EVC 803: Plains Woodland (*syn.* EVC 55 *Riverina* Plains Grassy Woodland) - Victorian Volcanic Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
MS	*Acacia pycnantha*	Golden Wattle
MS	*Acacia acinacea s.l.*	Gold-dust Wattle
SS	*Eutaxia microphylla* var. *microphylla*	Common Eutaxia
PS	*Astroloma humifusum*	Cranberry Heath
LH	*Senecio quadridentatus*	Cotton Fireweed
MH	*Acaena echinata*	Sheep's Burr
MH	*Plantago gaudichaudii*	Narrow Plantain
MH	*Maireana enchylaenoides*	Wingless Bluebush
MH	*Calocephalus citreus*	Lemon Beauty-heads
SH	*Solenogyne dominii*	Smooth Solenogyne
SH	*Oxalis perennans*	Grassland Wood-sorrel
SH	*Daucus glochidiatus*	Austral Carrot
SH	*Goodenia pinnatifida*	Cut-leaf Goodenia
LTG	*Austrostipa bigeniculata*	Kneed Spear-grass
MTG	*Austrostipa scabra*	Rough Spear-grass
MTG	*Austrodanthonia setacea*	Bristly Wallaby-grass
MTG	*Dianella revoluta* s.s.	Black-anther Flax-lily
MTG	*Austrodanthonia caespitosa*	Common Wallaby-grass
MNG	*Wurmbea dioica*	Common Early Nancy
TTG	*Centrolepis strigosa* ssp. *strigosa*	Hairy Centrolepis
TTG	*Centrolepis aristata*	Pointed Centrolepis
EP	*Amyema miquelii*	Box Mistletoe
SC	*Thysanotus patersonii*	Twining Fringe-lily
SC	*Convolvulus erubescens* spp. agg.	Pink Bindweed

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Trifolium angustifolium* var. *angustifolium*	Narrow-leaf Clover	high	low
MH	*Hypochoeris glabra*	Smooth Cat's-ear	high	low
MH	*Arctotheca calendula*	Cape Weed	high	low
MH	*Petrorhagia velutina*	Velvety Pink	high	low
MH	*Trifolium dubium*	Suckling Clover	high	low
MH	*Anagallis arvensis*	Pimpernel	high	low
SH	*Trifolium glomeratum*	Cluster Clover	high	low
LNG	*Avena fatua*	Wild Oat	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Briza minor*	Lesser Quaking-grass	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Lolium rigidum*	Wimmera Rye-grass	high	low
MTG	*Vulpia bromoides*	Squirrel-tail Fescue	high	low
MNG	*Vulpia myuros*	Rat's-tail Fescue	high	low
MNG	*Juncus capitatus*	Capitate Rush	high	low
MNG	*Bromus rubens*	Red Brome	high	low

EVC 851: Stream Bank Shrubland

Description:
Tall shrubland to 8 m tall above a ground layer of sedges and herbs. A sparse eucalypt overstorey to 15 m tall may sometimes be present. Occurs along rivers and major streams where the watercourse consists of either rocky banks, a flat rocky stream bed or broad gravel banks which are often dry but are also regularly flooded by fast flowing waters.

+ eucalypt woodland only components (ignore when assessing shrublands and standardise site condition score as required)

Large trees+:

Species	DBH(cm)	#/ha
Eucalyptus spp.	70 cm	10 / ha

Tree Canopy Cover+:

%cover	Character Species	Common Name
10%	*Eucalyptus camaldulensis*	River Red-gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree+		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	4	20%	MS
Large Herb	3	5%	LH
Medium Herb	12	20%	MH
Small or Prostrate Herb	4	10%	SH
Large Tufted Graminoid	3	10%	LTG
Large Non-tufted Graminoid	3	10%	LNG
Medium to Small Tufted Graminoid	10	15%	MTG
Medium to Small Non-tufted Graminoid	5	10%	MNG
Scrambler or Climber	2	5%	SC

LF Code	Species typical of at least part of EVC range	Common Name
T	*Acacia mearnsii*	Black Wattle
T	*Acacia melanoxylon*	Blackwood
MS	*Leptospermum lanigerum*	Woolly Tea-tree
MS	*Hymenanthera dentata* s.l.	Tree Violet
MS	*Bursaria spinosa* ssp. *spinosa*	Sweet Bursaria
MS	*Callistemon sieberi*	River Bottlebrush
LH	*Persicaria decipiens*	Slender Knotweed
LH	*Epilobium billardierianum*	Variable Willow-herb
MH	*Acaena novae-zelandiae*	Bidgee-widgee
MH	*Hydrocotyle verticillata*	Shield Pennywort
MH	*Oxalis perennans*	Grassland Wood-sorrel
SH	*Crassula helmsii*	Swamp Crassula
SH	*Dichondra repens*	Kidney-weed
SH	*Apium prostratum* ssp. *prostratum*	Sea Celery
SH	*Hydrocotyle verticillata*	Shield Pennywort
LTG	*Poa labillardierei*	Common Tussock-grass
LTG	*Lomandra longifolia*	Spiny-headed Mat-rush
LNG	*Phragmites australis*	Common Reed
LNG	*Schoenoplectus tabernaemontani*	River Club-sedge
MTG	*Triglochin procerum* s.l.	Water Ribbons
MNG	*Microlaena stipoides* var. *stipoides*	Weeping Grass
MNG	*Ficinia nodosa*	Knobby Club-sedge
SC	*Calystegia sepium*	Large Bindweed

Ecological Vegetation Class bioregion benchmark

Victoria The Place To Be

EVC 851: Stream Bank Shrubland - Victorian Volcanic Plain bioregion

Recruitment:
Continuous

Organic Litter:
40 % cover

Logs:
10 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	*Crataegus monogyna*	Hawthorn	high	high
MS	*Rosa rubiginosa*	Sweet Briar	high	high
MS	*Ulex europaeus*	Gorse	high	high
LH	*Plantago lanceolata*	Ribwort	high	low
LH	*Rumex crispus*	Curled Dock	high	low
LH	*Sonchus oleraceus*	Common Sow-thistle	high	low
LH	*Rumex conglomeratus*	Clustered Dock	high	low
LH	*Sonchus asper* s.l.	Rough Sow-thistle	high	low
LH	*Helminthotheca echioides*	Ox-tongue	high	low
LH	*Aster subulatus*	Aster-weed	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MH	*Trifolium angustifolium* var. *angustifolium*	Narrow-leaf Clover	high	low
MH	*Trifolium dubium*	Suckling Clover	high	low
MH	*Plantago major*	Greater Plantain	high	low
SH	*Trifolium repens* var. *repens*	White Clover	high	low
LTG	*Phalaris aquatica*	Toowoomba Canary-grass	high	high
LNG	*Holcus lanatus*	Yorkshire Fog	high	high
MTG	*Vulpia bromoides*	Squirrel-tail Fescue	high	low
MTG	*Bromus hordeaceus* ssp. *hordeaceus*	Soft Brome	high	low
MTG	*Nassella neesiana*	Chilean Needle-grass	high	high
MTG	*Bromus diandrus*	Great Brome	high	low
MTG	*Lolium perenne*	Perennial Rye-grass	high	low
MTG	*Romulea rosea*	Onion Grass	high	low
MTG	*Bromus catharticus*	Prairie Grass	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Briza minor*	Lesser Quaking-grass	high	low
MNG	*Cynosurus echinatus*	Rough Dog's-tail	high	low
MNG	*Dactylis glomerata*	Cocksfoot	high	high
MNG	*Avena barbata*	Bearded Oat	high	low
MNG	*Paspalum distichum*	Water Couch	high	high
SC	*Galium aparine*	Cleavers	high	low
SC	*Vicia sativa* ssp. *sativa*	Common Vetch	high	low

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Appendix 7: Best / Remaining 50% habitat assessment for rare and threatened species

Species and DSE Conservation Status	Habitat Zones	Assessment Process	Outcome	Conservation Significance	Justification
Arching Flax-lily (v)	B, C and D	A, D, F, No	Remaining 50% Habitat	High	The quality of the understorey in these Habitat Zones is not considered to be significant.
Austral Tobacco (r)	J	A, B, E, F, Yes	Best 50% Habitat	High	The large size of the population recorded in Habitat Zone J suggests that it provides above-average habitat for the species.
Branching Groundsel (r)	I, P and Q	A, D, No	No further consideration	N/A	The quality of the understorey in these Habitat Zones is not considered to be significant.
Fragrant Saltbush (r)	J and Q	A, B, E, F, Yes	Best 50% Habitat	Very High	The large size of the population recorded in Habitat Zones suggests that it provides above-average habitat for the species.
Melbourne Yellow-gum (v)	J, L, M and N	A, B, E, F, Yes	Best 50% Habitat	Very High	The large size of the population recorded in Habitat Zones suggests that it provides above-average habitat for the species.
Melbourne Yellow-gum (v) (Scattered trees)	Tree Nos. 88, 96, 104 and 106	N/A	Best 50% Habitat	Very High	The large size of the population recorded in Habitat Zones and as scattered trees suggests that it provides above-average habitat for the species.
Yellow Star (k)	B, C and D	A, D, F, No	Remaining 50% Habitat	High	The quality of the understorey in these Habitat Zones is not considered to be significant.
Black Falcon (vu)	R, S, T, U, V, W	A, D, No	No further consideration	High	Although habitat is suitable at the study area it is unlikely that the Black Falcon would make significant use of the area.
Diamond Firetail (vu)	K, L, M, N	A, D, F, No	Remaining 50% of habitat	Medium	Although there is suitable habitat for this species at the study area, it is considered to be below average habitat quality.
	A, B, C, D, E, F, G, H, O		Remaining 50% of habitat	High	
	J, Q		Remaining 50% of habitat	Very High	
Swift Parrot (en)	K, L, M, N	A, D, F, No	Remaining 50% of habitat	Medium	Although there is suitable habitat for this species at the study area, it is considered to be below average habitat

Species and DSE Conservation Status	Habitat Zones	Assessment Process	Outcome	Conservation Significance	Justification
	A, B, C, D, E, F, G, H, O		Remaining 50% of habitat	High	quality and is not considered to be core habitat, the bird may just pass through.
	J, Q		Remaining 50% of habitat	Very High	
Grey-headed Flying-Fox (vu)	K, L, M, N	A, D, F, No	Remaining 50% of habitat	Medium	Although there is suitable habitat for this species at the study area, it is considered to be below average habitat quality.
	A, B, C, D, E, F, G, H, O		Remaining 50% of habitat	High	
	J, Q		Remaining 50% of habitat	Very High	
Brown Toadlet (en)	K, L, M, N	A, D, F, No	Remaining 50% of habitat	Medium	Although there is suitable habitat for this species at the study area, it is considered to be below average habitat quality.
	A, B, C, D, E, F, G, H, O		Remaining 50% of habitat	High	
	J, Q		Remaining 50% of habitat	Very High	
Growling Grass Frog (en)	A, B, F, Y, Z, AA	A, D, F, Yes	Best 50% of habitat	Very High	The creeks in the study area are considered to be of high habitat quality.
	I, P		Best 50% of habitat	Very High	

Notes: For habitat zones refer to Figures 1, 2 & 3; Assessment process refers to Table 2 in the Guide for Assessment of referred planning permit applications (DSE 2007a)

Appendix 8: AVW Records of Brown Toadlet

Common Name	Scientific Name	FFG	DSE	Date	Latitude	Longitude	Location
Brown Toadlet	*Pseudophryne bibronii*	L	EN	15-Apr-61	37°37'59"	144°49'00"	1.6 km. E. of Bulla
				15-Apr-61	37°37'54"	144°45'04"	4 km. E. of Diggers Rest
				15-Apr-61	37°37'00"	144°55'00"	5.6 km. N. of Broadmeadows
				25-Apr-61	37°37'00"	144°55'00"	5.6 km. N. of Broadmeadows
				6-May-62	37°34'59"	144°52'59"	1.6 km. N. of Yuroke
				11-May-62	37°37'54"	144°55'04"	4.8 km. N. of Broadmeadows
				1-Apr-72	37°34'59"	144°43'59"	Sunbury
				28-Sep-72	37°34'59"	144°43'59"	Sunbury
				3-Oct-72	37°34'59"	144°43'59"	Sunbury
				2-May-89	37°35'26"	144°48'23"	Roughly 4 km NNW of bulla
				2-May-89	37°38'09"	144°47'40"	Bulla
				30-Mar-90	37°38'53"	144°49'13"	Oaklands Junction
				4-May-90	37°37'02"	144°44'14"	Roughly 2 km W of Redstone
				29-May-90	37°38'02"	144°50'58"	Roughly 2 km NE of Oaklands Junction

Appendix 9: Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on flora species	Austral Tobacco (1), Fragrant Saltbush (2) and Melbourne Yellow-gum (3) (recorded in study area)- DSE listed flora species	*Without the proposed mitigation measures*	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**
			With the proposed mitigation measures	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**	No impacts on these species **Very Well**

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on fauna species	Growling Grass Frog (habitat in Deep Creek) -EPBC Act, FFG Act & DSE listed	*Without the proposed mitigation measures*	Non perpendicular crossingof Deep Creek for approximately 250 m increasing the likelihood that some piers supporting the bridge will need to be placed within the creekline and thus impact on Growling Grass Frog habitat **Very Poor**	A perpendicular crossing of Deep Creek minimises impacts to Growling Grass Frog habitat however supporting piers may still be placed in suitable habitat **Poor**	A perpendicular crossing of Deep Creek minimises impacts to Growling Grass Frog habitat however supporting piers may still be placed in suitable habitat **Poor**	A perpendicular crossing of Deep Creek minimises impacts to Growling Grass Frog habitat however supporting piers may still be placed in suitable habitat **Poor**	Does not cross Deep Creek **Very Well**	Does not cross Deep Creek **Very Well**
			With the proposed mitigation measures	Amending the creek crossing to that of BB1 North, including mitigation measures outlined, minimises impacts to Growling Grass Frog habitat **Moderately Well**	If the piers supporting the bridge are not placed in Growling Grass Frog habitat in Deep Creek, the impacts to this species are minimised. **Moderately Well**	If the piers supporting the bridge are not placed in Growling Grass Frog habitat in Deep Creek, the impacts to this species are minimised. **Moderately Well**	If the piers supporting the bridge are not placed in Growling Grass Frog habitat in Deep Creek, the impacts to this species are minimised. **Moderately Well**	Does not cross Deep Creek. No mitigation measures required **Very Well**	Does not cross Deep Creek. No mitigation measures required **Very Well**

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on fauna species	Australian Grayling and Yarra Pygmy Perch(habitat in Deep Creek) - EPBC Act, FFG Act & DSE listed)	*Without the proposed mitigation measures*	A creek crossing over Deep Creek may impact on the habitat and life cycle of these fish Very Poor	A creek crossing over Deep Creek may impact on the habitat and life cycle of these fish Poor	A creek crossing over Deep Creek may impact on the habitat and life cycle of these fish Poor	A creek crossing over Deep Creek may impact on the habitat and life cycle of these fish Poor	Does not cross Deep Creek Very Well	Does not cross Deep Creek Very Well
			With the proposed mitigation measures	Amending the creek crossing to that of BB1 North, including mitigation measures outlined, minimises Impacts. The Deep Creek crossing must be a bridge and construction and usage of the bridge must not impede water movement, cause no obstruction to fish passage and ensure that the hydrological regime of the creek is retained **Moderately Well**	The Deep Creek crossing must be a bridge and construction and usage of the bridge must not impede water movement, cause no obstruction to fish passage and ensure that the hydrological regime of the creek is retained **Moderately Well**	The Deep Creek crossing must be a bridge and construction and usage of the bridge must not impede water movement, cause no obstruction to fish passage and ensure that the hydrological regime of the creek is retained **Moderately Well**	The Deep Creek crossing must be a bridge and construction and usage of the bridge must not impede water movement, cause no obstruction to fish passage and ensure that the hydrological regime of the creek is retained **Moderately Well**	Does not cross Deep Creek. No mitigation measures required Very Well	Does not cross Deep Creek. No mitigation measures required Very Well

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on vegetation communities	Grey Box Grassy Woodlands - EPBC Act listed- and Derived Native Grasslands of South-eastern Australia - EPBC Act listed -Grey Box – Buloke Grassy Woodland (Habitat Zone W) - FFG Act listed	*Without the proposed mitigation measures*	No impacts **Very Well**	No impacts **Very Well**	No impacts **Very Well**	No impacts **Very Well**	No impacts **Very Well**	No impacts **Very Well**
			With the proposed mitigation measures	No impacts so no mitigation required **Very Well**	No impacts so no mitigation required **Very Well**	No impacts so no mitigation required **Very Well**	No impacts so no mitigation required **Very Well**	No impacts so no mitigation required **Very Well**	No impacts so no mitigation required **Very Well**

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on vegetation communities	Remnant patch vegetation removal	*Without the proposed mitigation measures*	0.652 ha 0.22 Hha High and Very High Conservation Significance **Well**	2.005 ha 0.47 Hha High and Very High Conservation Significance **Moderately Well**	3.381 ha 0.69 Hha High and Very High Conservation Significance **Poor**	2.767 ha 0.567 Hha High and Very High Conservation Significance **Poor**	None to be removed **Very Well**	0.043 ha 0.01Hha High Conservation Significance **Very Well**
			With the proposed mitigation measures	Vegetation removal has been minimized however amending the creek crossing to a perpendicular one as in alignment BB1 North can reduce creekline remnant patch vegetation removal **Very Well**	None of the proposed mitigation measures lessens this impact **Moderately Well**	None of the proposed mitigation measures lessens this impact **Well**	None of the proposed mitigation measures lessens this impact **Well**	None to be removed **Very Well**	This alignment involves a small amount of remnant patch vegetation removal and there is no opportunity for further reductions to vegetation removal **Very Well**

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	Sub-objectives			Alignment Option					
				BB1 South	BB1 North	BB2	BB3	Oaklands Road Duplication	Airport Link
To minimise impacts on biodiversity, including catchment values / waterways	Minimise impacts on Large Old Trees, Very Large Old trees and scattered trees	%of total Large and Very Large Old Trees in study area proposed to be removed	*Without the proposed mitigation measures*	1.89 **Well**	5.03 **Moderately Well**	6.29 **Poor**	6.92 **Poor**	1.89 **Well**	1.89 **Well**
			With the proposed mitigation measures	Vegetation removal has been minimized however amending the creek crossing to a perpendicular one like other alignments can reduce large old tree removal **Very Well**	None of the proposed mitigation measures lessens this impact **Moderately Well**	None of the proposed mitigation measures lessens this impact **Poor**	None of the proposed mitigation measures lessens this impact **Poor**	There is no opportunity to avoid impacting upon these trees **Well**	There is no opportunity to avoid impacting upon these trees **Well**

Objective Based Evaluation Matrix (OBEM) for Bulla Bypass - Biodiversity									
Project Objective	**Sub-objectives**			**Alignment Option**					
				BB1 South	**BB1 North**	**BB2**	**BB3**	**Oaklands Road Duplication**	**Airport Link**
To minimise impacts on biodiversity, including catchment values / waterways	**Minimise impacts on Large Old Trees, Very Large Old trees and scattered trees**	Scattered tree removal	*Without the proposed mitigation measures*	1 x Large **Very Well**	1 x Large **Very Well**	3 x Very large 5 x Large 4 x Medium 7 x Small **Poor**	3 x Very Large 6 x Large 9 x Medium 8 x Small **Poor**	1 x Very large 1 x Small **Well**	1 X Very Large 1 x Large 1 x Medium **Well**
			With the proposed mitigation measures	Minimal vegetation removal **Very Well**	Minimal vegetation removal **Very Well**	None of the proposed mitigation measures lessens this impact **Poor**	None of the proposed mitigation measures lessens this impact **Poor**	No further mitigation practical or proposed **Well**	No further mitigation practical or proposed **Well**
	Mininise isolating and/or fragmenting habitat in a landscape context	Habitat Isolated and/or fragmented	*Without the proposed mitigation measures*	Bypass option with second least impact **Well**	Least impact of bypass options **Very Well**	High impacts **Poor**	High impacts **Poor**	No impacts **Very Well**	Very low impacts **Very Well**
			With the proposed mitigation measures	Impact further reduced **Very Well**	None of the proposed mitigation measures lessens this impact **Very Well**	None of the proposed mitigation measures lessens this impact **Poor**	None of the proposed mitigation measures lessens this impact **Poor**	No impacts **Very Well**	No further mitigation practical or proposed **Very Well**