.

Comparatively small areas of additional EVCs occur throughout the OMR / E6 ROW Boundary including woodland, wetland and shrubland vegetation. Descriptions of the dominant EVCs recorded are provided below.

Plains Grassland

Plains Grassland has an endangered conservation status in the Victorian Volcanic Plain and Otway Plain bioregions. Plains Grassland is further split into three EVCs which are used to classify differences in this vegetation type based on rainfall and soil type. Information from DSE vegetation mapping does not provide the specific Plains Grassland EVC and is therefore defined only as Plains Grassland (EVC 132).

However, field investigations carried out by the GAA identified the vegetation to the following specific EVCs: Heavier-soils Plains Grassland (EVC 132_61) and Low-

rainfall Plains Grassland (EVC 132_63). The benchmark description for these EVCs are provided below.

Heavier-soils Plains Grassland (EVC 132_61)

Treeless vegetation mostly less than 1 m tall dominated by largely graminoid and herb life forms. Occupies fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least 500 mm annual rainfall.

Low-rainfall Plains Grassland (EVC 132_63)

Treeless vegetation mostly < 1 m tall dominated by largely graminoid and herb life forms. Occupies cracking basalt soils prone to seasonal waterlogging in areas receiving < 500 mm annual rainfall.

Plains Grassy Woodland

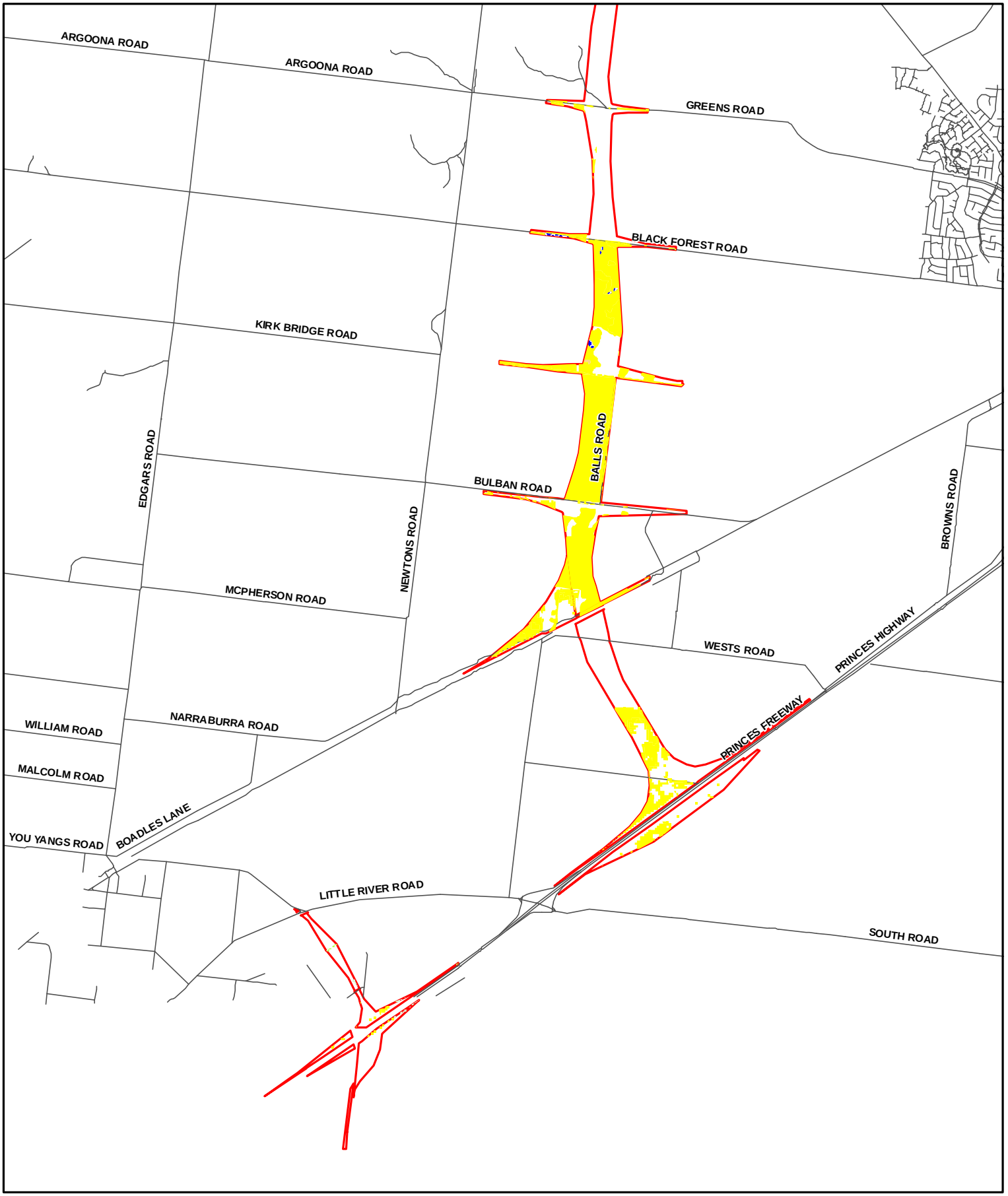
Plains Grassy Woodland has an endangered conservation status in the Central Victorian Uplands, Victorian Volcanic Plain and Otway Plain bioregions. The benchmark description for this EVC is provided below.

Plains Grassy Woodland (EVC 55)

An open eucalypt woodland to 15 m tall. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. This variant occupies areas receiving approximately 500 – 700 mm annual rainfall.

5.1.2. Degraded treeless vegetation

Results from the field investigations indicate a substantial amount of degraded treeless vegetation (DTV) occurs within the OMR ROW Boundary. It is thought that this could also apply to the un-surveyed areas in the OMR / E6 ROW Boundary in that a large proportion of the native vegetation presented in the DSE data may potentially be DTV. Future surveying is required to ground truth the DSE vegetation mapping throughout the entire alignment.



Legend

EVCs

- EVC 125: Plains Grassy Wetland
- EVC 132: Plains Grassland
- EVC 55: Plains Grassy Woodland
- EVC 649: Stony Knoll Shrubland
- EVC 68: Creekline Grassy Woodland

- Right of Way Boundary
- Road Network

Metres
0 1,000 2,000 4,000

Figure 3 : Native Vegetation, Princes Fwy to Greens Rd.

OMR/E6 Transport Corridor - Flora & Fauna Desktop Assessment

Client: VicRoads

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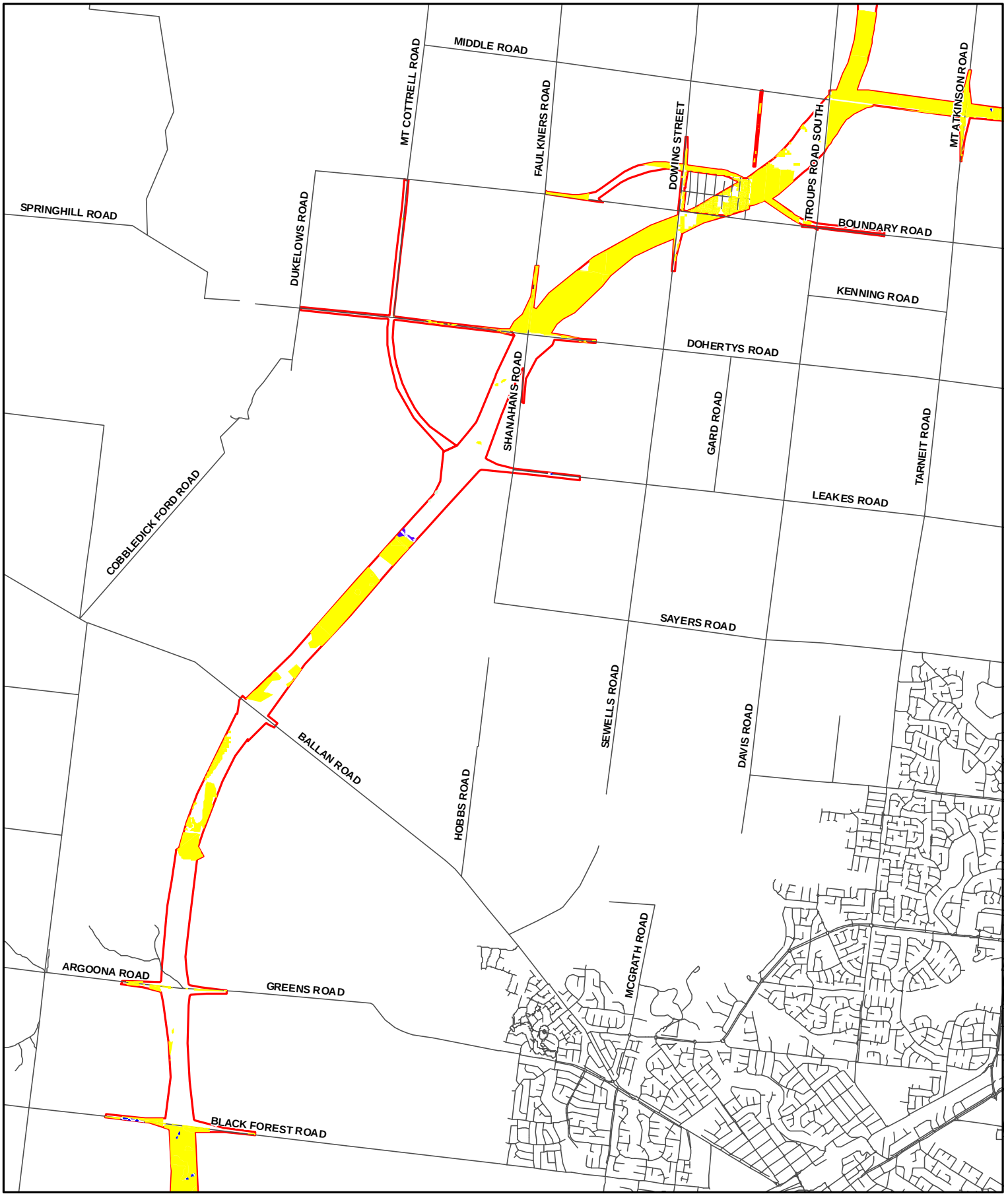

Legend

EVC

- EVC 55: Plains Grassy Woodland
- EVC 56: Floodplain Riparian Woodland
- EVC 125: Plains Grassy Wetland
- EVC 132: Plains Grassland

- Road Network
- *Right of Way Boundary*

Metres

0 1,000 2,000 4,000

Figure 4 : Native Vegetation, Greens Rd to Boundary Rd

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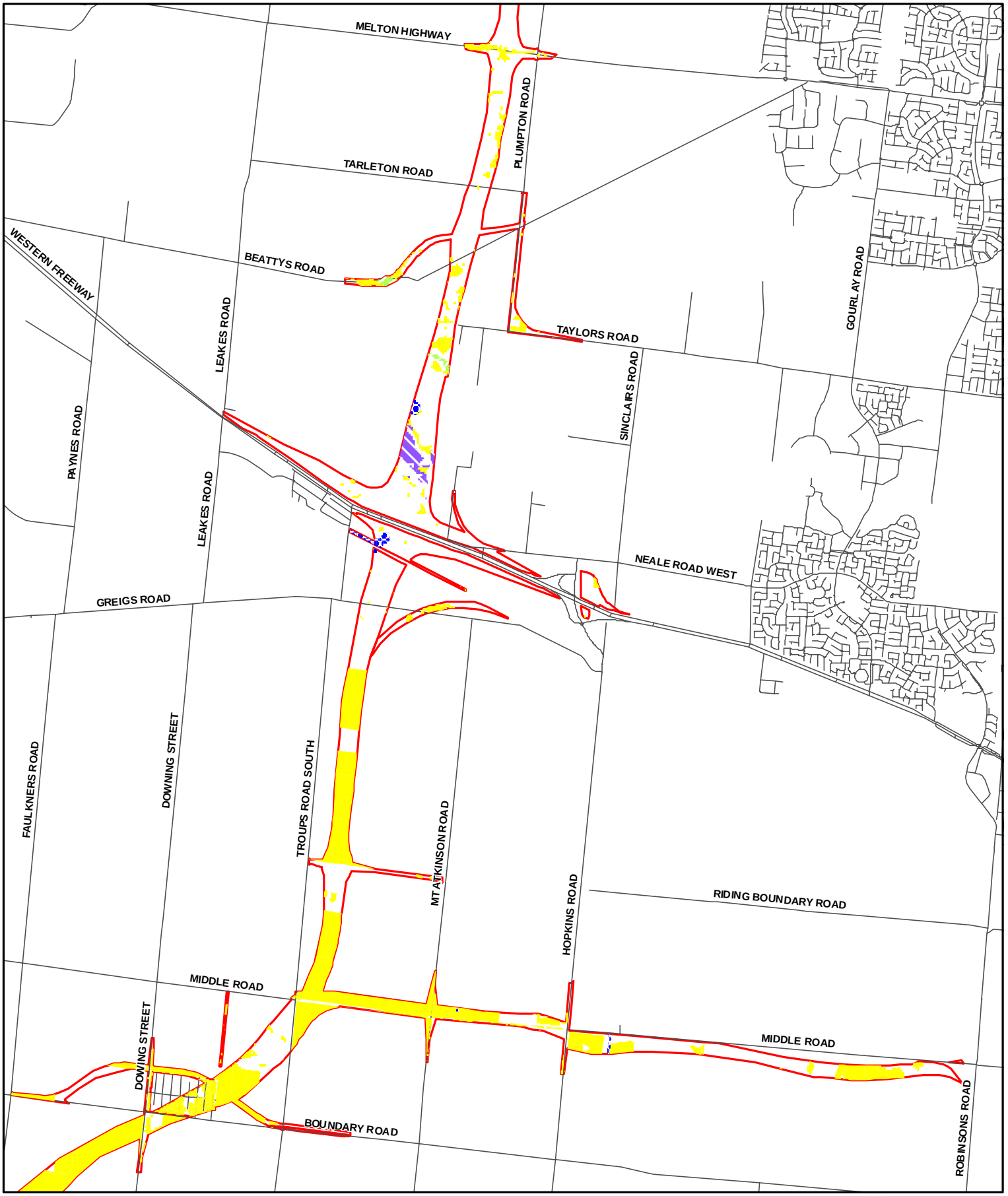

Legend

EVC

- EVC 68: Creekline Grassy Woodland
- EVC 104: Lignum Wetland
- EVC 125: Plains Grassy Wetland
- EVC 132: Plains Grassland

- Road Network
- *Right of Way Boundary*

Metres

0 1,000 2,000 4,000

Figure 5 : Native Vegetation, Boundary Rd to Melton Hwy.

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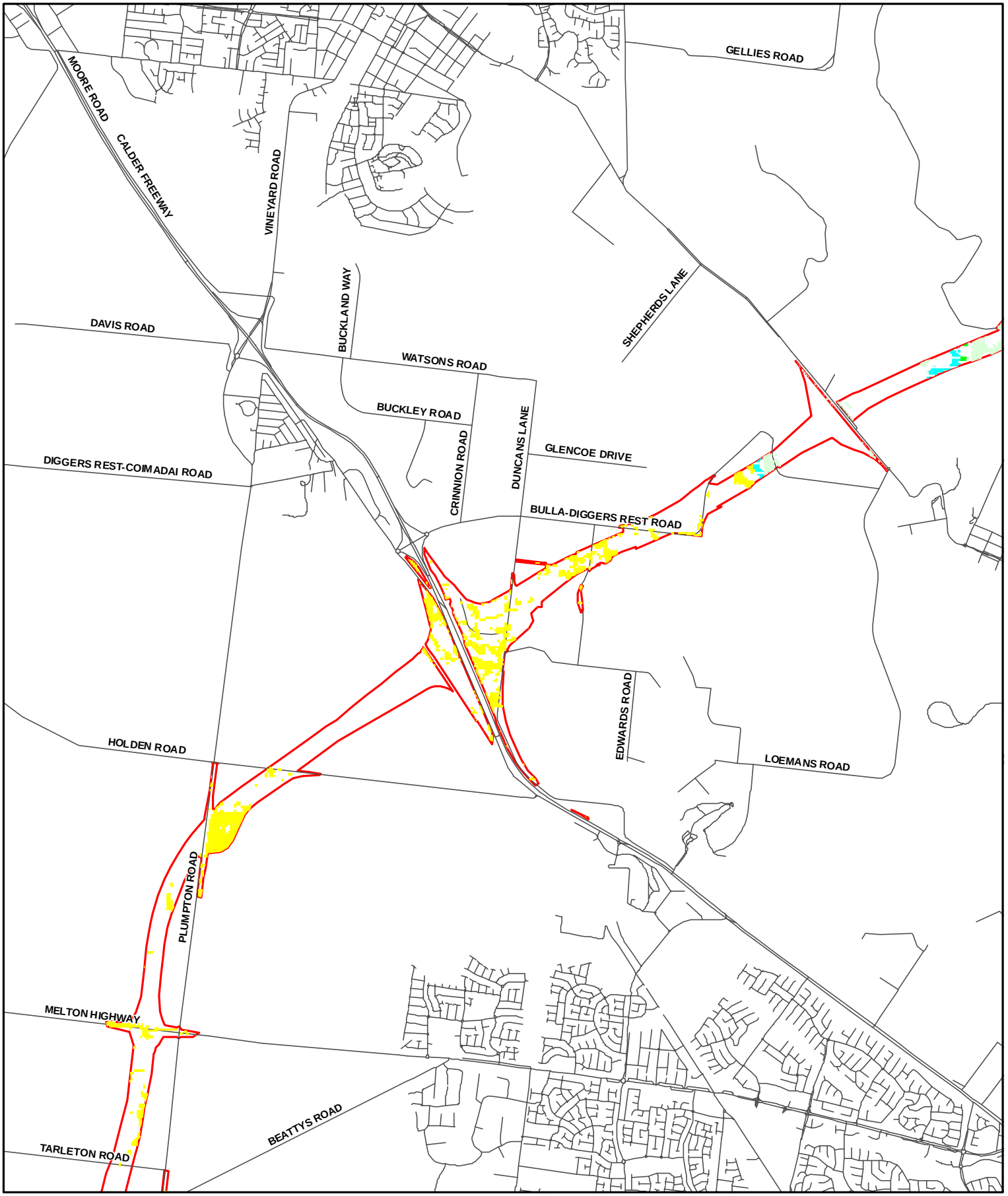

Legend

EVC

- EVC 55: Plains Grassy Woodland
- EVC 132: Plains Grassland
- EVC 641: Riparian Woodland
- EVC 851: Stream-Bank Shrubland
- EVC 895: Scarpament Shrubland

- Road Network
- *Right of Way Boundary*

Metres

0 1,000 2,000 4,000

Figure 6 : Native Vegetation, Melton Hwy to Sunbury Rd.

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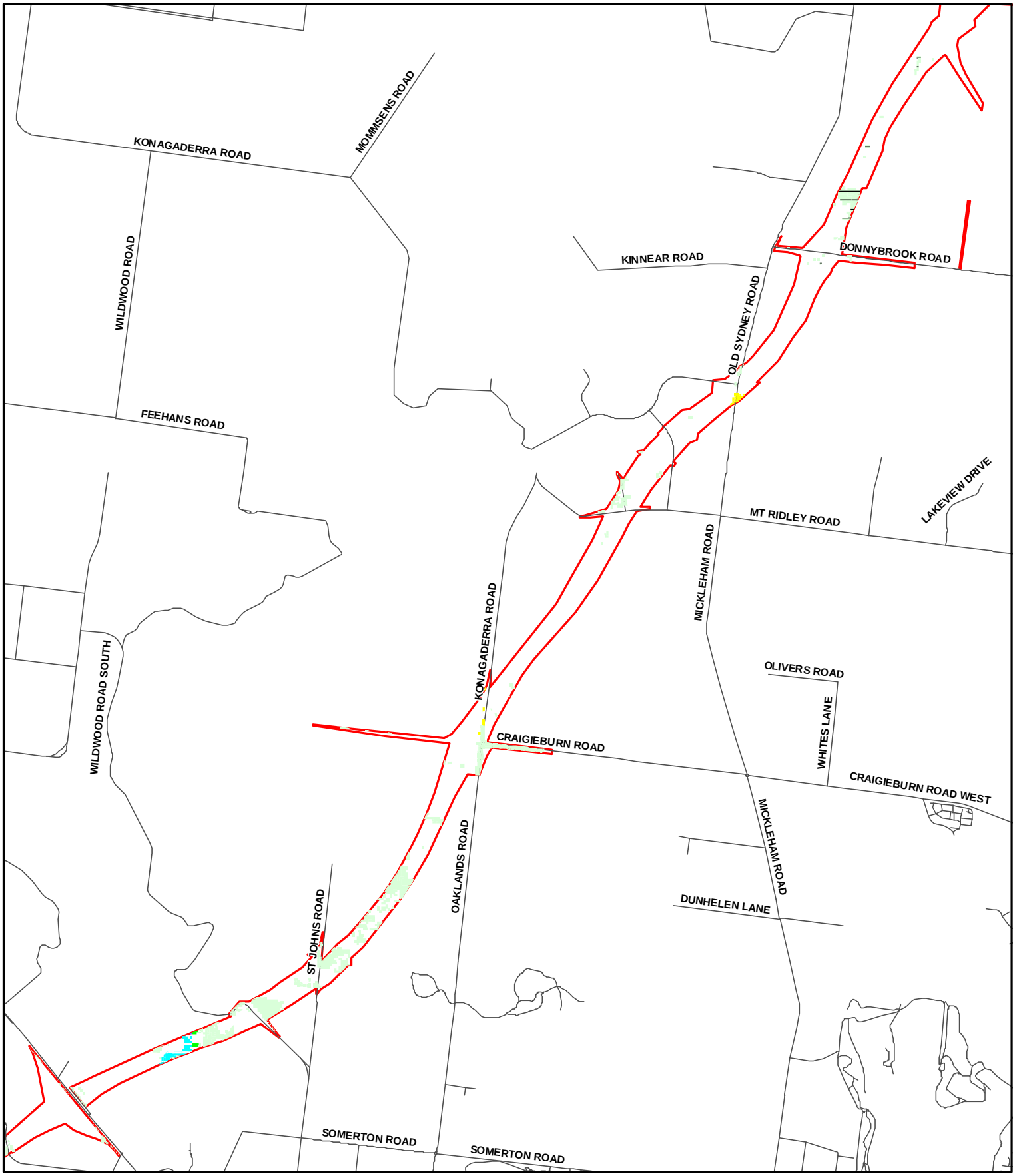

Legend

EVC

- EVC 55: Plains Grassy Woodland
- EVC 132: Plains Grassland
- EVC 175: Grassy Woodland
- EVC 641: Riparian Woodland
- EVC 851: Stream-Bank Shrubland
- EVC 895: Scarpament Shrubland

- Road Network
- *Right of Way Boundary*

Metres
0 1,000 2,000 4,000

Figure 7 : Native Vegetation, SunburyRd to DonnybrookRd.

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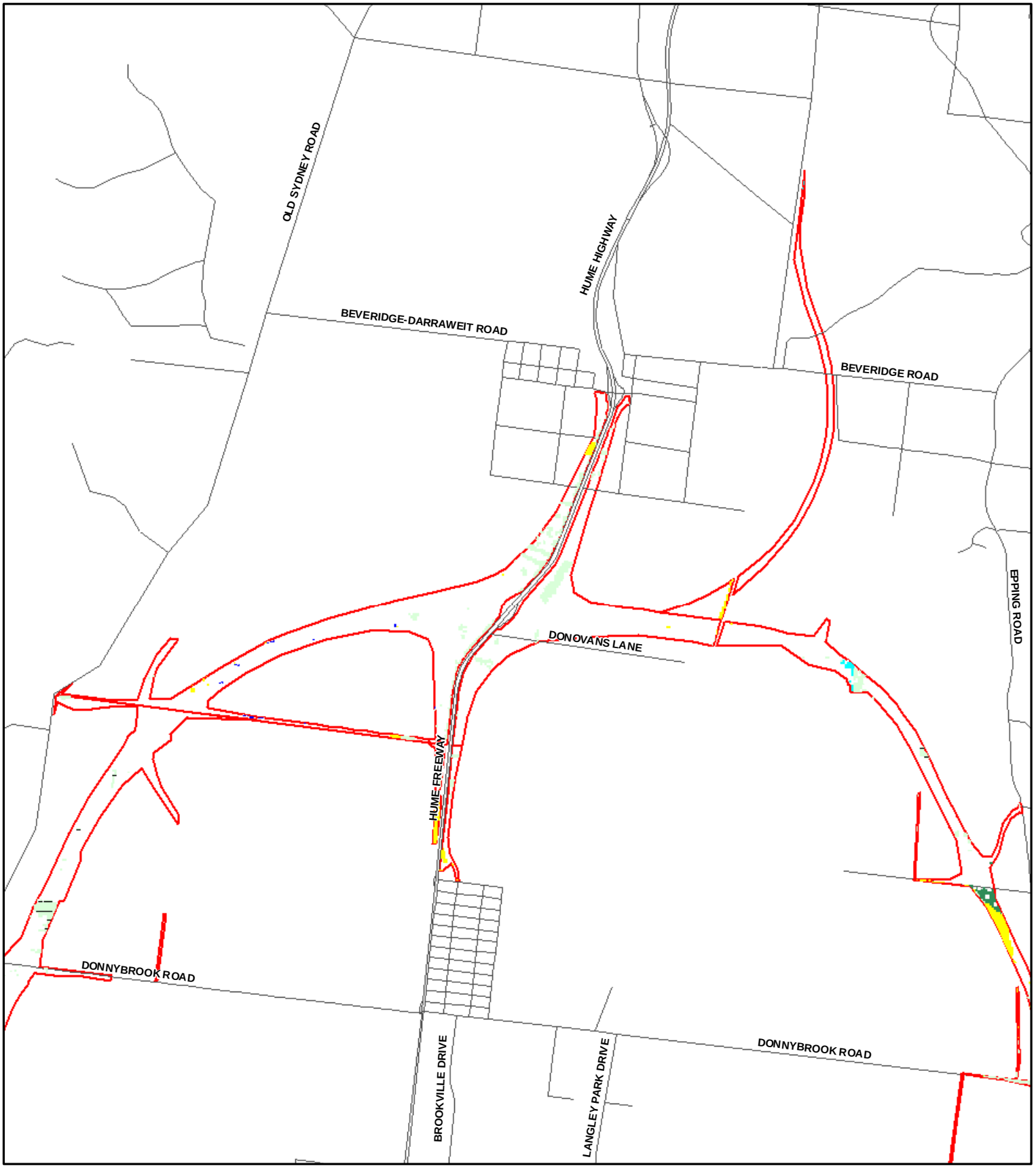

Legend

EVC

- EVC 17: Riparian Scrub
- EVC 47: Riparian Grassy Forest
- EVC 68: Creekline Grassy Woodland
- EVC 55: Plains Grassy Woodland
- EVC 125: Plains Grassy Wetland
- EVC 126: Swampy Riparian Complex
- EVC 132: Plains Grassland
- EVC 175: Grassy Woodland

- Road Network
- *Right of Way Boundary*

0 1,000 2,000 4,000 Metres

Figure 8 : Native Vegetation, Donnybrook Rd to Epping Rd.

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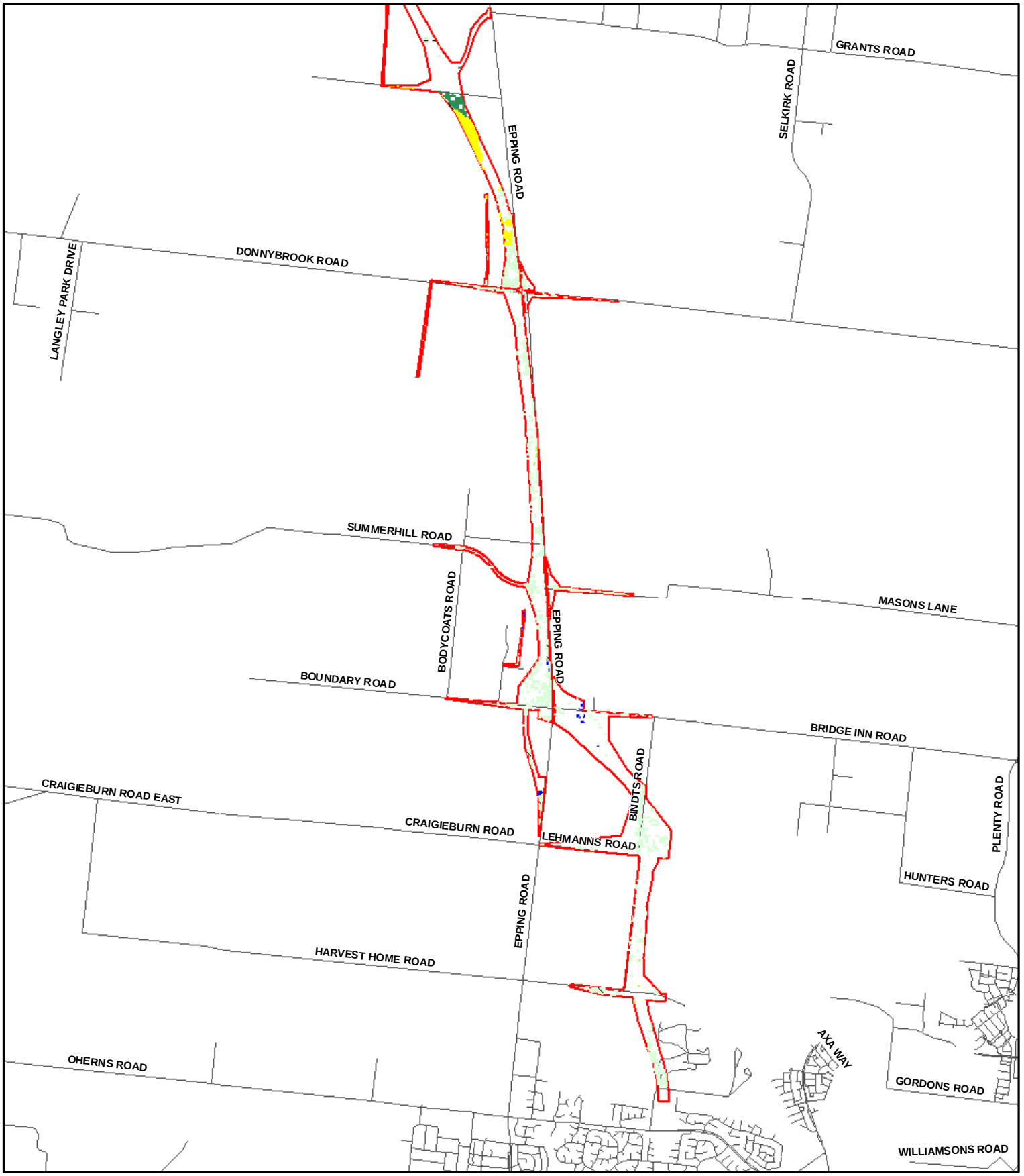

Legend

EVC

- EVC 47: Riparian Grassy Forest
- EVC 55: Plains Grassy Woodland
- EVC 68: Creekline Grassy Woodland
- EVC 124: Grey Clay Drainage Line Herbland.
- EVC 125: Plains Grassy Wetland
- EVC 132: Plains Grassland
- EVC 175: Grassy Woodland

- Road Network
- *Right of Way Boundary*

Note E6 includes a Public Acquisition Overlay from Findom Rd to the Metropolitan Ring Road.

0 1,000 2,000 4,000 Metres

Figure 9 : Native Vegetation, Epping Rd to Harvest Home Rd.

OMR/E6 Transport Corridor - Flora & Fauna Desktop Assessment

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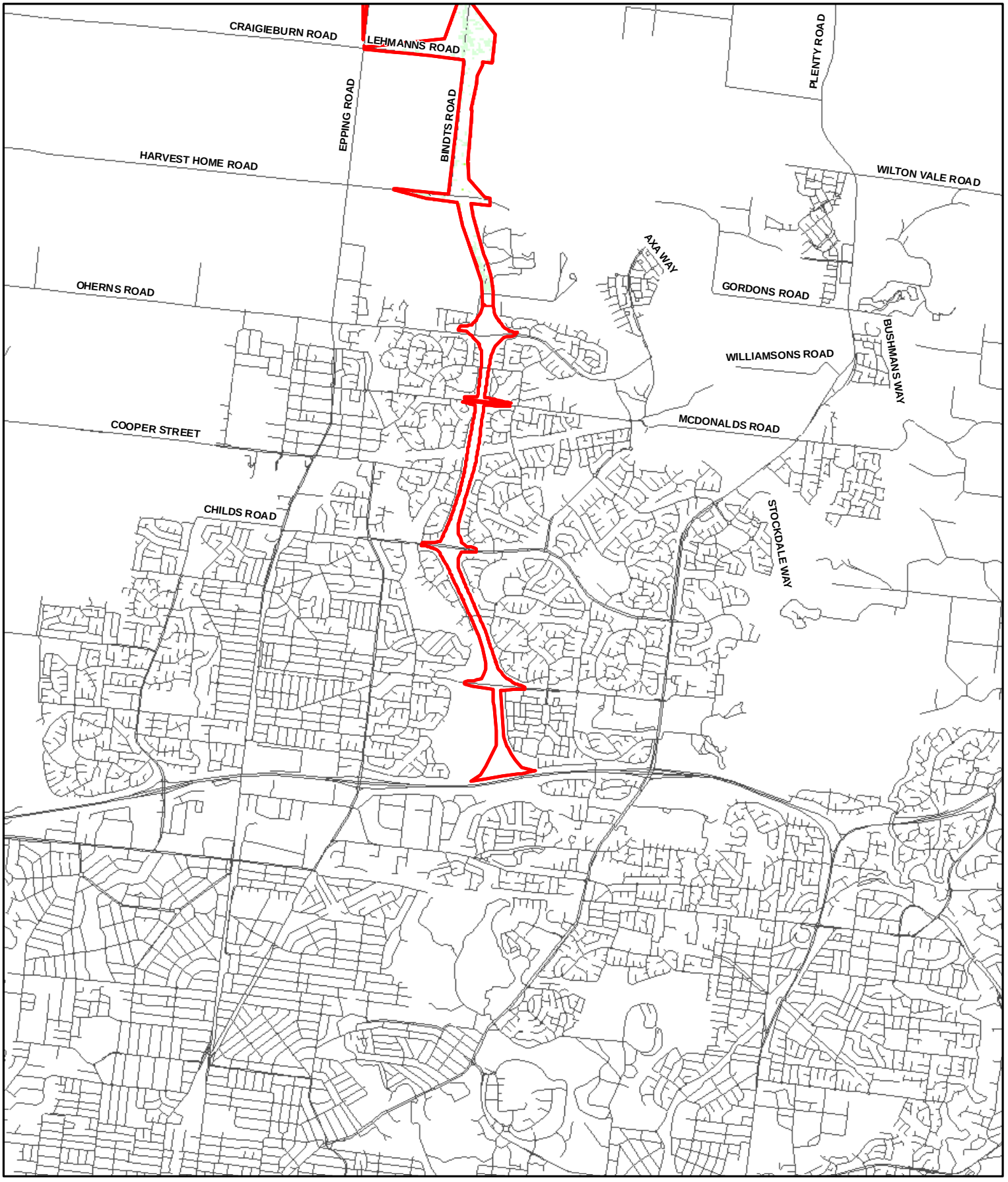

Metres
0 1,000 2,000 4,000

Legend

EVC

- EVC 17: Riparian Scrub
- EVC 55: Plains Grassy Woodland
- EVC 68: Creekline Grassy Woodland
- EVC 124: Grey Clay Drainage Line Herbland.
- EVC 125: Plains Grassy Wetland

Road Network

Right of Way Boundary

Figure 10 Native Vegetation, Harvest Home Western Rd.

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5.2. Habitats

This section provides a discussion on the various habitats recorded within the OMR / E6 ROW Boundary.

5.2.1. Grasslands

Native grassland within the west and north-west of Melbourne is dominated by Basalt Plains Grassland, comprising native tussock grasses, interspersed with flowering herbs. The dominant species is Kangaroo Grass with other species, such as wallaby grasses and spear grasses, occurring. This habitat was once widely distributed, however due to extensive development and agricultural intensification the extent of native grasslands has been significantly reduced, with less than 0.5% of the original habitat remaining.

This habitat has high potential to support a variety of threatened flora and fauna species and has the potential to be found within the OMR / E6 ROW Boundary.

5.2.2. Grassy woodland

Plains Grassy Woodland is a habitat characterized by a very low density of trees including Red Gum, Yellow Box, Grey Box, Black Box, Yellow Gum and Buloke with a shrub-layer dominated by Gold-dust Wattle, Spreading Eutaxia, and Cranberry Heath (Department of Primary Industries, 2009a). The ground-flora comprises perennial grasses including wallaby and spear grasses, and Kangaroo Grasse. Additional perennial and annual herbs and geophytes are also present. A characteristic feature of Plains Grassy Woodland is the seasonal presence of wetlands and swamps which may be essential for a number of species found within this habitat.

This habitat was once wide-spread however its distribution has been greatly reduced due to agricultural and urban expansion, leaving only fragmented and dispersed patches.

This habitat has high potential to support threatened flora and fauna species and has the potential to be found within the OMR / E6 ROW Boundary.

5.2.3. Aquatic Habitats

Aquatic habitats encompass a number of habitats including rivers, creeks, reservoirs and seasonal and permanent waterbodies. Habitat structure varies depending on the presence and type of bank vegetation, submerging vegetation, flow and water quality.

Threats to aquatic habitats include changes in water flow, salinity and quality and bank vegetation structure. Within rural areas, intensification of agriculture as significantly impacted aquatic habitats.

This habitat has low potential to support threatened flora species and high potential to support threatened species of fauna, namely the Growling Grass Frog and has the potential to be found within the OMR / E6 ROW Boundary.

5.2.4. *Riparian Woodland*

Riparian Woodland is a habitat dominated by River Red Gum with a medium to tall shrub layer of Silver Wattle with Tree Violet and Blackwood, and occasional Swamp Paperbark. Ground flora is dominated by Common Tussock-grass on the elevated banks, and Common Reed, rushes and sedges in the wetter areas. This habitat is generally regularly flooded.

This habitat is threatened by a number of factors including changes to the natural flow regime, habitat degradation through loss of natural embankment regeneration, loss of water quality and stock grazing. This habitat has high potential to support threatened fauna species and has the potential to be found within the OMR / E6 ROW Boundary.

5.2.5. *Ramsar Site*

The property boundary of the Western Treatment Plant (owned and managed by Melbourne Water) was used in 1983 to define the boundary of that component of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site. Whilst sections of the southern portion of the OMR / E6 ROW Boundary are situated within the Ramsar Wetland, habitats within this section are not all wetland and include substantial areas of exotic pasture and native grassland. Most of the mapped area affected by the proposed OMR E6 ROW Boundary lies well clear of any wetlands, with the nearest being Ryan's Swamp, some 500m south of the Princes Freeway. Larger and more productive wetland areas lie several kilometres south of the Princes Freeway.

One small wetland, a seasonal Cane-grass swamp (Paul and Belfrage's Swamp) lies just west of the proposed OMR / E6 ROW Boundary at the Princes Freeway interchange. This will not be directly affected by works but best practice construction environmental management measures should be adopted to prevent accidental disturbance to these wetlands or sediment laden runoff from reaching the wetland.

For these reasons, and provided that appropriate construction environmental management measures are adopted, the construction and operation of the OMR / E6 Transport Corridor near the Princes Freeway within this boundary will not have a significant impact on the ecological character of the Ramsar Wetland.

5.3. Flora

This section provides an overview of all flora species with potential to occur in the OMR / E6 ROW Boundary and discusses in detail any threatened species of flora likely to occur in the OMR / E6 ROW Boundary.

5.3.1. *Flora species*

The desktop assessment identified 1274 species of flora with records occurring within one kilometre either side of the OMR / E6 ROW Boundary, 833 (65%) of which were indigenous and 441 (35%) of which were introduced (including non-indigenous native) in origin. These are listed in Appendix 1.

5.3.2. Threatened Flora

A total of seven species of threatened flora were recorded as present within the OMR ROW Boundary with an additional 16 species considered likely to occur. No species of threatened flora were recorded as present within the E6 ROW Boundary although 15 species were considered likely to occur.

The occurrence of threatened flora in the OMR / E6 ROW Boundary is summarised in Table 9 and presented in Appendix 3. Threatened flora species within the OMR / E6 ROW Boundary are discussed in detail in Section 5.3.3.

Likelihood of occurrence for potential threatened flora species occurring within one kilometre either side of the OMR / E6 ROW Boundary is presented in Table 10. Of these, species considered likely to occur in the OMR / E6 ROW Boundary are discussed in detail in Section 5.3.4.

Table 9: Total threatened flora species site records within OMR / E6 ROW Boundary

Common Name	Site Records			Habitat	Conservation status		
	OMR	E6	Total		EPBC	DSE	FFG
Buloke	2	0	2	Woodlands			f
Large-headed Fireweed	1	0	1	Native Grasslands	V	e	f
Pale Spike-sedge	3	0	3	Aquatic Habitats		k	
Plains Joyweed	3	0	3	Native Grasslands		k	
Swamp Fireweed	1	0	1	Aquatic Habitats	V	v	
Werribee Blue-box	1	0	1	Grassy Woodland		e	
Wetland Blown-grass	1	0	1	Native Grassland		k	
Total No. of Species Present	**7**	**0**	**7**				
Total No. of Threatened Flora Species Record Sites	**12**	**0**	**12**				

Notes: EPBC – Status under EPBC Act; **DSE** – Status from DSE (2007); **FFG** – Listed under FFG Act; **C** = critically endangered; **E, e** = endangered; **V, v** = vulnerable; **R, r** = rare; **k** = insufficiently known

5.3.3. Threatened flora species recorded within the OMR / E6 ROW Boundary

EPBC Act

Large-headed Fireweed (Senecio macrocarpus)

Large-headed Fireweed is listed as Vulnerable (V) under the EPBC Act, listed under the Victorian FFG Act (f) and listed as Endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It is known to occur in Kangaroo Grass dominated grasslands on basalt soils (Walsh 1999b). The species flowers August to October.

Records of Large-headed Fireweed occur at one site (dating from 2001) within the proposed OMR ROW Boundary. The high number of recent records (dating between 1984 and 2005) of Large-headed Fireweed in the region and large amount of Plains Grassland within the OMR ROW Boundary suggests that the project is likely to impact on this species.

Swamp Fireweed (Senecio psilocarpus)

Swamp Fireweed is listed as Vulnerable (V) under the EPBC Act and listed as Vulnerable (v) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It is known to occur in herb-rich winter-wet swamps on volcanic clays or peaty soils (Walsh 1999b). The species flowers from November to March.

Records of Swamp Fireweed occur at one site, from 1994, within the proposed OMR Boundary, north of the Hume Freeway interchange. Whilst only one record of this species currently occurs within the OMR ROW Boundary, there are several other records occurring within this area, dating between 1994 and 2002. Swamp Fireweed is thought to be potentially impacted on by the project due to the abundant recent records of this species within a close proximity to the OMR ROW Boundary. Further surveys are recommended to determine the exact location of the species and any associated impacts.

FFG Act

Buloke (Allocasuarina luehmannii)

Buloke is listed under the Victorian *Flora and Fauna Guarantee Act 1988* (f). It occurs in woodlands on non-calcareous soils and commonly grows with Grey Box (Entwisle 1996). The species flowers September to November.

Records of Buloke occur at two sites within the proposed OMR ROW Boundary, dating from between 197 and 1995. The presence of Buloke within the OMR ROW Boundary indicates that the project is likely to impact on the species.

DSE Advisory List

Plains Joyweed (Alternanthera sp. 1 [Plains])

Plains Joyweed is listed as poorly known (k) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*. It is known to occur chiefly on clayey, often gilgai soils in the Riverina or on drier clays or clay-loams derived from Basalt.

Records of Plains Joyweed occur at three sites within the proposed OMR ROW Boundary, dating from between 2004 and 2007. The high number of records of Plains Joyweed in the region and large amount of Plains Grassland within the OMR ROW Boundary suggests that the project is likely to impact on this species.

Pale Spike-sedge (Eleocharis pallens)

Pale Spike-sedge is listed as poorly known (k) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*. It is known to occur on seasonally wet areas usually on clayey soils.

Records of Pale Spike-sedge occur at three sites within the proposed OMR ROW Boundary, dating between 1993 and 1999. Pale Spike-sedge is thought to potentially be impacted on by the project due to the low area of suitable habitat within the OMR ROW Boundary.

Werribee Blue-box (Eucalyptus aff. baueriana [Werribee])

Werribee Blue-box is recognised as a separate taxon to Blue Box by DSE and is listed as endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*. No published information regarding this specie's taxonomy or habitat is available.

Records of Werribee Blue-box dating from 1985 to 2006 occur at one site within the proposed OMR ROW Boundary. Werribee Blue-box nearby the Werribee River is thought to potentially be impacted on by the project.

Wetland Blown-grass (Lachnagrostis filiformis var. 2)

Wetland Blown-grass is listed as poorly known (k) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*. It is known from a range of habitats but is usually found on poorly drained or seasonally wet sites (Walsh 1994).

Records of Wetland Blown-grass occur at one site within the proposed OMR ROW Boundary, dating from 1989 to 2000. Wetland Blown-grass is thought to potentially be impacted on by the project due to the low area of suitable habitat within the OMR ROW Boundary.

Table 10: Likelihood of occurrence of threatened flora species that have the potential to occur within OMR / E6 ROW Boundary

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
Adamson's Blown-grass	Native Grassland	E	v	f	Habitat present; nearby records along merry creek (upstream of E6 site)	Unlikely	Likely
Arching Flax-lily	Native Grassland/Grassy Woodland		v		Habitat present	Likely	Likely
Austral Crane's-bill	Grassy Woodland		v		Habitat present	Unlikely	Likely
Austral Moonwort	Native Grassland		v	f	Only recorded from Diggers Rest site	Unlikely	Unlikely
Austral Toad-flax	Native Grassland and Woodland	V	v	f	Only recorded from Diggers Rest site	Unlikely	Unlikely
Austral Tobacco	Rocky escarpments		r		Habitat present; nearby records along Werribee River escarpment, Einesbury	Likely	Unlikely
Basalt Peppercress	Native Grassland	E	e	f	All records are very old, the only relatively recent records are from Organ Pipes NP (1982)	Unlikely	Unlikely
Black Roly-poly	Native Grasslands (wetter areas)		k		Habitat present; nearby records	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					along OMR route and southern part of E6		
Branching Groundsel	Rocky escarpments		r		All records are very old, the only relatively recent records are from Organ Pipes NP (1982)	Unlikely	Unlikely
Brittle Greenhood	Open Forest		e	f	No habitat present	Unlikely	Unlikely
Button Wrinklewort	Native Grasslands	E	e	f	All known populations occur within high quality grassland reserves	Limited potential along Geelong – Melbourne Rail Reserve	Unlikely
Clover Glycine	Native Grassland/Grassy Woodland	V			Habitat present	Likely	Likely
Curly Sedge	Native Grassland	E			Habitat present – nearby records along Merri Creek	Unlikely	Likely
Green-top Sedge	Native Grassland (distributed on foothills)		k		No habitat present	Unlikely	Unlikely
Maroon Leek Orchid	Native Grassland	E			All records are from east of Melbourne (i.e. out of range)	Unlikely	Unlikely
Matted Flax-lily	Native Grassland/Grassy Woodland	E			Habitat present	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
Melbourne Yellow-gum	Grassy Woodland		v		Habitat present; nearby records from Jackson's Creek in Diggers Rest	Likely	Un likely
Native Peppercress	Native Grassland		k		All records are from high quality woodlands (e.g. Woodlands historic Park); no such areas will be affected by the current proposal	Unlikely	Unlikely
Pale Swamp Everlasting	Native Grassland/Aquatic Habitats		v		Habitat present	Likely	Likely
Pale-flower Crane's-bill	Grassy Woodland		r		Habitat present	Likely	Likely
Plains Yam-daisy	Native Grassland		v		Only recorded from Diggers Rest site	Unlikely	Unlikely
Plump Swamp Wallaby-grass	Native Grassland and Woodland		e	f	Habitat present; nearby records from Donnybrook area	Unlikely	Likely
Proud Diuris	Native Grassland		e		The only records more recent than 1962 are from Lawrie Emmins Reserve	Limited potential to occur	Unlikely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					(1994) and private land adjacent to the Caroline Springs housing estate (2001)		
River Swamp Wallaby-grass	Aquatic Habitats	V			Records are from Merri Creek, Curly Sedge Creek and the Yarra River; no records in close proximity to proposed alignments	Unlikely	Unlikely
Rough Eyebright	Native Grassland		e	f	Only recorded from Diggers Rest site	Unlikely	Unlikely
Rough-grain Love-grass	Native Grasslands		r		Habitat present; recent nearby records within Geelong-Melbourne Rail Reserve	Likely	Unlikely
Rye Beetle-grass	Native Grassland		r		Habitat present in western region	Likely	Unlikely
Slender Bindweed	Native Grassland		k		Habitat present	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
Slender Tick-trefoil	Native Grassland		k		Habitat present; nearby records at Kalkallo	Unlikely	Likely
Small Milkwort	Native Grassland		v	f	Habitat present in western region; nearby records in Diggers Rest site* and along Geelong-Melbourne Rail Reserve	Likely	Likely
Small Scurf-pea	Native Grassland		e	f	Habitat present; nearby records in Lollypop Creek, Wyndham Vale	Likely	Unlikely
Snowy Mint-bush	Grassy Woodland		r		Only recorded from Diggers Rest site	Unlikely	Unlikely
Spiny Rice-flower	Native Grasslands	C	e	f	Habitat present in western region	Likely	Unlikely
Sunshine Diuris	Native Grassland	E	e	f	All records are highly localised around Sunshine except	Unlikely	Unlikely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					for an additional record at the Diggers Rest site		
Swamp Diuris	Native Grassland/Grassy Woodland		v	f	Only recorded from Diggers Rest site	Unlikely	Unlikely
Swamp Flax-lily	Native Grassland/Aquatic Habitats		r		Only one record from Epping	Unlikely	Unlikely
Tough Scurf-pea	Native Grassland		e	f	Habitat present	Likely	Likely
Winged Water-starwort	Aquatic Habitats		r		Habitat present; nearby records in Merri Creek, Kalkallo	Unlikely	Likely
Yarra Gum	Grassy Woodland		r		Habitat present; nearby records in Woodstock	Unlikely	Likely
Yellow Star	Native Grassland/Grassy Woodland		k		Only one record in Mickleham	Unlikely	Unlikely

Notes: EPBC – Status under EPBC Act; **DSE** – Status from DSE (2007); **FFG** – Listed under FFG Act; **C** = critically endangered; **E, e** = endangered; **V, v** = vulnerable; **R, r** = rare; **k** = insufficiently known;

5.3.4. Threatened Flora species likely to occur within the OMR / E6 ROW Boundary

EPBC Act

Matted Flax-lily (Dianella amoena)

Matted Flax-lily is listed as Endangered (E) under the *Environment Protection and Biodiversity Conservation Act 1999* and as endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

The species prefers lowland grassland and grassy woodlands on very well-drained to seasonally waterlogged fertile soils (Carr & Horsfall 1995). This species flowers from December to February.

Adamson's Blown-grass (Lachnagrostis adamsonii)

Adamson's Blown-grass is listed as endangered (E) under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as vulnerable (v) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs in slightly saline, seasonally wet areas on and near the volcanic plain (Walsh 1994). This species flowers in November.

Clover Glycine (Glycine latrobeana)

Clover Glycine is listed as vulnerable (V) under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as vulnerable (v) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs in grasslands and grassy woodlands (Jeanes 1996). This species flowers from September to December.

Curly Sedge (Carex tasmanica)

Curly Sedge is listed as vulnerable (V) under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as vulnerable (v) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs on seasonally wet heavy clayey soils (Wilson 1994). This species flowers from September to November.

Spiny Rice-flower (Pimelea spinescens subsp. spinescens)

Spiny Rice-flower is listed as Critically Endangered (CE) under the *Environment Protection and Biodiversity Conservation Act 1999,* listed under the Victorian *Flora and Fauna Guarantee Act 1988* (f) and listed as Endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It is known to occur in grasslands or open shrublands on basalt derived soils (Entwisle 1996) and prefers shallow depressions and drainage lines with moderate soil moisture (D. Coppolino pers. obs.). This species flowers from April to August.

FFG Act

Plump Swamp Wallaby-grass (Amphibromus pithogastrus)

Plump Swamp Wallaby-grass is listed as threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs in swampy depressions in Themeda grassland, sedgeland or woodland (DSE 2004a; Walsh 1994). This species flowers in November.

Small Milkwort (Comesperma polygaloides)

Small Milkwort is listed as threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as vulnerable (v) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs on heavy soils supporting grasslands and grassy woodlands (Walsh 1999a). This species flowers from November to January.

Small Scurf-pea (Cullen parvum)

Small Scurf-pea is listed as threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs in seasonally wet areas with heavy soils in Grasslands and Grassy (River Red Gum) Woodlands including grazing country and table drains. Small Scurf-pea habitat is limited to areas receiving between 450 and 700 millimetres annual rainfall (Jeanes, 1996). This species flowers from October to January.

Tough Scurf-pea (Cullen tenax)

Tough Scurf-pea is listed as threatened (f) under the Victorian *Flora and Fauna Guarantee Act 1988* and as endangered (e) under the DSE *Advisory List of Rare and Threatened Plants in Victoria*.

It occurs in grasslands and grassy woodlands on heavy soils in drier regions (Jeanes 1996). This species flowers from November to December.

DSE Advisory List

The following eight DSE-listed species were considered to be likely to occur within the OMR ROW Boundary:

- Arching Flax-lily (*Dianella sp. aff. longifolia (Benambra)*): Records of this species are sparsely distributed throughout Victoria. This species is found west of Melbourne and occurs within native grassland and grassy woodlands.
- Austral Tobacco (*Nicotiana suaveolens):* Austral Tobacco is primarily found west of Melbourne and is not common throughout Victoria. This species is usually found on sandy or gravelly soils and is often associated with streams and gullies.
- Black Roly-poly (*Sclerolaena muricata var. muricata):* This species' distribution within Victoria is primarily concentrated around the north-western areas of Melbourne, with some records along the Victoria – New South Wales border. Very little is known about this species, though it is mostly associated with associated lakes and floodplains.

- Melbourne Yellow-gum (*Eucalyptus leucoxylon subssp. Connata*): Victorian distribution confined to western areas of Melbourne.
- Pale Swamp Everlasting (*Helichrysum aff. rutidolepis*): Sparsely distributed within western Victoria. Often found within grass wetland, or drainage lines in basalt plains grasslands.
- Rough-grain Love-grass (*Eragrostis trachycarpa*): There are some records of this species north and west of Melbourne, though records are concentrated within eastern Victoria.
- Slender Bindweed (*Convolvulus angustissimus subsp. omnigracilis*): Records are concentrated north and west of Melbourne, though there are sparse records of Slender Bindweed occurring in western and northern Victoria; and
- Rye Beetle-grass (*Tripogon loliiformis*): This species' distribution is concentrated north and west of Melbourne with records also found in northern Victoria. Species are generally found in dry and rocky sites.

The following nine DSE-listed species were considered to be likely to occur within the E6 ROW Boundary:

- Arching Flax-lily: Described above.
- Austral Crane's-bill: *(Geranium solanderi var. solanderi s.s).* This species is distributed throughout Victoria, with many records occurring west and north of Melbourne. Whilst this species occurs within a wide range of soils and ecosystems, it is usually absent from the Alps, deep wet forests and the Mallee. Austral Crane's-bill is commonly found in sheltered sites in grassy woodlands, often along drainage lines.
- Black Roly-poly: Described above.
- Pale Swamp Everlasting: Described above.
- Pale-flower Crane's-bill *(Geranium sp. 3):* Records of this species are primarily found north of Melbourne with some records within western Victoria. Species are generally found within Open, grassy areas of dry woodlands and forests.
- Slender Bindweed: Described above.
- Slender Tick-trefoil: *(Desmodium varians)* This species is distributed throughout eastern Victoria and is primarily found in grasslands, woodland, stony knoll shrubland and open forest.
- Winged Water-starwort *(Callitriche umbonata):* Winged Water-starwort is very sparsely distributed within Victoria, though the majority of records are found north of Melbourne and in northern Victoria. Species are generally found in damp or swamp habitats; and
- Yarra Gum *(Eucalyptus yarraensis):* The distribution of this species is concentrated in two sites, north and north-west of Melbourne. Species are generally found in river flats and floodplains of valley sclerophyll forest.

5.4. Fauna

This section provides an overview of all fauna species with the potential to occur in the OMR / E6 ROW Boundary and discusses in detail any threatened species of fauna likely to occur in the OMR / E6 ROW Boundary.

5.4.1. Fauna species

The desktop assessment identified 230 species of fauna with records occurring within one kilometre either side of the OMR / E6 ROW Boundary, 219 (91%) of

which were indigenous and 21 (9%) of which were introduced. These are listed in Appendix 2.

Species of fauna were divided into the following groups:

- Birds – 159;
- Mammals – 32;
- Reptiles – 23;
- Amphibians – 14; and
- Invertebrates – 2.

5.4.2. Threatened fauna

One species of threatened fauna was recorded as present within the OMR ROW Boundary with an additional 35 species recorded as being potentially present. No threatened fauna were recorded as present within the E6 ROW Boundary with an additional 28 species recorded as being potentially present.

The occurrence of threatened fauna in the OMR / E6 ROW Boundary is summarised in Table 11 and presented in Appendix 3. Threatened fauna species occurring within the OMR / E6 ROW Boundary are discussed in detail in Section 5.4.3.

Likelihood of occurrence for potential threatened fauna species occurring within one kilometre either side of the / E6 ROW Boundary is presented in Table 12. Of these, species considered likely to occur in the OMR / E6 ROW Boundary are discussed in Section 5.4.4.

Table 11: Total Threatened Fauna species site records within OMR / E6 ROW Boundary

Common Name	Site Records			Habitat	Conservation Status		
	OMR	E6	Total		EPBC	DSE	FFG
Fauna - Species Present							
Golden Sun Moth	2	0	2	Native Grassland	CE	EN	f
Total No. of Fauna Species Present	**2**	**0**	**2**				
Total No. of Threatened Fauna Species Record Sites	**1**	**0**	**1**				

Notes: EPBC – Status under EPBC Act; **DSE** – Status from DSE (2007); **FFG** – Listed under FFG Act; **FAUNA KEY: CR** – Critically endangered; **EN** – Endangered; **VU**– Vulnerable; **NT** – Lower risk near threatened; **DD –** Data Deficient; **f**– Listed as threatened under FFG Act.

5.4.3. Threatened fauna species within the OMR / E6 ROW Boundary

EPBC Act

Golden Sun Moth (Synemon plana)

The Golden Sun Moth is a bronze-coloured diurnal moth with clubbed antennae. It is part of the Castniidae family in the order Lepidoptera (DSE, 2008b). Golden Sun Moth has been listed as Critically Endangered on the Environment Protection

and Biodiversity Conservation (EPBC) Act, Endangered on the Department of Sustainability and Environment (DSE) Threatened Species Advisory List and listed on the Flora and Fauna Guarantee (FFG) Act.

Golden Sun Moths were once widely distributed throughout Victoria, however due to expanding development, their distribution has significantly decreased (O'Dwyer et al., 2004). Within the wider region, small and isolated Golden Sun Moth populations are found in Western Victoria and around Melbourne.

Preferred habitat includes Natural Temperate Grasslands and Grassy Box-Gum Woodlands with a ground flora dominated by wallaby grasses (*Autrodanthonia* species) with spear grasses (*Austrostipa* species) or Kangaroo Grass (*Themeda australis*). Additional features preferred by this species include patches of bare ground between grassy tussocks.

Threats to Golden Sun Moths include habitat loss, disturbance and fragmentation from the intensification of agriculture and the expansion of urbanization. Habitat degradation is a primary cause of local extinction (DSE, 2008b). These factors affect Golden Sun Moths by decreasing the availability of suitable food sources and changing grassland habitat structure.

Records of Golden Sun Moth, dating from 2005, occur at two sites within the proposed OMR ROW Boundary south of Ballan Road, west of Werribee. Due to the presence of records and high occurrence of native grassland habitat, it is likely the project will have an impact on this species.

Table 12: Likelihood of occurrence of threatened fauna species that have the potential to occur within OMR / E6 ROW Boundary

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
Australasian Bittern	Wetland Habitats		EN	f	Unlikely to occur regularly along much of the alignment. May occur occasionally in reed-dominated wetlands but the route does not pass through any of this habitat	Unlikely	Unlikely
Australasian Shoveler	Wetland Habitats		V		Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Australian Grayling	Wetland Habitats	VU			Waterways	Likely	Unlikely
Australian Painted Snipe	Wetland Habitats	VU	CE	f	Rarely occurs in seasonal, shallow wetlands, which are limited in extent along the alignment	Unlikely	Unlikely
Azure Kingfisher	Riverine Habitats	NT			Waterways	Likely	Likely
Barking Owl	Riparian and other Woodland		EN	f	May occur occasionally in remnant dry forest and woodland areas	Likely	Likely
Black Falcon	Woodland, Scrub, Shrubland and Native Grassland		VU		May occur nomadically in wooded and grassland areas	Likely	Likely
Black-chinned Honeyeater	Woodland and		NT		May occur occasionally	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
	Grassy Woodland				in remnant dry forest and woodland areas		
Blue-billed Duck	Wetland Habitats		E	f	Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Brown Quail	Wetland and Wet Grassland Habitats		NT		Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Brown Toadlet	Dry forests, Native Grassland, Wetlands, Shrubland and Heathland		EN	f	May occur in wooded and grassy gullies and at the edge of wetlands	Likely	Likely
Brown Treecreeper (south-eastern ssp.)	Forest and Woodland		NT		May occur occasionally in remnant dry forest and woodland areas	Likely	Unlikely
Bush Stone-curlew	Grassy Woodland and Farmland	EN		f	May occur occasionally in remnant dry forest and woodland areas	Likely	Unlikely
Common Dunnart	Grassy Woodland	VU			May occur occasionally in remnant dry forest and woodland areas	Likely	Likely
Diamond Dove	Grassy Woodland/Native Grassland		NT	f	May occur occasionally in remnant dry forest and woodland areas	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
Diamond Firetail	Grassy Woodland		VU	f	May occur occasionally in remnant dry forest and woodland areas	Likely	Unlikely
Eastern Barred Bandicoot	Grassy Woodland/Native Grassland	EN	CE	f	Unlikely to occur as only known from reintroductions at Woodlands Historic park	Unlikely	Unlikely
Eastern Dwarf Galaxias	Aquatic Habitats	VU			Waterways	Likely	Likely
Eastern Great Egret	Native Grassland/Woodland/Aquatic Habitats		V	f	Probably occurs regularly in small numbers in the limited area of wetland habitat	Likely	Likely
Fat-tailed Dunnart	Native Grassland, Woodland, Farmland		NT		Likely to occur in many areas of grassland	Likely	Likely
Freckled Duck	Aquatic Habitats	EN		f	Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Grassland Earless Dragon	Native Grassland	EN	CE	f	Regionally extinct	Unlikely	Unlikely
Grey-crowned Babbler	Forests and Woodland	EN		f	Regionally extinct	Unlikely	Unlikely
Grey-headed Flying-fox	Woodland , Aquatic Habitats	VU	VU	f	Probably occasionally occurs in treed habitats	Likely	Likely
Growling Grass Frog	Aquatic Habitats	VU	EN	f	Likely to occur along	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					major watercourses and associated wetlands and artificial water bodies		
Hardhead	Aquatic Habitats		VU		Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Smoky Mouse	Heaths and forests Habitats	EN			No suitable habitats	Unlikely	Unlikely
Latham's Snipe	Aquatic Habitats		NT		Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Little Button-quail	Woodland and Native Grassland				May occasionally occur in grasslands	Likely	Likely
Nankeen Night Heron	Aquatic Habitats	NT			Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Plains Wanderer	Native Grassland	VU	CE	f	Thought to be regionally extinct, although recent record near Werribee warrant further investigation of the alignment in this area	Likely	Unlikely
Red-chested Button-quail	Native Grassland		VU	f	May occasionally occur	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					in grasslands		
Regent Honeyeater	Woodland	EN			Likely to be regionally extinct	Unlikely	Unlikely
River Blackfish	Aquatic Habitats		DD		Waterways	Likely	Likely
Royal Spoonbill	Coastal and Wetland Habitats		VU		Probably occasionally occurs in the limited area of wetland habitats	Likely	Likely
Southern Brown Bandicoot	Forest and Woodland	EN	NT		Likely to be regionally extinct	Unlikely	Unlikely
Southern Toadlet	Forest, Woodland, Native Grassland	VU			May occur in wooded and grassy gullies and at the edge of wetlands	Likely	Likely
Speckled Warbler	Grassy Woodland		VU	f	May occur occasionally in remnant dry forest and woodland areas	Likely	Likely
Spot-tailed Quoll	Forest	EN			Likely to be regionally extinct	Unlikely	Unlikely
Spotted Harrier	Native Grassland/Grassy Woodland		N		May occur nomadically in wooded and grassland areas	Likely	Likely
Striped Legless Lizard	Native Grassland	VU	EN	f	Likely to be present in higher quality and rockier grassland area with cracking soils.	Likely	Likely
Swift Parrot	Woodland	EN			May occur occasionally	Likely	Likely

Common Name	Habitat	Conservation status			Notes on likelihood of occurrence	Occurrence in OMR ROW Boundary	Occurrence in E6 ROW Boundary
		EPBC	DSE	FFG			
					in wooded areas		
Whiskered Tern	Coastal Habitats		NT		Probably occasionally occurs in the limited area of wetland habitats	Likely	Unlikely
Yarra Pygmy Perch	Aquatic Habitats	VU			Waterways	Likely	Unlikely

Notes: EPBC – Status under EPBC Act; **DSE** – Status from DSE (2007); **FFG** – Listed under FFG Act; **FAUNA KEY: CR** – Critically endangered; **EN** – Endangered; **VU**– Vulnerable; **NT** – Lower risk near threatened; **DD –** Data Deficient; **f**– Listed as threatened under FFG Act.

5.4.4. Threatened fauna species likely to occur in the OMR / E6 ROW Boundary

EPBC Act

Growling Grass Frog (Litoria raniformis)

Growling Grass Frog is a large frog, generally brownish-green or greenish-brown above off-white below, with a bright green lateral stripe running the length of the body (Cogger 2000). This species is listed as Vulnerable on the EPBC Act, Endangered on the DSE Threatened Species Advisory List and listed on the FFG Act.

Prior to European settlement, Growling Grass Frog was distributed throughout Australia. However, population distribution and numbers have significantly decreased throughout recent decades. Growling Grass Frogs are now extinct in the ACT and are threatened or declining in the remainder of its range. Within Victoria, they are predominantly found in central and south-western parts of the state.

Habitats preferred by Growling Grass Frogs include cool temperate grasslands near permanent water, including reservoirs, farm dams, and swamps (Turner, 2004). It is usually associated with water bodies supporting large areas of fringing and aquatic vegetation such as Common Reed, Bullrush and Water Ribbon (Organ 2002). Nearby terrestrial vegetation has been reported to include grassland, shrubland, woodland or forest (Pyke 2002).

Threats to Growling Grass Frog populations include habitat loss and degradation, predation by introduced species and atmospheric ozone depletion resulting in higher ultraviolet-B radiation. Habitat loss and degradation include draining or filling of waterbodies, barriers to movement between waterbodies, changes in water quality, salinity, pollution; loss of terrestrial habitat and fungal diseases.

Due to the presence of habitat within the OMR / E6 ROW Boundary the project has the potential to impact on this species and further investigation of its status is warranted, particularly in the vicinity of the Werribee River, Kororoit Creek and Merri Creek.

Plains-wanderer (Pedionomus torquatus)

The Plains-wanderer is a small ground-dwelling bird, which resembles Button-quail and is distinguished by a prominent white-spotted collar above a rich rufous breast patch in females. Plains-wanderer is listed as being Endangered on the EPBC Act, Endangered on the DSE Threatened Species Advisory List and listed on the FFG Act.

Plains-wanderer populations are currently distributed in south-western Victoria, south-eastern South-Australia and eastern New South Wales.

Plains-wanderer prefers sparse native grassland habitats, dominated by wallaby and spear grasses. This species is unlikely to be found in habitats which have been cultivated, overgrazed or degraded by weeds.

This species is threatened by changes in habitat management practices, which reduce the suitability of the grasslands to support viable populations (Department

of the Environment, Water, Heritage and the Arts, 2009b). In addition, Plains-wanderer is heavily predated by introduced species, including fox and cats.

A recent record near Werribee suggests that its status in this part of the OMR / E6 ROW Boundary should be further investigated. Due to the presence of native grassland habitat, the project may potentially impact on this species.

Grey-headed Flying Fox (Pteropus poliocephalus)

Grey-headed Flying Fox are a species of fruit-bat identified by their large size, collar of golden-orange and leg fur extending to the ankles (Menkhorst, 2004). This species is listed as Vulnerable on the EPBC Act, Vulnerable on the DSE Threatened Species Advisory List and listed on the FFG Act.

Grey-headed Flying Fox distribution extends along the east coast of Australia and can be found throughout south Victoria (Menkhorst, 2004).

Taking into consideration the habitats present within the alignment, there is a possibility that Grey-headed Flying Fox may be present.

This species of bat forage and roost within a range of habitats including riparian woodland, *Melaleuca* swamps and *Banksia* woodlands. It also feeds on fruits trees within urban areas and commercial fruit plantations. Roost-site fidelity has been known to last for several decades.

The main threat to this species is habitat loss, fragmentation and degradation and direct mortality resulting from persecution from commercial fruit-growers and accumulation of pollutants within their food source (Tideman *et al.,* 2009).

Occasionally individuals would fly over wooded and treed habitat on the alignment but its wide ranging movements make significant impacts highly unlikely as a result of the project.

Striped Legless Lizard (Delma impar)

Although the striped legless lizard has the appearance of a snake, it has two scaly flaps near the vent, which are reduced tail hind limbs (DSE, 2003b). This species can be distinguished from other legless lizard species by its distinctive ear-openings and characteristic longitudinal stripes. Striped legless lizards are listed as Vulnerable on the EPBC Act, Endangered in Victoria (DSE Threatened Species Advisory List) and listed on the FFG Act.

Little information is known about the distribution of the striped legless lizard, though it is thought that its distribution is concentrated in Victoria with isolated populations around Canberra (ACT) and Bool Lagoon (South Australia) (Department of the Environment, Water, Heritage and the Arts, 2009a). Within Victoria, records appear to be concentrated around near-urban areas in west and north Melbourne. Although sightings have been recorded in other areas, comprehensive surveys have not yet been undertaken which would clarify this species' distribution.

Striped Legless lizards inhabit lowland native grasslands, which generally occur in flat or gently undulating plains (ACT, 1997). Lowland native grasslands are dominated by perennial tussock-forming grasses, including Kangaroo Grass, and wallaby and spear grass species. Striped legless lizards appear to prefer the tussock formation, though little is known about the way the habitat structure is

utilized by this species. It is important to note that this species has also been found in other habitats including woodland.

The main threats to Striped Legless Lizards, and the main cause for its decline, are loss and fragmentation of habitats, though urban expansion and agricultural intensification; modification and degradation of grassland habitat, caused by the implementation of inappropriate management practices; and predation from non-native species, including foxes and cats.

Within the context of the development, the construction of the proposed OMR / E6 Transport Corridor has the potential to affect this species due to the presence of extensive suitable habitat and further investigation of its status in the project area is warranted.

FFG Act and DSE Advisory List

In Table 12, information is provided on the balance of the threatened species recorded historically within one kilometre of the route alignment. For many species, habitats are limited (e.g. wetlands and waterways) and occurrence is likely to be occasional or in small numbers so project impacts are unlikely to be significant at the scale of the regional or wider population. However, further investigation of those species considered likely to occur is warranted to confirm in more detail the availability of suitable habitat and their status and abundance in the OMR / E6 ROW Boundary.

6. IMPLICATIONS OF THE OMR / E6 TRANSPORT CORRIDOR

This section provides an outline of the regulatory issues related to the flora, fauna and native vegetation known to occur in the study area. The implications under national, state and local legislation and policies are discussed.

6.1. Planning Controls

Removal of native vegetation on allotments of 0.4 hectares or more requires a planning permit under Clause 52.17 of all Victorian Planning Schemes. Before issuing a planning permit, Responsible Authorities are obligated to refer to Clause 15.09 (Protection of Flora and Fauna) in the Planning Scheme. This refers in turn to the Native Vegetation Management Framework, discussed in the following section.

6.2. Native Vegetation Management Framework

This part of the report describes the Framework and applies its provisions to the proposed development. The Framework is a state-wide policy, separate from local planning overlays that may also require a permit for the removal of trees or vegetation. In the latter case, different criteria and controls may apply to those described below.

6.2.1. How the Framework operates

Any proposal to remove native vegetation from the study area must demonstrate that the three-step approach of 'Net Gain' outlined in the Framework has been applied. This approach is hierarchical and includes the following principles:

- Adverse impacts on native vegetation should be ***avoided***, particularly removal of vegetation;
- Where impacts cannot be avoided, impacts should be ***minimised*** through responsive planning and design, with input from relevant experts; and
- Appropriate ***offsets*** need to be identified to compensate for native vegetation removal.

A combination of project design and offsetting should aim to achieve a net gain in the area and quality of native vegetation across Victoria.

Responses to planning permit applications to remove native vegetation vary depending on the conservation significance of the vegetation proposed for removal. Conservation significance determines both the likelihood of approval and, importantly, the scale of the required offset. This is summarised in Table 13.

Table 13: Likely response to applications for removal of intact native vegetation

Framework conservation significance	Likely response to application for clearing	Likely offset requirements
VERY HIGH	Clearing not permitted unless exceptional circumstances apply. Offset Management Plan to be submitted with application.	Substantial Net Gain At least 2 X calculated loss in habitat hectares plus a large tree protection and replacement offset if any large trees are removed

Framework conservation significance	Likely response to application for clearing	Likely offset requirements
HIGH	Clearing generally not permitted	Net Gain At least 1.5 X calculated loss in habitat hectares plus a large tree protection and replacement offset if any large trees are removed

Offsets targets are directly related to the habitat hectare value of the removed vegetation. They can comprise indigenous vegetation retained for conservation purposes within the study area, or vegetation elsewhere, secured on a case-by-case basis by the proponent or through the DSE Bush Broker scheme.

Clause 66.02 of the planning scheme determines the role of the DSE in the assessment of indigenous vegetation removal planning permit applications. If an application is referred to the DSE then the Responsible Authority must follow that department's recommendation in relation to that permit application. The criteria presented in Table 14 indicate when the DSE becomes a referral authority.

Table 14: Application referral criteria

Applications will be referred to the Department of Sustainability and Environment under the following circumstances:
Scattered Trees ▪ To remove more than 15 trees of DBH less than 40 centimetres ▪ To remove more than 5 trees of DBH 40 centimetres or greater (DBH = diameter at 1.3 metres above ground)
Remnant Patch Vegetation (may include trees) ▪ To remove more than 0.5 hectares of vegetation in an EVC with Bioregional Conservation Status of Endangered, Vulnerable or Rare. ▪ To remove more than 1 hectare of vegetation in an EVC with Bioregional Conservation Status of Depleted or Least Concern.

For the current proposal, a referral to DSE would be triggered due to the extensive removal of endangered vegetation to be impacted on by the project.

6.2.2. Offset targets for removal of native vegetation

A total of 765.82 hectares of native vegetation was recorded within the OMR ROW Boundary. A total of 128.65 hectares of native vegetation was recorded within the E6 ROW Boundary. For the OMR / E6 ROW Boundary, a total of 894.47 ha was recorded. This area was calculated using a dataset from DSE incorporating GAA data, DSE ground truthed data and recently updated DSE vegetation mapping. These figures have been confirmed by DSE (J. Todd, DSE, pers. comm.).

Using the information from the desktop assessment, Net Gain accounting was carried out to determine an initial offset target for the removal of all native vegetation within the OMR / E6 ROW Boundary. Habitat scores were provided by DSE for all data including some of which has been ground truthed and some of which has been calculated through recent vegetation modelling.

Where overlaps existed between these datasets a prioritisation system was implemented. The GAA was always used as a top priority, followed by ground truthed data from DSE then modelled data from DSE.

The total value of vegetation in habitat-hectares (hha) in the OMR/E6 ROW Boundaries, along with the total offset target required in habitat hectares is presented in Table 15. The offset target for removal of native vegetation within the OMR ROW Boundary is 644.83 habitat hectares. The offset target for removal of native vegetation within the E6 ROW Boundary is 59.11 habitat hectares. These prescribed offset targets have been confirmed by DSE (J. Todd, DSE, pers. comm.).

Table 15: Native vegetation and Habitat Hectares in the OMR/E6 ROW Boundaries and total Offset Targets Required

	OMR	E6	Total (OMR and E6 combined)
Total area of Native Vegetation in ROW boundary (ha)	765.82	128.65	894.47
Total Habitat Hectares in ROW boundary (hha)	343.34	38.11	381.45
Total Offset Target for Removal of Vegetation in ROW boundary (hha)	644.83	59.11	703.94

Note that these figures take account of the Conservation Significance of the vegetation in the OMR /E6 ROW Boundary.

Based on a rule-of-thumb of an offset area totalling in hectares about five times the habitat hectare offset target (A. Webster, DSE, pers. comm.), approximately 3225 hectares of native vegetation, predominantly Plains Grassland would be required to achieve the offset target for the OMR ROW Boundary.

An additional 300 hectares of native vegetation, predominantly Plains Grassy Woodland would be required to achieve the offset target for the E6 ROW Boundary.

Therefore, a total of 3525 ha of native vegetation are required to offset the impact incurred within the OMR / E6 ROW Boundary. This is an approximation only and the final area would require confirmation of the habitat score of the proposed offset area and a full gain-scoring exercise as part of an offset plan.

It is recommended that a Net Gain Analysis be undertaken following extensive field work. In practice, analysis based on ground truthed data, would lead to a significantly lesser area of native vegetation probably being affected. Experience suggests strongly that the actual 'limit of works' within the OMR / E6 ROW Boundary from which native vegetation will need to be removed may not represent the entire OMR / E6 ROW Boundary. Therefore, the area of vegetation presented and the associated offset target may be reduced.

6.3. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* contains a list of threatened species and ecological communities that are considered to be of national conservation significance. A Strategic Assessment Report has been prepared by the DSE for the program of activities including the OMR / E6 Transport Corridor for protected species and communities to enable the commitments in the Strategic Assessment, and any activities required by the Federal Minister of the Environment to be carried out.

Two flora species, Large-headed Fireweed and Swamp Fireweed, listed as threatened under the EPBC Act have records within the OMR ROW Boundary. An additional four flora species including Matted Flax-lily, Clover Glycine, Adamson's Blown-grass and Spiny Rice-flower, listed under the EPBC Act are considered likely to occur within the OMR / E6 ROW Boundary.

One threatened ecological community, the Natural Temperate Grassland of the Victorian Volcanic Plain is likely to occur, within the OMR / E6 ROW Boundary. This community is listed as Critically Endangered under the EPBC Act and is considered likely to occur in areas of Plains Grassland, the dominant vegetation type within the OMR ROW Boundary.

One threatened fauna species, Golden Sun Moth, listed as Critically Endangered under the EPBC Act has records within the OMR ROW Boundary. Fourteen threatened fauna species, Freckled Duck, Swift Parrot, Bush Stone-curlew, Azure Kingfisher, Nankeen Night Heron, Common Dunnart, Eastern Dwarf Galaxias, Grey-headed Flying-fox, Growling Grass Frog, Southern Toadlet, Striped Legless Lizard, Australian Grayling, Plains Wanderer and Yarra Pygmy Perch were identified as having the potential to occur within the OMR / E6 ROW Boundary.

Future habitat assessments and targeted threatened species surveying is recommended to determine the occurrence of threatened communities, and flora and fauna species within the study area.

6.4. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* lists threatened flora and fauna species to provide for their protection and management. The FFG Act has limited direct application to private land. However, Clause 15.09 of the Planning Scheme makes reference to this Act. The local planning authority is likely to consider impacts on FFG Act-listed species and communities when deciding on planning permit applications.

The removal of threatened species or communities, or protected flora under the FFG Act from public land requires a licence under the Act. This licence is obtained from the Department of Sustainability and Environment.

Two flora species, Buloke and Large-headed Fireweed, listed as threatened under the FFG Act have records within the OMR ROW Boundary. An additional seven flora species including Small Milkwort, Small Scurf-pea, Spiny Rice-flower, Tough Scurf-pea, Adamson's Blown-grass, Plump Swamp Wallaby-grass and Tough Scurf-pea listed under the FFG Act are considered likely to occur within the OMR / E6 ROW Boundary.

Two threatened ecological communities listed under the FFG Act are likely to occur throughout the OMR / E6 ROW Boundary. The Western (Basalt) Plains Grasslands Community is likely to occur in areas of Plains Grassland within the OMR ROW Boundary, namely in the western section. The Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community is likely to occur in areas of Plains Grassy Woodland within the E6 ROW Boundary.

One fauna species, Golden Sun Moth, listed as threatened under the FFG Act has records within the OMR ROW Boundary. An additional 14 fauna species, Freckled Duck, Grey-headed Flying-fox, Growling Grass Frog, Striped Legless Lizard, Barking Owl, Blue-billed Duck, Brown Toadlet, Diamond Dove, Eastern Great Egret, Red-chested Button-quail, Speckled Warbler, Bush Stone-curlew, Plains Wanderer, Diamond Firetail, listed under the FFG Act have potential to occur within the OMR / E6 ROW Boundary.

Future habitat assessments and targeted threatened species surveying is recommended to determine the occurrence of threatened communities, and species of flora and fauna within the study area.

6.5. EE Act

Under the *Environment Effects Act 1978*, proponents are required to prepare a Referral to the state minister for Planning, which will determine if an Environment Effects Statement (EES) is required for the project. Criteria related to flora and fauna are:

- Potential clearing of 10 ha or more of native vegetation from an area with endangered EVC, or vegetation that is or is likely to be, of very high conservation significance according to Victoria's Native Vegetation Management Framework, except where authorised under an approved Forest Management Plan or Fire Protection Plan;
- Potential long-term loss of a significant proportion (1 to 5% depending upon conservation status of species concerned) of known remaining habitat or population of a threatened species in Victoria;
- Potential long-term change to a wetland's ecological character, where that wetland is Ramsar listed, or listed in 'A Directory of Important Wetlands in Australia';
- Potential major effects upon the biodiversity of aquatic ecosystems over the long term;
- Potential significant effects on matters listed under the *Flora and Fauna Guarantee Act 1988*.

One or a combination of these criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine if an EES is required.

It is noted that an EES Referral is being proposed for the OMR / E6 Transport Corridor as works within the proposed OMR / E6 ROW Boundary are likely to remove more than 10 hectares of native vegetation of Endangered EVCs. Most of the vegetation to be removed will be of High or Very High Conservation Significance due to its Endangered Conservation Status in the bioregion.

6.6. DSE advisory lists

Rare and threatened species advisory lists administered by the Department of Sustainability and Environment include flora and fauna species known to be rare or threatened throughout the state. Although the advisory list has no statutory status, the Responsible Authority will consider impacts on any species on the list when assessing a planning application.

Six flora species, including Large-headed Fireweed, Pale Spike-sedge, Plains Joyweed, Swamp Fireweed, Werribee Blue-box and Wetland Blown-grass listed under DSE's Advisory list have records within the OMR ROW Boundary. An additional eight flora species listed under DSE's Advisory list are considered likely to occur within the OMR / E6 ROW Boundary.

Records of one fauna species, Golden Sun Moth, listed on the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007b) occurred within the OMR ROW Boundary. An additional 24 DSE listed fauna species, Plains Wanderer, River Blackfish, Blue-billed Duck, Growling Grass Frog, Striped Legless Lizard, Barking Owl, Brown Toadlet, Spotted Harrier, Diamond Dove, Black-chinned Honeyeater, Brown Quail, Fat-tailed Dunnart, Latham's Snipe, Brown Treecreeper (south-eastern ssp.), Whiskered Tern, Eastern Great Egret, Australasian Shoveler, Grey-headed Flying-fox, Red-chested Button-quail, Speckled Warbler, Black Falcon, Hardhead, Royal Spoonbill, Diamond Firetail have potential to occur within the OMR / E6 ROW Boundary.

7. CONCLUSIONS

The following section outlines recommendations and mitigations measures to address ecological constraints and issues identified on the site.

A desktop study was undertaken to assess the potential impact and legislative implications of the OMR / E6 Transport Corridor on native vegetation and threatened flora and fauna species. The study involved reviewing vegetation mapping and historical threatened species records within the OMR / E6 ROW Boundary and up to one kilometre either side of the proposed road. It should be noted that E6 includes a Public Acquisition Overlay from Findon Road to the Metropolitan Ring Road.

The study identified the presence of 12 Ecological Vegetation Classes in the OMR ROW Boundary and eight EVCs in the E6 ROW Boundary. The most common occurring EVC in the OMR ROW Boundary was Plains Grassland. Plains Grassy Woodland was the most commonly occurring EVC in the E6 ROW Boundary.

Net Gain accounting was undertaken to determine an initial offset target for the removal of all native vegetation within the OMR / E6 ROW Boundary. The total offset target for the OMR was 644.83 habitat hectares. The total offset target for the E6 was 59.11 habitat hectares. Based on a rule-of-thumb of an offset area totalling in hectares about five times the habitat hectare offset target (A. Webster, DSE, pers. comm.), approximately 3225 hectares of native vegetation, predominantly Plains Grassland would be required to achieve the offset target for the OMR ROW Boundary. An additional 300 hectares of native vegetation, predominantly Plains Grassy Woodland would be required to achieve the offset target for the E6 ROW Boundary. Therefore, a total of 3525 ha of native vegetation are required to offset the impact incurred within the OMR / E6 ROW Boundary. This is an approximation only and the final area would require confirmation of the habitat score of the proposed offset area and a full gain-scoring exercise as part of an offset plan.

Two flora species, Large-headed Fireweed and Swamp Fireweed, listed as threatened under the EPBC Act have records within the OMR ROW Boundary. An additional four flora species including Matted Flax-lily, Clover Glycine, Adamson's Blown-grass and Spiny Rice-flower, listed under the EPBC Act are considered likely to occur within the OMR / E6 ROW Boundary.

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Future habitat assessments and targeted threatened species surveying is required to determine the occurrence of threatened communities, and flora and fauna species within the study area.

An EES Referral is being prepared for the OMR / E6 Transport Corridor as works within the proposed OMR / E6 ROW Boundary are likely to remove more than 10 hectares of native vegetation of Endangered EVCs. Most of the vegetation to be removed will be of High or Very High Conservation Significance due to its Endangered Conservation Status in the bioregion.

8. REFERENCES

ACT Government, 1997. Striped Legless Lizard (*Delma impar*): A vulnerable species. Action Plan No. 2.

Biosis (2009) GAA investigation areas west of Melbourne: Biodiversity values, constraints and opportunities. Project No. 7656 written by Gilmore, D., Wong, N., Mueck, N., Schnittler, N. for Growth Areas Authority, Victoria.

Brooker, MIH & Slee, AV 1996, '*Eucalyptus*', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne, pp. 946-1009.

Carr, GW and Horsfall, PF 1995, 'Studies in Phormiaceae (Lilaceae) 1: New Species and Combinations in *Dianella* Lam. Ex Juss.', *Muelleria: an Australia Journal of Botany* Vol 8 pp. 365 – 378, National Herbarium of Victoria.

Clemann, N. and Loyn, R. (2003) Flora and Fauna Guarantee Act Action Statement Barking Owl, The State of Victoria, Department of Sustainability and Environment, Melbourne

Cogger, H.G. (2000). Reptiles and amphibians of Australia. Reed New Holland, Sydney, Australia.

Department of Environment, Water, Heritage and the Arts 2008, *Environmental Protection and Biodiversity Conservation Act 1999, Protected Matters Search Tool*. Department of Environment, Water, Heritage and the Arts, Canberra, viewed 18th March 2009, <http://www.environment.gov.au >.

Department of Natural Resources and Environment 1997, *Victoria's Biodiversity – Our Living Wealth*. Department of Natural Resources and Environment, Victoria.

Department of Natural Resources and Environment 2002, *Victoria's Native Vegetation Management – a Framework for Action*, Department of Natural Resources and Environment, Victoria.

Department of Primary Industries (2009a). Plains Grassy Woodland, viewed 20th March 2009, <http://www.dpi.vic.gov.au >.

Department of Sustainability and Environment 2003a, Flora and Fauna Guarantee Act Action Statement: Southern Lined Earless Dragon. The State of Victoria, Department of Sustainability and Environment, Melbourne.

Department of Sustainability and Environment 2003b, Flora and Fauna Guarantee Act Action Statement: Striped Legless Lizard. The State of Victoria, Department of Sustainability and Environment, Melbourne

Department of Sustainability and Environment 2004a, Action Statement No. 109 - Plump Swamp Wallaby-grass *Amphibromus pithogastrus,* Department of Sustainability and Environment, East Melbourne.

Department of Sustainability and Environment 2004b, *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual –*

guidelines for applying the Habitat Hectare scoring method (Version 1.3). Department of Sustainability and Environment, East Melbourne, Victoria.

Department of Sustainability and Environment 2005a, *Advisory List of Rare or Threatened Plants in Victoria*. Department of Sustainability and Environment, East Melbourne, Victoria.

Department of Sustainability and Environment 2005b, Matted Flax-lily, *Dianella amoena:* A Nationally Threatened Species of the Grassland Community. Department of Sustainability and Environment, Melbourne, Victoria.

Department of Sustainability and Environment 2007a, *Native Vegetation: Guide for assessment of Referred Planning Permit Applications*. Department of Sustainability and Environment, East Melbourne, Victoria.

Department of Sustainability and Environment 2007b, *Advisory List of Threatened Vertebrate Fauna in Victoria*. Department of Sustainability and Environment, East Melbourne, Victoria.

Department of Sustainability and Environment 2008a, *Biodiversity Interactive Map 2.0*. Department of Sustainability and Environment, East Melbourne, Victoria, viewed Day Month Year, <http://www.dse.vic.gov.au>.

Department of Sustainability and Environment 2008b, Golden Sun Moth Fact Sheet. Victorian Government Department of Sustainability and Environment, Melbourne

Department of the Environment, Water, Heritage and the Arts 2009a, *Delma impar* in Species Profile and Threats Database, Department of the Environment, Water, Heritage and the Arts, Canberra, viewed 20/03/09 <http://www.environment.gov.au>.

Department of the Environment, Water, Heritage and the Arts 2009b, Plains-wanderer (*Pedionomus torquatus*), Department of the Environment, Water, Heritage and the Arts, Canberra, viewed 20/03/09 <http://www.environment.gov.au>.

Department of the Environment, Water, Heritage and the Arts 2009, The Action Plan for Australian Bats: Grey-headed Flying Fox, viewed 20/03/09 <http://www.environment.gov.au>.

Department of the Environment, Water, Heritage and the Arts 2009, Species Profile and Threats Database Superb Parrot, viewed 20/03/09 <http://www.environment.gov.au>.

Ecology Partners (2009) Preliminary Flora and Fauna Assessment at Wollert Quarry, 10 Bindts Road, Epping, Victoria on behalf of Boral Resources Ltd.

Emison, W.B., Beardsell, C.M., Norman, F.I., Loyn, R.H., & Bennett, S.C. 1987, Atlas of Victorian Birds. Department of Conservation, Forests and Lands & Royal Australasian Ornithologists Union, Melbourne.

ENSR Unpublished Data.

Entwisle, TJ 1996, 'Brassicaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne, pp. 399-459.

Entwisle, TJ 1996, 'Casuarinaceae', in NG Walsh & TJ Entwisle (eds), Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae, Inkata Press, Melbourne, pp. 90-101.

Entwisle, TJ 1996, 'Thymelaceae', in NG Walsh & TJ Entwisle (eds), Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae, Inkata Press, Melbourne, pp. 912-930.

Garnett, S. T. and Crowley, G. M. (2000). The Action Plan for Australian Birds. Environment Australia.

Higgins, P. J. (ed.) 1999. Handbook of Australian, New Zealand and Antarctic Birds. Volume 4 Parrots to Dollarbird. Oxford University Press, Melbourne

Higgins, P. J. and Marchant, S. (ed.) 1999. Handbook of Australian, New Zealand and Antarctic Birds. Volume 2 Raptors and Lapwings. Oxford University Press, Melbourne.

Jeanes, JA 1996, 'Fabaceae', in NG Walsh & TJ Entwisle (eds), Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae, Inkata Press, Melbourne, pp. 663-829.

Jeanes, JA 1999, 'Asteraceae', in NG Walsh & TJ Entwisle (eds), Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae, Inkata Press, Melbourne, pp. 652-984.

MCMC Department of Sustainability and Environment, Unpublished Data.

Menkhorst, P.W. (1995) Mammals of Victoria: Distribution, Ecology and Conservation. Oxford University Press, Australia.

O'Dwyer, C. Hadden, S. and Arnold, A (2004). Flora and Fauna Guarantee Act Action Statement: Golden Sun Moth. The State of Victoria, Department of Sustainability and Environment, Melbourne

Organ, A. 2002. Survey for the Warty Bell Frog *Litoria raniformis*, at the Western Treatment Plant, Werribee, Victoria. Biosis Research, Victoria.

Parkes, D, Newell, G, & Cheal, D 2003, 'Assessing the Quality of Native Vegetation: The 'habitat hectares' approach'. *Ecological Management and Restoration*, vol. 4, supplement, pp. 29-38.

Pyke, G.H. 2002. A review of the Biology of the Southern Bell Frog Litoria raniformis (Anura: Hylidae). Australian Zoologist 32: 32–48.

Robertson, P. & Cooper, P. (2000). Recovery Plan for the Grassland Earless Dragon (Tympanocryptis pinguicolla). Unpublished report to Environment Australia, Canberra.

SMEC Unpublished data.

Turner, J.R. 2004. Frogs of Australia - An introduction to their classification, biology and distribution. Pensoft Publishers, Bulgaria.

Walsh, NG 1994, 'Poaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 2: Ferns and Allied Plants, Conifers and Monocotyledons*, Inkata Press, Melbourne, pp. 356-627.

Walsh, NG 1999a, 'Polygalaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae*, Inkata Press, Melbourne, pp. 130-137.

Walsh, NG 1999b, 'Senecio', in NG Walsh & TJ Entwisle (eds), Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae, Inkata Press, Melbourne, pp. 941-965.

Wilson, KL 1994 'Cyperaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 2: Ferns and Allied Plants, Conifers and Monocotyledons*, Inkata Prass, Melbourne, pp. 238-356.