Figure 12: Native vegetation to be removed by BB1 North

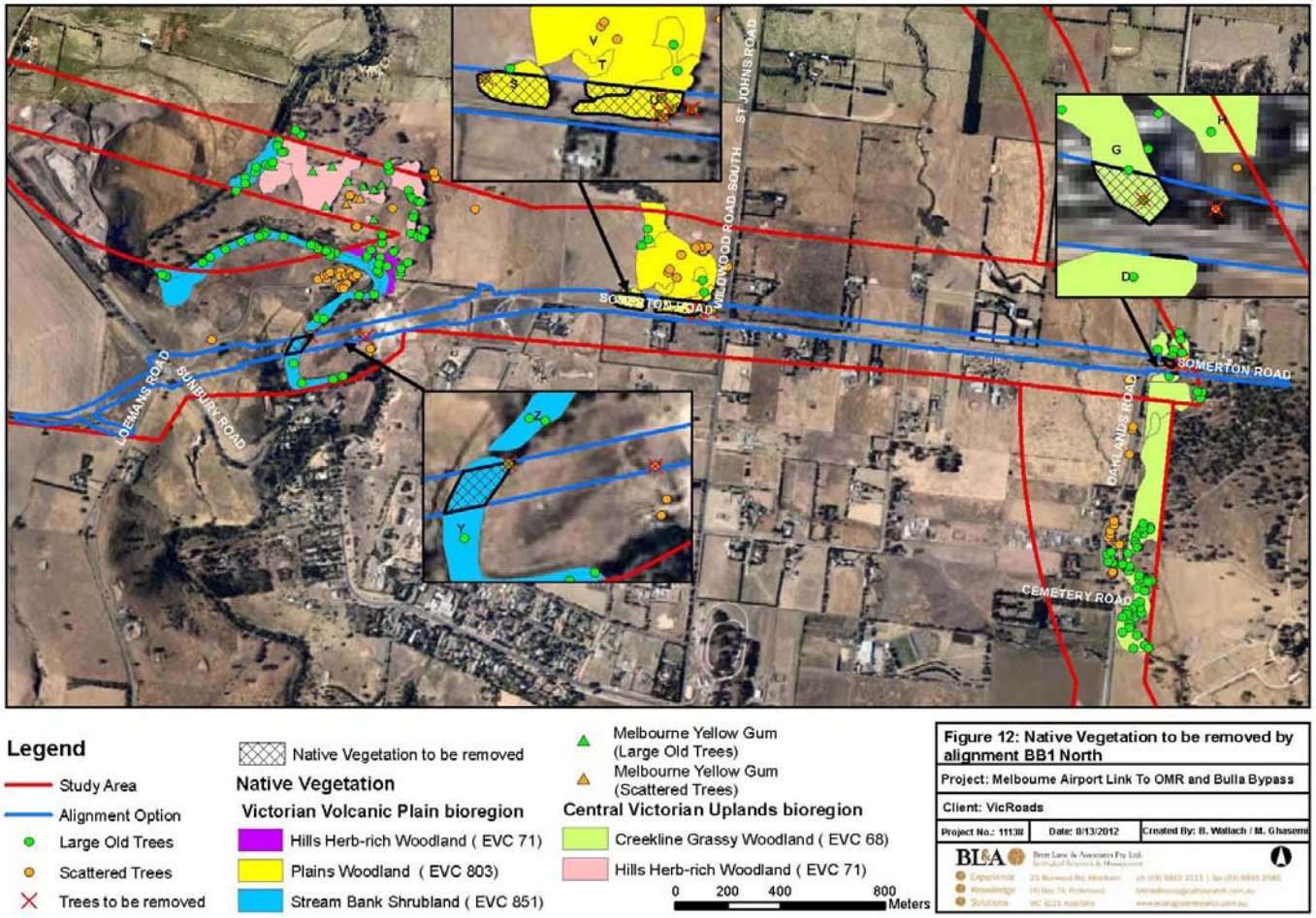


Figure 13: Native vegetation to be removed by BB2

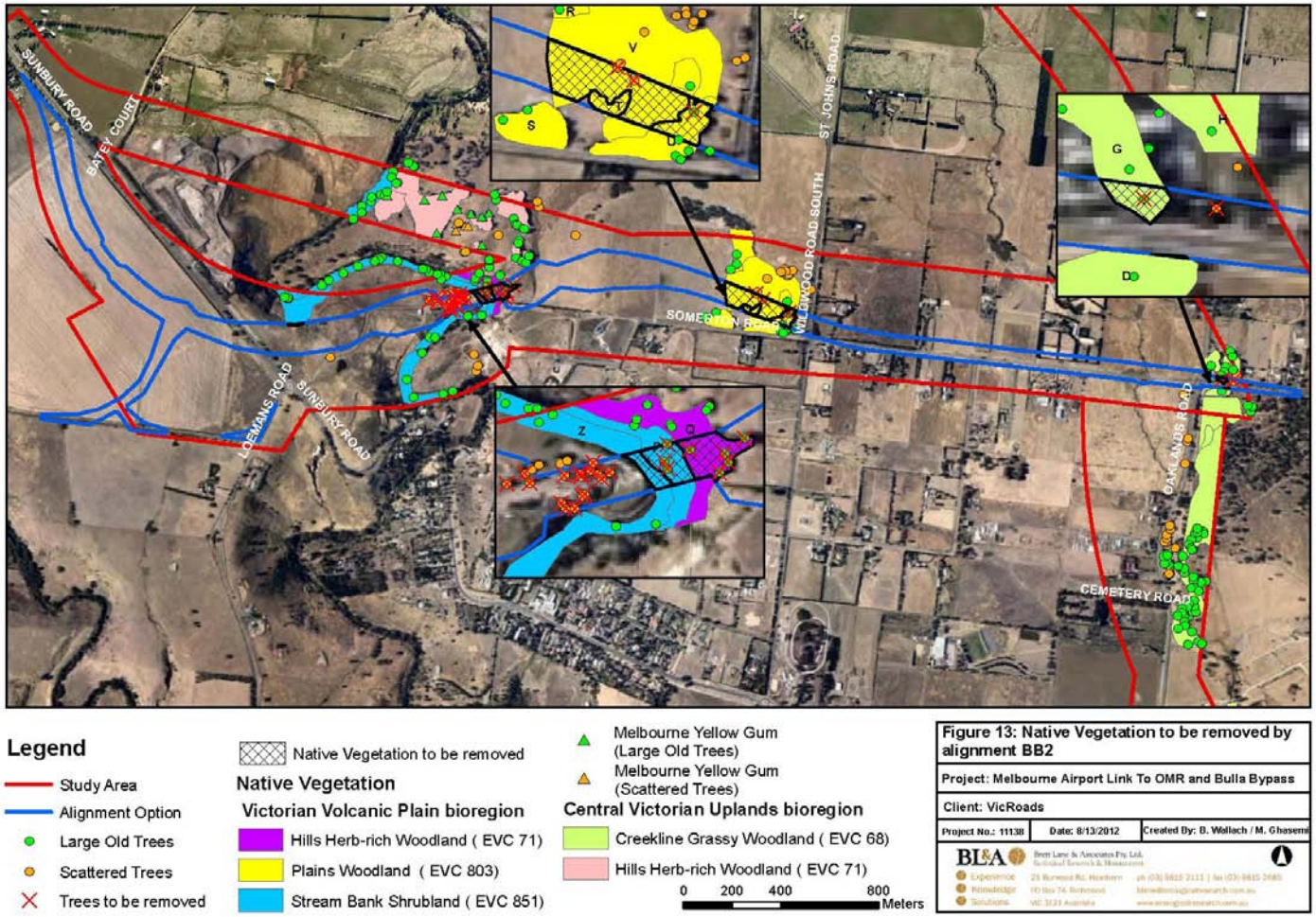


Figure 14: Native vegetation to be removed by BB3

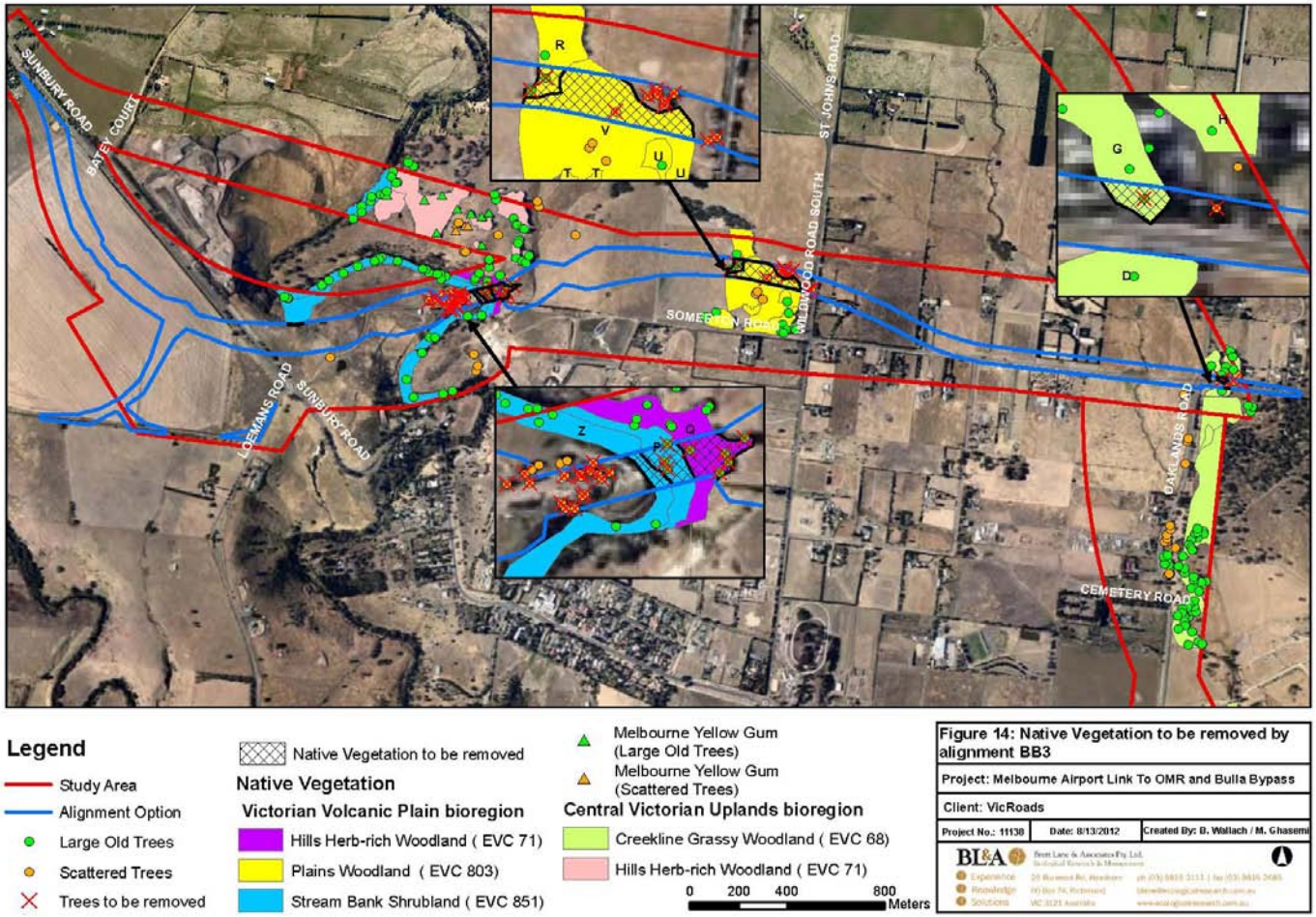


Figure 15: Native vegetation to be removed by Oaklands Road Duplication

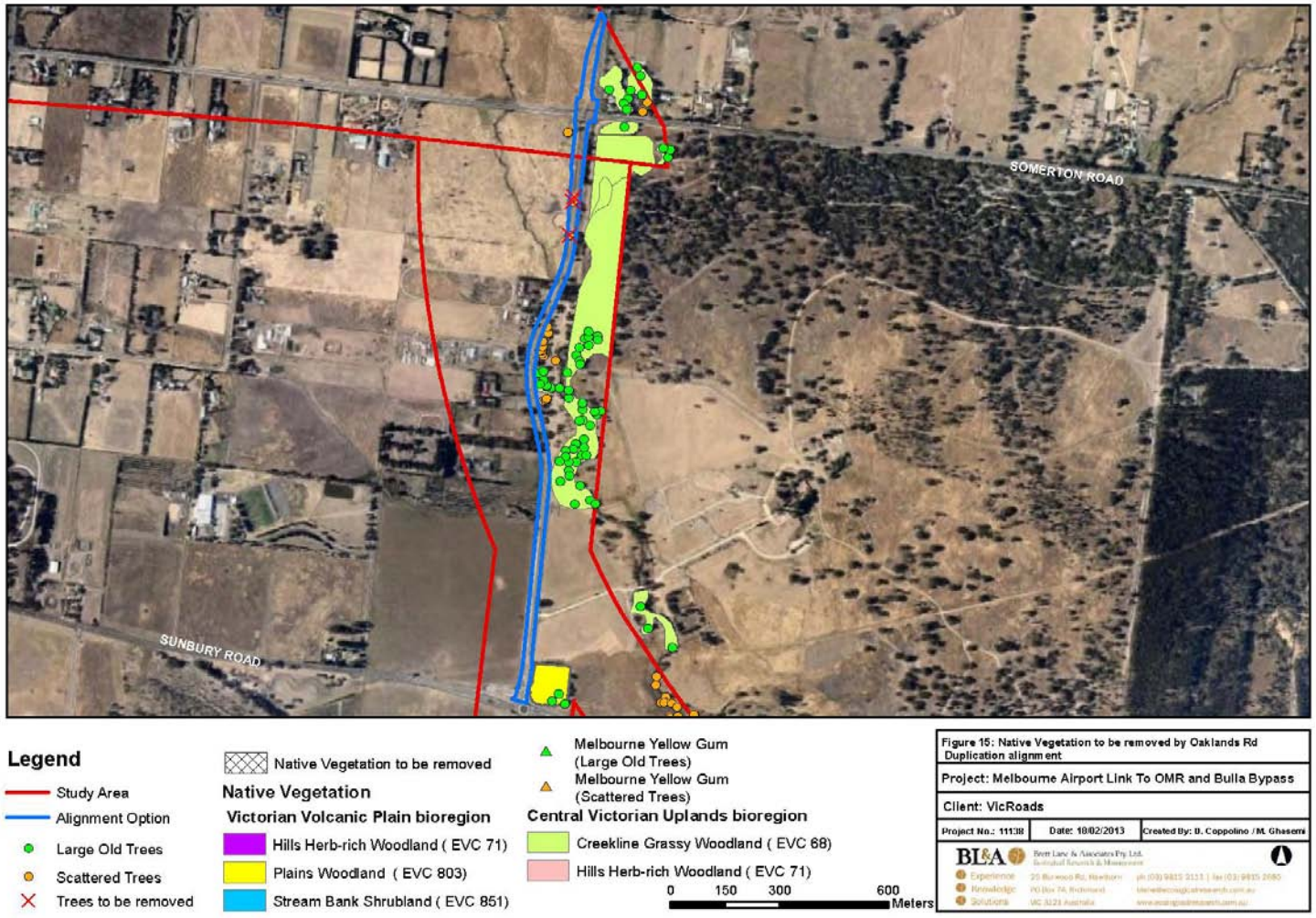
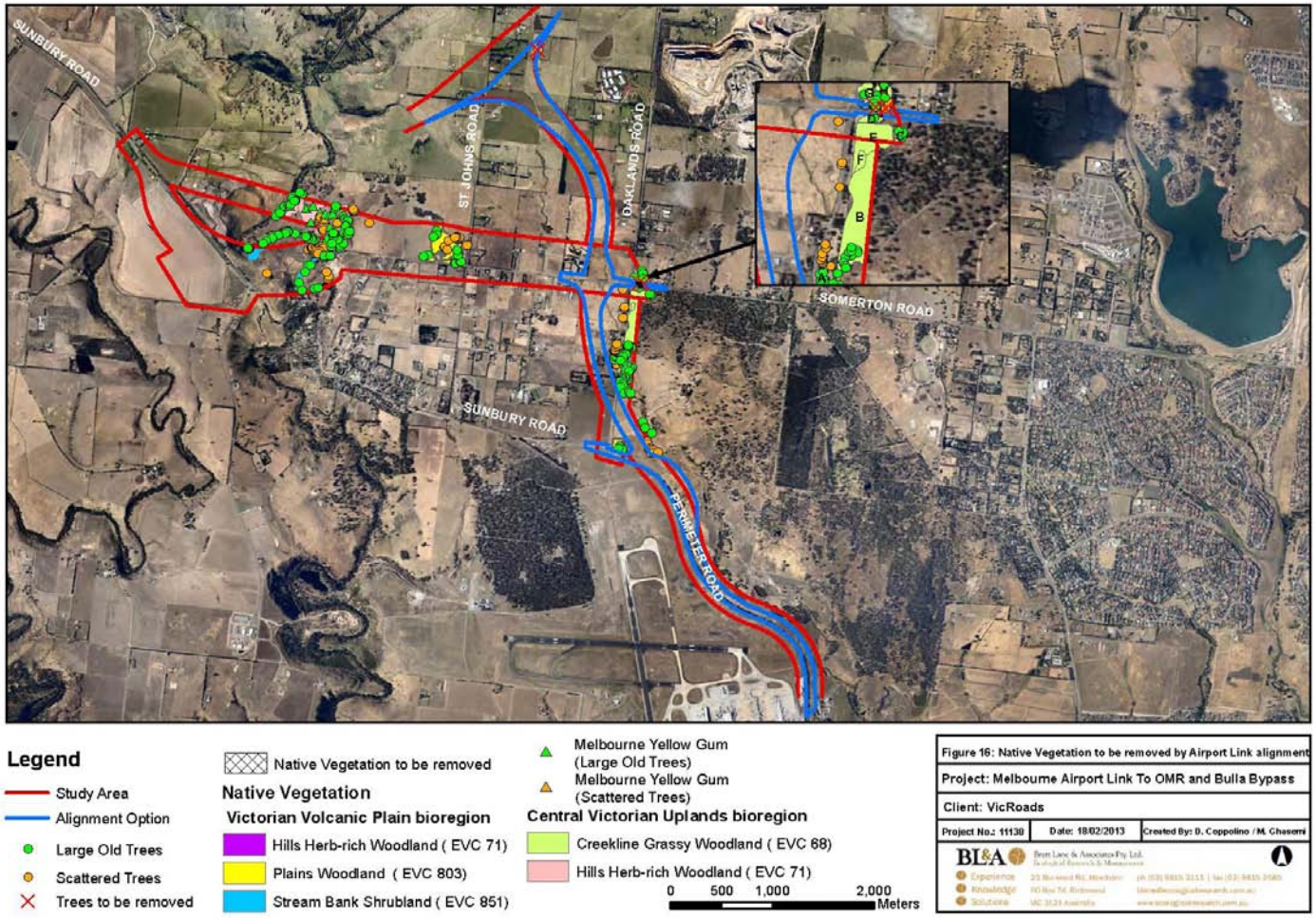


Figure 16: Native vegetation to be removed by Melbourne Airport Link



7.11. Planning controls

7.11.1. State provisions

Destruction, lopping or 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. This includes the removal of dead trees with a DBH of 40 centimetres or greater, native degraded treeless vegetation and/or any individual scattered native plants.

Before issuing a planning permit, Responsible Authorities are obligated to refer to Clause 12.01 (Biodiversity) in the Planning Scheme. This refers in turn to Victoria's Native Vegetation Management Framework – a Framework for Action, discussed in the following section.

7.11.2. Local provisions

The study area is subject to several overlays in the Hume Planning Scheme, one of which is relevant to this assessment. The purpose and implications of this relevant overlay is discussed in this section.

Environmental Significance Overlay (ESO1)

This overlay applies to the steep escarpments that occur along Deep Creek near the Bulla Township.

Purpose:

The overlay covers a number of waterways within the Hume City Council that are considered to have significant visual and geological features of the rural landscape and which serve important ecological, drainage and recreational functions. This overlay aims to protect and enhance the health and vitality of these aquatic ecosystems.

Implications:

The proposed works will require a planning permit if any native vegetation is proposed to be removed within the ESO1. A planning permit would also be required if any degradation is expected along Deep Creek. Specific construction control measures should however be put in place to avoid any impact on this aquatic ecosystem.

With the exception of the Melbourne Airport Link and Oaklands Road Duplication, all proposed alignments are likely to require a planning permit under ESO1 for impacting on native vegetation within area subject to the overlay and any possible degradation along Deep Creek.

7.12. Native Vegetation Management Framework

7.12.1. 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 steps:

- Step 1: As a priority, ***avoid*** adverse impacts on native vegetation, particularly through clearance;

If the removal of native vegetation cannot be avoided:

- Step 2: ***Minimise*** impacts through appropriate consideration in the planning process and expert input to project design or management; and
- Step 3: Identify appropriate ***offset*** options.

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 Table 12.

Table 12: 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
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
MEDIUM	Clearing generally not permitted	Equivalent Gain At least 1 X calculated loss in habitat hectares plus a large tree protection and replacement offset if any large trees are removed
LOW	Clearing may be permitted but only as part of an appropriate sustainable use response	Equivalent Gain At least 1 X calculated loss in habitat hectares

Offset 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 13 indicate when the DSE becomes a referral authority.

Table 13: Application referral criteria

Applications will be referred to the Department of Sustainability and Environment under the following circumstances:
Scattered Trees ▪ To remove or destroy more than 15 native trees if each tree has a trunk diameter of less than 40 centimetres at a height of 1.3 metres above ground level (DBH = diameter at 1.3 metres above ground). ▪ To remove or destroy more than 5 native trees if each tree has a trunk diameter of 40 centimetres or more at a height of 1.3 metres above ground level.
Remnant Patch Vegetation (may include trees) ▪ To remove or destroy native vegetation which is in an Ecological Vegetation Class that has a Bioregional Conservation Status of Endangered, Vulnerable or Rare if the area to be cleared is more than 0.5 hectare. ▪ To remove or destroy native vegetation which is in an Ecological Vegetation Class that has a Bioregional Conservation Status of Depleted or Least Concern if the area to be cleared is more than 1 hectare.

The criterion described above has been considered for each of the proposed alignments, and the need for a referral to DSE is discussed below. In summary, all alignment options other than Melbourne Airport Link and Oaklands Road Duplication would trigger a referral to DSE.

- **BB1 South:** This alignment would trigger a referral to DSE due to the proposed removal of more than 0.5 hectares from Habitat Zones D, G, P, Q, U and Z. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
- **BB1 North:** This alignment would trigger a referral to DSE due to the proposed removal of more than 0.5 hectares from Habitat Zones D, G, S, U, V and Y. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
- **BB2:** This alignment would trigger a referral to DSE due to the proposed removal of more than five scattered trees with a DBH of 40 centimetres or greater AND more than 0.5 hectares from Habitat Zones D, G, P, Q, T, U, V, Z and AA. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
- **BB3**: This alignment would trigger a referral to DSE due to the proposed removal of more than five scattered trees with a DBH of 40 centimetres or greater AND more than 0.5 hectares from Habitat Zones D, G, P, Q, R, V, Z and AA. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
- **Melbourne Airport Link:** This alignment would not trigger a referral to DSE as none of the criteria are met.
- **Oaklands Road Duplication:** This alignment would not trigger a referral to DSE as none of the criteria are met

7.12.2. Design recommendations

The proposed alignments have been designed taking into account the results of an ecological overview assessment conducted in November 2010 and February 2011 (BL&A, 2011). VicRoads have indicated that, where possible, the six road alignments considered in the current report have avoided areas of significant native vegetation and/or fauna habitat.

The results of this detailed habitat hectare and net gain assessment will allow the proponent to either:

- Make further adjustments to the alignments being considered and so reduce impacts on environmental values; or
- Choose the alignment with the least impact.

7.12.3. Offset targets for removal from habitat zones

Offsets for the removal of native vegetation from habitat zones are directly related to the habitat hectare value of the removed vegetation. These may include the permanent protection (e.g. Section 173 agreement under the *Planning and Environment Act 1987*) for conservation purposes of other existing remnant vegetation. Offsets may be located within the study area or offsite. The offset site must be actively managed to achieve a gain for a period of 10 years and subsequently maintained in perpetuity. Offsite offsets may be identified on a case-by-case basis by the proponent or through the DSE Bush Broker scheme.

Offsets must be of a like-for-like nature as outlined in the Framework. Like-for-like requirements are summarised in Table 14.

Table 14: Like-for-like requirements for offsetting removal of remnant patch native vegetation

Like-for-like criteria	Conservation significance			
	Very high	High	Medium	Low
Type of vegetation that may be used for offsets	Same EVC	Same EVC OR *very high* conservation significance vegetation within the same bioregion	Any EVC in the same bioregion OR *very high* or *high* conservation significance vegetation in an adjacent bioregion	
Minimum quality of the existing vegetation proposed as the basis of an offset	90% of the quality in the area being lost	75% of the quality in the area being lost	50% of the quality in the area being lost	
Maximum proportion of the offset target (in Habitat Hectares) that may be achieved through revegetation	10%	25%	50%	100%

Offset targets for the removal from habitat zones in each of the six development alignments are presented individually from Table 15 to Table 19.

Table 15: Offset targets for removal from habitat zones for BB1 South

Habitat Hectares Target							Large Tree Target				
								Protect		Recruit^	
Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier*	Net Gain Target (Hha)	Total Losses	Multiplier*	Target (trees)	Multiplier*	Target (plants)
P	Very high	Stream Bank Shrubland (EVC 851)	0.049	0.02	x 2	0.04	0	X 8	0	X 40	0
Q	Very high	Hills Herb-rich Woodland (EVC 71)	0.044	0.01	x 2	0.02	0	X 8	0	X 40	0
D	High	Creekline Grassy Woodland (EVC 68)	0.001	0.00	x 1.5	0.00	0	X 4	0	X 20	0
G	High		0.062	0.01	x 1.5	0.02	1	X 4	4	X 20	20
Z	High	Stream Bank Shrubland (EVC 851)	0.488	0.17	x 1.5	0.26	2	X 4	8	X 20	40
U	High	Plains Woodland (EVC 803)	0.008	0.01	x 1.5	0.02	0	X 4	0	X 20	0
Totals			**0.652**	**0.22**		**0.36**	**3**		**12**		**60**

***** = These multipliers relate to Table 6 of the Framework and may be varied by the Regional Vegetation Plans; **^** = 15% of plants recruited must be canopy trees; Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 16: Offset targets for removal from habitat zones for BB1 North

Habitat Hectares Target							Large Tree Target				
								Protect		Recruit^	
Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier*	Net Gain Target (Hha)	Total Losses	Multiplier*	Target (trees)	Multiplier*	Target (plants)
Y	Very high	Stream Bank Shrubland (EVC 851)	0.379	0.09	x 2	0.18	0	X 8	0	X 40	0
D	High	Creekline Grassy Woodland (EVC 68)	0.001	0.00	x 1.5	0.00	0	X 4	0	X 20	0
G	High		0.094	0.02	x 1.5	0.03	1	X 4	4	X 20	20
S	High	Plains Woodland (EVC 803)	0.637	0.13	x 1.5	0.20	1	X 4	4	X 20	20
U	High		0.729	0.21	x 1.5	0.32	6	X 4	24	X 20	120
V	High		0.165	0.02	x 1.5	0.03	0	X 4	0	X 20	0
Totals			**2.005**	**0.47**		**0.76**	**8**		**32**		**160**

***** = These multipliers relate to Table 6 of the Framework and may be varied by the Regional Vegetation Plans; **^** = 15% of plants recruited must be canopy trees; Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 17: Offset targets for removal from habitat zones for BB2

Habitat Hectares Target							Large Tree Target				
								Protect		Recruit^	
Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier*	Net Gain Target (Hha)	Total Losses	Multiplier*	Target (trees)	Multiplier*	Target (plants)
P	Very high	Stream Bank Shrubland (EVC 851)	0.271	0.11	x 2	0.22	1	X 8	8	X 40	40
Q	Very high	Hills Herb-rich Woodland (EVC 71)	0.452	0.14	x 2	0.28	4	X 8	32	X 40	160
D	High	Creekline Grassy Woodland (EVC 68)	0.001	0.00	x 1.5	0.00	0	X 4	0	X 20	0
G	High		0.062	0.01	x 1.5	0.02	1	X 4	4	X 20	20
Z	High	Stream Bank Shrubland (EVC 851)	0.129	0.05	x 1.5	0.08	3	X 4	12	X 20	60
AA	High		0.029	0.00	x 1.5	0.00	0	X 4	0	X 20	0
T	High	Plains Woodland (EVC 803)	0.201	0.03	x 1.5	0.05	0	X 4	0	X 20	0
U	High		0.430	0.12	x 1.5	0.18	1	X 4	4	X 20	20
V	High		1.806	0.22	x 1.5	0.33	0	X 4	0	X 20	0
Totals			**3.381**	**0.693**		**1.16**	**10**		**60**		**300**

***** = These multipliers relate to Table 6 of the Framework and may be varied by the Regional Vegetation Plans; **^** = 15% of plants recruited must be canopy trees; Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 18: Offset targets for removal from habitat zones for BB3

Habitat Hectares Target							Large Tree Target				
								Protect		Recruit^	
Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier*	Net Gain Target (Hha)	Total Losses	Multiplier*	Target (trees)	Multiplier*	Target (plants)
P	Very high	Stream Bank Shrubland (EVC 851)	0.271	0.11	x 2	0.22	1	X 8	8	X 40	40
Q	Very high	Hills Herb-rich Woodland (EVC 71)	0.452	0.14	x 2	0.28	4	X 8	32	X 40	160
D	High	Creekline Grassy Woodland (EVC 68)	0.001	0.00	x 1.5	0.00	0	X 4	0	X 20	0
G	High		0.062	0.01	x 1.5	0.02	1	X 4	4	X 20	20
Z	High	Stream Bank Shrubland (EVC 851)	0.129	0.05	x 1.5	0.08	3	X 4	12	X 20	60
AA	High		0.029	0.00	x 1.5	0.00	0	X 4	0	X 20	0
R	High	Plains Woodland (EVC 803)	0.247	0.05	x 1.5	0.02	2	X 4	8	X 20	40
V	High		1.576	0.19	x 1.5	0.29	0	X 4	0	X 20	0
Totals			**2.767**	**0.567**		**0.91**	**11**		**64**		**320**

***** = These multipliers relate to Table 6 of the Framework and may be varied by the Regional Vegetation Plans; **^** = 15% of plants recruited must be canopy trees; Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 19: Offset targets for removal from habitat zones for Melbourne Airport Link

Habitat Hectares Target							Large Tree Target				
								Protect		Recruit^	
Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier*	Net Gain Target (Hha)	Total Losses	Multiplier*	Target (trees)	Multiplier*	Target (plants)
D	High	Creekline Grassy Woodland (EVC 68)	0.001	0.00	x 1.5	0.00	0	X 4	0	X 20	0
G	High		0.042	0.01	x 1.5	0.02	1	X 4	4	X 20	20
Totals			**0.043**	**0.01**		**0.02**	**1**		**4**		**20**

***** = These multipliers relate to Table 6 of the Framework and may be varied by the Regional Vegetation Plans; **^** = 15% of plants recruited must be canopy trees; Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

The process of calculating offsets is highly complex. The area required to achieve the offset targets listed above, is based on vegetation quality within the offset site and the proposed management, tenure and security. Previous experience has demonstrated that the following amount of suitable native vegetation may be required to achieve the offset target per alignment.

- **BB1 South:** Approximately 1.80 hectares (EQUATION: Gain Target (hha) x 5 = 1.80)
- **BB1 North:** Approximately 3.80 hectares (EQUATION: Gain Target (hha) x 5 = 3.80)
- **BB2:** Approximately 5.80 hectares (EQUATION: Gain Target (hha) x 5 = 5.80)
- **BB3:** Approximately 4.55 hectares (EQUATION: Gain Target (hha) x 5 = 4.55)
- **Melbourne Airport Link:** Approximately 0.10 hectares (EQUATION: Gain Target (hha) x 5 = 0.10)

These estimates are based on a potential 20% improvement of the offset site. It should be noted that this is an approximation only. The potential for an offset site to achieve the required offset targets can only be calculated once the final offset site has been identified.

These offset targets may or may not be achieved within the study area; it will largely be determined by which alignment is selected by the proponent and the willingness of landholders to provide offsets on their land. If they cannot be met within the study area, an appropriate third party offset site (i.e. site located on another property) would need to be identified through discussions with the Responsible Authority or with the DSE BushBroker coordinator.

Additional offset targets for removal of large and very large trees from habitat zones (except from habitat zones of low conservation significance) apply to any such approved removal under the Framework and the Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006) and are presented in Table 15 to Table 19.

These offsets contain both a protection and recruitment component, whereby a prescribed number of existing trees must be protected for conservation purposes, and a prescribed number of new indigenous plants must be successfully recruited through planting and/or assisted natural regeneration.

It is likely that there will be enough large old trees to protect and space for new tree recruitment in the study area provided that landholders are willing to provide offsets on their land. As mentioned earlier, the location of large tree offsets will need to be finalised once the final development plan is confirmed (i.e. one alignment is chosen). Large tree offsets can also be obtained through the DSE BushBroker coordinator.

7.12.4. Offset targets for removal of scattered trees

Any approved removal of scattered trees will attract an offset target comprising protection and recruitment components, whereby a prescribed number of trees of the same size class must be protected and recruitment (planting or assisted

regeneration) of indigenous plants undertaken. The scale of the offset is determined by the size class of the trees proposed to be removed. Alternatively, in the event that the protection of existing trees is considered not to be feasible, a 'recruit only' offset for tree removal may apply, subject to negotiation with the Responsible Authority.

Offset targets for approved removal of scattered trees in each of the six alignments, as determined by the Framework and the Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006), are presented in Table 20 to Table 25.

Table 20: BB1 South - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
Medium	Large	1	x 2	2	x 15	15	65
Totals		**1**		**2**		**15**	**65**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); **# =** Offsets for the removal of small scattered trees are calculated based on the specific DBH of the tree. Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 21: BB1 North - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
Medium	Large	1	x 2	2	x 15	15	65
Totals		**1**		**2**		**15**	**65**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); **# =** Offsets for the removal of small scattered trees are calculated based on the specific DBH of the tree. Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 22: BB2 - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
High	Large	2	x 4	8	x 20	40	240
Medium	Very Large	3	x 4	12	x 20	60	280
Medium	Large	3	x 2	6	x 15	45	195
Medium	Medium	4	x 1	4	x 15	60	140
Low	Small	7	N/A	N/A	Variable #	161	161
Totals		**19**		**30**		**366**	**1156**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); **# =** Offsets for the removal of small scattered trees are calculated based on the specific DBH of the tree. Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 23: BB3 - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
High	Large	3	x 4	12	x 20	60	360
High	Medium	5	x 2	10	x 20	100	300
Medium	Very Large	3	x 4	12	x 20	60	420
Medium	Large	3	x 2	6	x 15	45	195
Medium	Medium	4	x 1	4	x 15	60	140
Low	Small	8	N/A	N/A	Variable #	192	192
Totals		**26**		**44**		**517**	**1607**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); **# =** Offsets for the removal of small scattered trees are calculated based on the specific DBH of the tree. Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 24: Oaklands Road Duplication - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
High	Very large	1	x 5	5	x 30	30	180
Low	Small	1	N/A	N/A	Variable #	30	30
Totals		**2**		**5**		**60**	**210**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); **** =** This scattered tree is a Melbourne Yellow-gum, a species listed on DSE's Advisory List, see Appendix 7 for more details regarding conservations significance; **# =** Offsets for the removal of small scattered trees are calculated based on the specific DBH of the tree. Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

Table 25: Melbourne Airport Link - Summary of offset targets for scattered tree removal

Conservation Significance	Size Class	No. Trees to be Removed	Protect and Recruit Option				Recruit Only Option*
			Protect (No. of Trees)		Recruit (No. of Plants)*		
			Multiplier*	Offset Total	Multiplier*	Offset Total	
High	Very large	1	x 5	5	x 30	30	180
High	Medium	1	x 2	2	x 20	20	60
Medium	Large	1	x 2	2	x 15	15	65
Totals		**3**		**9**		**65**	**305**

***** = 15% of plants recruited must be canopy trees only (PPWCMA 2006); Tree replacement numbers are sourced from Section 3.4.4 (Figure 7) of the Port Phillip and Western Port CMA Native Vegetation Plan (2006); Note that DSE acknowledge that the secure protection of 1 tree will result in the natural recruitment of 5 new plants.

7.13. 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. Any impacts on these species considered significant requires the approval of the Australian Minister for the Environment. If there is a possibility of a significant impact on nationally threatened species or communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide after 20 business days whether the project will be a 'controlled action' under the EPBC Act, in which case it cannot be undertaken without the approval of the Minister. This approval depends on a further assessment and approval process.

7.13.1. Threatened ecological communities

One EPBC Act listed ecological community, Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, was recorded within Habitat Zone W in the study area. No other listed communities were recorded or considered likely to occur in the study area.

7.13.2. Threatened flora species

No EPBC Act listed flora species were recorded and none were considered likely to occur in the study area.

7.13.3. Threatened fauna species

No EPBC Act listed fauna species were recorded but three were considered likely to occur — Growling Grass Frog, Grey-headed Flying-fox and Swift Parrot. The Growling Grass Frog is known from the Moonee Ponds Creek. No targeted surveys for this highly mobile species were undertaken as surveys may not record the species. Instead, a precautionary approach has been taken whereby it is assumed that Growling Grass Frog is present in the study area along the Moonee Ponds Creek and Deep Creek (Figures 1, 2 & 3).

Growling Grass Frog could potentially be impacted upon by creek crossings undertaken as part of this project.

7.13.4. Key Threatening Processes under the EPBC Act

The following Key Threatening Process is considered relevant for the project:

- Land clearance.

7.13.5. Implications

Alignment BB1 South:

- Potential impacts on the Growling Grass Frog – removal of habitat and potential impacts to water quality along Deep Creek.
- This alignment crosses Deep Creek for approximately 250 metres and is likely to have some piers in the creekline causing disturbance to creek ecology, native vegetation and habitat connectivity.

Alignment BB1 North:

- Potential impacts on the Growling Grass Frog – removal of habitat and potential impacts to water quality along Deep Creek.

Alignment BB2:

- Potential impacts on the Growling Grass Frog – removal of habitat and potential impacts to water quality along Deep Creek.

Alignment BB3:

- Potential impacts on the Growling Grass Frog – removal of habitat and potential impacts to water quality along Deep Creek.

Alignment Oaklands Road Duplication:

- Potential impacts to water quality along the Moonee Ponds Creek due to excess water runoff from road and potential bike path.

A Referral under the EPBC Act is required for the project for the proposed abovementioned impacts.

Alignment Melbourne Airport Link

- Potential impacts to water quality along the Moonee Ponds Creek due to excess water runoff from road and potential bike path.

A Referral under the EPBC Act is required for the project for the proposed abovementioned impacts.

7.14. 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.

7.14.1. Threatened ecological communities

One FFG Act listed ecological community (Grey box – Buloke Grassy Woodland) was recorded in Habitat Zone W, on Commonwealth Land. This ecological community will not be impacted on by any of the alignments.

Additionally, one community (the Victorian temperate woodland bird community) was considered likely to occur. This community was only identified on private land. The impacts of the development will be considered by the local planning authority during the planning permit application.

7.14.2. Threatened/protected flora species

No FFG Act listed flora species were recorded and none were considered likely to occur in the study area.

No protected flora values under the FFG Act were recorded on public land within the study area.

7.14.3. Threatened fauna species

No FFG Act listed fauna species were recorded and six were considered likely to occur.

7.14.4. Key Threatening Processes under the FFG Act

The following Key Threatening Processes are considered relevant for the project:

- Alteration to the natural flow regimes of rivers and streams.
- Alteration to the natural temperature regimes of rivers and streams.
- Degradation of native riparian vegetation along Victorian rivers and streams.
- Habitat fragmentation as a threatening process for fauna in Victoria.
- Infection of amphibians with Chytrid Fungus, resulting in chytridiomycosis.
- Invasion of native vegetation by "environmental weeds".
- Prevention of passage of aquatic biota as a result of the presence of instream structures.

Mitigation measures in Section 8.2 identify specific actions required to manage these key threatening processes.

7.14.5. Implications

A Protected Flora Licence under the FFG Act would not be required for the current proposal.

The impacts of the development on one FFG Act listed ecological community on commonwealth land and one listed bird community on private land will be considered by the local planning authority during the planning permit application.

7.15. EE Act

The "Ministerial Guidelines for Assessment of Environmental Effects under the *Environment Effects Act 1978"* (DSE 2006), identifies the following criteria related to flora and fauna which assist in determining whether a Referral to the State Minister for Planning is required:

- Potential clearing of ten hectares 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. A Referral to the state Minister for Planning in relation to flora and fauna is therefore not required.

7.16. 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.

The proposed development will not impact on any flora species from the DSE *Advisory List of Rare and Threatened Plants in Victoria* (DSE 2007b) recorded in the study area.

The following fauna species listed on the DSE *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007c) are vulnerable to impacts from the proposed development.

- Growling Grass Frog.

Suitable habitat for this species has been mapped and can be viewed in Figure 4. These habitats are to be avoided where possible.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusions

The following implications would pertain to the current development proposal:

- A permit will be required for the proposed removal of native vegetation from the study area.
- The project will be referred to DSE under the following alignments:
    - **BB1 South:** This alignment would trigger a referral to DSE due to the proposed removal of more than 0.5 hectares from Habitat Zones D, G, P, Q, U and Z. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
    - **BB1 North:** This alignment would trigger a referral to DSE due to the proposed removal of more than 0.5 hectares from Habitat Zones D, G, S, U, V and Y. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
    - **BB2:** This alignment would trigger a referral to DSE due to the proposed removal of more than five scattered trees with a DBH of 40 centimetres or greater AND more than 0.5 hectares from Habitat Zones D, G, P, Q, T, U, V, Z and AA. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
    - **BB3**: This alignment would trigger a referral to DSE due to the proposed removal of more than five scattered trees with a DBH of 40 centimetres or greater AND more than 0.5 hectares from Habitat Zones D, G, P, Q, R, V, Z and AA. All these habitat zones have a Bioregional Conservation Status of either Endangered or Vulnerable.
- **Oaklands Road Duplication** would not trigger a referral to DSE as none of the referral criteria are met.
- **Melbourne Airport Link** would not trigger a referral to DSE as none of the referral criteria are met.
- Ministerial approval would be required for the project for the proposed removal of vegetation with conservation significance of very high;
- A Referral under the EPBC Act is required for the following proposed impacts to an EPBC Act listed value:
    - Potential impacts to Growling Grass Frog habitat; and
    - Potential impacts to water quality along Deep Creek and Moonee Ponds Creek due to excess water runoff from the Melbourne Airport Link and Oaklands Road Duplication.
- A Protected Flora Licence under the FFG Act would not be required for the current proposal. However, the impacts of the development on the FFG Act listed ecological community (Victorian temperate woodland bird

community) will be considered by the local planning authority during the planning permit application.

- The Growling Grass Frog listed on the DSE *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007c) are vulnerable to impacts from the proposed development.
- A targeted Brown Toadlet survey was undertaken using best-practice methods to determine whether the species was present in areas potentially impacted upon by the proposed development. No Brown Toadlet was recorded during the targeted survey. It is possible that the species could reach the area of concern, particularly after periods of high rainfall when frogs may disperse to colonise new areas.
- Potential impacts at the Deep Creek crossing at alignment BB1 South due to some piers for the bridge being placed in the creek line causing disturbance to the ecology of the waterway and habitat connectivity.
- There is no need to submit a Referral in relation to flora and fauna to the State Minister under the EE Act.

Ultimately a modification of alignment BB1 South so that it crosses Deep Creek at the same location as BB1 North would be the preferred option in regard to minimizing ecological impacts. Alignment BB1 South along Somerton Road has the least impact to flora and fauna due to minimal native vegetation and fauna habitat removal. However, BB1 South crosses Deep Creek for approximately 250 metres, this has the potential for some piers to be unavoidably placed within the creekline and have a greater impact on Growling Grass Frog, native vegetation and habitat connectivity within the creek corridor. Alignment BB1 North has a lesser impact on the creekline at the Deep Creek crossing.

If a modification of BB1 South is not possible then the preferred route option is alignment BB1 North. This route has the least impact at the Deep Creek crossing.

8.2. Mitigation Recommendations

Consideration should be given to including the mitigation measures described below in the project:

Pre-construction:

- Modification of BB1 South so that it crosses Deep Creek at the same location as BB1 North.
- Avoid disturbing the intact native vegetation and scattered trees where feasible.
- Avoid removal of large, hollow-bearing indigenous trees where feasible.
- Avoid removing suitable habitat for the Growling Grass Frog and Brown Toadlet.
- In accordance with the *Catchment and Land Protection Act 1994*, the noxious weed species listed below, which were recorded in the study area, must be controlled using precision methods that minimise off-target kills

(e.g. spot spraying). This method of control will be implemented throughout the project.

  - African Boneseed
  - African Box-thorn
  - Hawthorn
  - Horehound
  - Spear Thistle and
  - Sweet Briar.

- Avoid impacts upon Deep Creek and Moonee Ponds Creek.
  - A water sensitive road design to filter contaminates from entering Deep Creek and Moonee Ponds Creek should be implemented
  - Ensure there are no barriers constructed in either of the creeks that will prevent movement and connectivity of fauna.
- The proposed development should be designed in a way that does not alter the site's hydrology in areas that support native vegetation or act as tributaries to Deep Creek and Moonee Ponds Creek.
- The recommended mitigation measures outlined below are from the aquatic assessment undertaken by Streamline Research Pty. Ltd. (Appendix 3) and states that all aquatic habitat remains intact and that water and pollutant runoff to waterways is prevented if Bulla Bypass is to cross Deep Creek. The following is a list of mitigation measures from the aquatic assessment.
  - All stream crossings need to be constructed in a manner which does not impede water movement and to ensure that no obstruction to fish passage occurs.
  - Best practice environmental protection measures need to be in accordance with the VicRoads Environment Strategy 2005-2015 (VicRoads, 2005), VicRoads Environmental Management Guidelines (2006).
  - A minimal footprint should be used for construction activities. No-go zones could be applied both during construction and after completion of the works. Temporary barriers must be erected around the perimeter of construction areas, and around sites of native vegetation adjacent to the construction zone, prior to construction activities commencing and for the duration of construction works. The barriers will prevent access by construction personnel to Deep Creek and the floodplain habitat.
- Construction contractors should be inducted into an environmental management program for construction works.
- All environmental controls should be checked for compliance on a regular basis.

Construction phase:

- Environmentally sensitive areas should be securely fenced at two metres from the perimeter and appropriately signed. All machinery and earthworks are to be excluded from these areas.
- Any tree pruning should be undertaken by an experienced arborist to prevent disease or unnecessary damage to the tree or disturbance to understorey vegetation during tree trimming.
- Any stockpiling will occur outside of environmentally sensitive areas.
- All machinery should enter and exit works sites along defined routes that do not impact on native vegetation or cause soil disturbance and weed spread.
- All machinery brought on site should be weed and pathogen free. This is important for environmental and agricultural protection. Soil borne pathogens such as Cinnamon Fungus and livestock diseases can be easily transported by machinery.
- All machinery wash down, lay down and personnel rest areas should be defined (fenced) and located in disturbed areas.
- Sediment and hazardous wastes should be prevented from entering Deep Creek. As a precaution against flooding, the storage of fill, excavated material, fuels and oils should not be stockpiled near Deep Creek.
- Sedimentation and erosion controls must be implemented during construction in accordance with Victorian Environment Protection Authority (EPA) guidelines including Environmental Guidelines for Major Construction Sites (1996) and Construction Techniques for Sediment Pollution Control (1991).
- Sedimentation control measures must remain in place until the completion of the works. Sediment fences should be installed to prevent unnecessary erosion and sedimentation to the creek. Sediment and erosion control plans should be developed.
- Where an erosion hazard is identified, erosion control activities should include:
    - The use of sediment fences down slope of exposed soil and stockpiles.
    - Bunding of stockpiles.
        - Minimisation of the area of disturbed soil at any one time. Sediment and hazardous wastes should be prevented from entering Deep Creek. As a precaution against flooding, the storage of fill, excavated material, fuels and oils should not be stockpiled near Deep Creek.
- The adoption of best practise drainage management and incorporation of water sensitive road design (Wong et al., 2000) should be incorporated into the works. VicRoads should ensure that there would be no drainage/runoff from the new road directly into Deep Creek. Construction of swale drains /wetlands should be provided to catch and treat excess water runoff before entering into the Moonee Ponds Creek. This would create more habitat for Growling Grass Frog and help to mitigate any potential impacts to the species.

- The movement of construction vehicles in the vicinity of Deep Creek should be minimised. Passage of vehicles should occur within the smallest amount of easement possible.
- Monitoring following an incident that may impact on aquatic fauna will comprise appropriate sampling to confirm the extent of the disturbance to aquatic habitat. For spillages, post incident monitoring (water quality) will be repeated at daily intervals until the contaminant is no longer considered to be a threat. Monitoring should be performed by a suitably qualified aquatic biologist.

Post-construction phase:

- Weed control, by an experienced bush regenerator, is to be carried out in bushland or wetland areas disturbed after construction so as to control any weed outbreaks.
- A suitable buffer area along Deep Creek, Moonee Ponds Creek and their tributaries should be revegetated with appropriate indigenous plants of local genetic provenance. This measure is aimed at minimising any potential long-term adverse impacts that the proposed development may have on the health and functionality of these watercourses.
- The use of local indigenous plant species, of local genetic provenance, should be considered in the landscaping of any development on the site. Locally indigenous species generally have low water-use requirements, high survival rates and provide habitat to local fauna species. The site provides a large reservoir for seed collection within wetland and forested areas.

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Appendix 1: Flora species recorded in the study area and threatened species known (or with the potential) to occur in the search region

Origin	Common Name	Scientific Name	Family Name	Conservation Status			Recorded
				EPBC	FFG	DSE	
	Adamson's Blown-grass	Lachnagrostis adamsonii	Poaceae	E	f	v	
*	African Boneseed	Chrysanthemoides monilifera subsp. monilifera	Asteraceae				X
*	African Box-thorn	Lycium ferocissimum	Solanaceae				X
*	Agapanthus	Agapanthus praecox subsp. orientalis	Alliaceae				X
*	Apple of Sodom	Solanum linnaeanum	Solanaceae				X
	Arching Flax-lily	Dianella sp. aff. longifolia (Benambra)	Hemerocallidaceae			v	
*	Artichoke Thistle	Cynara cardunculus	Asteraceae				X
	Austral Crane's-bill	Geranium solanderi var. solanderi s.s.	Geraniaceae			v	
	Austral Moonwort	Botrychium australe	Ophioglossaceae		f	v	
	Austral Toad-flax	Thesium australe	Santalaceae	V	f	v	
	Austral Tobacco	Nicotiana suaveolens	Solanaceae			r	X
	Austral Trefoil	Lotus australis var. australis	Fabaceae			k	
	Basalt Peppercress	Lepidium hyssopifolium	Brassicaceae	E	f	e	
	Basalt Podolepis	Podolepis sp. 1	Asteraceae			e	
	Berry Saltbush	Atriplex semibaccata	Chenopodiaceae				X
*	Big Heron's-bill	Erodium botrys	Geraniaceae				X
*	Black Nightshade	Solanum nigrum s.s.	Solanaceae				X
	Black Roly-poly	Sclerolaena muricata var. muricata	Chenopodiaceae			k	
	Black-anther Flax-lily	Dianella revoluta s.l.	Hemerocallidaceae				X
*	Blackberry	Rubus fruticosus spp. agg.	Rosaceae				X
	Blackwood	Acacia melanoxylon	Mimosaceae				X
	Branching Groundsel	Senecio cunninghamii var. cunninghamii	Asteraceae			r	
	Bristly Wallaby-grass	Rytidosperma setaceum	Poaceae				X
	Brittle Greenhood	Pterostylis truncata	Orchidaceae		f	e	
	Bronze Bluebell	Wahlenbergia luteola	Campanulaceae				X
	Brown-back Wallaby-grass	Rytidosperma duttonianum	Poaceae				X
*	Brown-top Bent	Agrostis capillaris	Poaceae				X
	Buloke	Allocasuarina luehmannii	Casuarinaceae		f		
	Button Wrinklewort	Rutidosis leptorhynchoides	Asteraceae	E	f	e	
*	Cape Weed	Arctotheca calendula	Asteraceae				X
	Cherry Ballart	Exocarpos cupressiformis	Santalaceae				X
*	Chickweed	Stellaria media	Caryophyllaceae				X
*	Chilean Needle-grass	Nassella neesiana	Poaceae				X
*	Clover	Trifolium spp.	Fabaceae				X
	Clover Glycine	Glycine latrobeana	Fabaceae	V	f	v	
	Coarse Dodder-laurel	Cassytha melantha	Lauraceae				X
*	Cocksfoot	Dactylis glomerata	Poaceae				X
*	Common Centaury	Centaurium erythraea	Gentianaceae				X
	Common Cudweed	Euchiton involucratus s.l.	Asteraceae				X
	Common Grass-sedge	Carex breviculmis	Cyperaceae				X
*	Common Heron's-bill	Erodium cicutarium	Geraniaceae				X
*	Common Onion-grass	Romulea rosea var. australis s.s.	Iridaceae				X
	Common Reed	Phragmites australis	Poaceae				X
	Common Spike-sedge	Eleocharis acuta	Cyperaceae				X
	Common Tussock-grass	Poa labillardierei	Poaceae				X
*	Common Vetch	Vicia sativa	Fabaceae				X
	Common Wallaby-grass	Rytidosperma caespitosum	Poaceae				X

Origin	Common Name	Scientific Name	Family Name	Conservation Status			Recorded
				EPBC	FFG	DSE	
*	Couch	Cynodon dactylon var. dactylon	Poaceae				X
	Curly Sedge	Carex Tasmanica	Cyperaceae	V	f	v	
	Curved Rice-flower	Pimelea curviflora s.l.	Thymelaeaceae				X
*	Cut-leaf Crane's-bill	Geranium dissectum	Geraniaceae				X
*	Drain Flat-sedge	Cyperus eragrostis	Cyperaceae				X
	Drooping Cassinia	Cassinia arcuata	Asteraceae				X
	Drooping Sheoak	Allocasuarina verticillata	Casuarinaceae				X
*	Fennel	Foeniculum vulgare	Apiaceae				X
	Flat Spike-sedge	Eleocharis plana	Cyperaceae			v	
	Floodplain Fireweed	Senecio campylocarpus	Asteraceae			r	
	Fragrant Saltbush	Rhagodia parabolica	Chenopodiaceae			r	X
*	Galenia	Galenia pubescens var. pubescens	Aizoaceae				X
*	Garden Dandelion	Taraxacum officinale spp. agg.	Asteraceae				X
#	Giant Honey-myrtle	Melaleuca armillaris subsp. armillaris	Myrtaceae			r	
	Gold-dust Wattle	Acacia acinacea s.l.	Mimosaceae				X
*	Golden Thistle	Scolymus hispanicus	Asteraceae				X
*	Gorse	Ulex europaeus	Fabaceae				X
	Grassland Wood-sorrel	Oxalis perennans	Oxalidaceae				X
	Grey Box	Eucalyptus microcarpa	Myrtaceae				X
	Grey Roly-poly	Sclerolaena muricata var. villosa	Chenopodiaceae				X
	Grey Spike-sedge	Eleocharis macbarronii	Cyperaceae			k	
*	Hawthorn	Crataegus monogyna	Rosaceae				X
	Hedge Wattle	Acacia paradoxa	Mimosaceae				X
*	Horehound	Marrubium vulgare	Lamiaceae				X
	Inland Pigface	Carpobrotus modestus	Aizoaceae				X
	Kangaroo Apple	Solanum aviculare	Solanaceae				X
	Kangaroo Grass	Themeda triandra	Poaceae				X
	Kidney-weed	Dichondra repens	Convolvulaceae				X
	Kneed Spear-grass	Austrostipa bigeniculata	Poaceae				X
*	Large Quaking-grass	Briza maxima	Poaceae				X
*	Large-flower Wood-sorrel	Oxalis purpurea	Oxalidaceae				X
	Large-headed Fireweed	Senecio macrocarpus	Asteraceae	V	f	e	
	Leafless Bluebush	Maireana aphylla	Chenopodiaceae			k	
	Lightwood	Acacia implexa	Mimosaceae				X
	Maroon Leek-orchid	Prasophyllum frenchii	Orchidaceae	E	f	e	
	Matted Flax-lily	Dianella amoena	Hemerocallidaceae	E	f	e	
	Melbourne Yellow-gum	Eucalyptus leucoxylon subsp. connata	Myrtaceae			v	X
*	Mirror Bush	Coprosma repens	Rubiaceae				X
*	Montpellier Broom	Genista monspessulana	Fabaceae				X
	Native Peppercress	Lepidium pseudohyssopifolium	Brassicaceae			k	
	Nodding Saltbush	Einadia nutans subsp. nutans	Chenopodiaceae				X
	Pale Plover-daisy	Leiocarpa leptolepis	Asteraceae		f	e	
	Pale Rush	Juncus pallidus	Juncaceae				X
	Pale Swamp Everlasting	Helichrysum aff. rutidolepis (Lowland Swamps)	Asteraceae			v	
*	Panic Veldt-grass	Ehrharta erecta var. erecta	Poaceae				X
*	Paterson's Curse	Echium plantagineum	Boraginaceae				X
*	Pepper Tree	Schinus molle	Anacardiaceae				X
*	Perennial Rye-grass	Lolium perenne	Poaceae				X
*	Pimpernel	Anagallis arvensis	Primulaceae				X

Origin	Common Name	Scientific Name	Family Name	Conservation Status			Recorded
				EPBC	FFG	DSE	
	Plains Joyweed	Alternanthera sp. 1 (Plains)	Amaranthaceae			k	
	Plains Yam-daisy	Microseris scapigera s.s.	Asteraceae			v	
*	Prairie Grass	Bromus catharticus	Poaceae				X
*	Prickly Pear	Opuntia spp.	Cactaceae				X
	Prickly Starwort	Stellaria pungens	Caryophyllaceae				X
	Purple Diuris	Diuris punctata var. punctata	Orchidaceae		f	v	
*	Radiata Pine	Pinus radiata	Pinaceae				X
*	Red-ink Weed	Phytolacca octandra	Phytolaccaceae				X
	Red-leg Grass	Bothriochloa macra	Poaceae				X
*	Ribwort	Plantago lanceolata	Veronicaceae				X
	River Bottlebrush	Callistemon sieberi	Myrtaceae				X
	River Red-gum	Eucalyptus camaldulensis	Myrtaceae				X
	River Swamp Wallaby-grass	Amphibromus fluitans	Poaceae	V			
	Rough Eyebright	Euphrasia scabra	Orobanchaceae		f	e	
*	Rough Sow-thistle	Sonchus asper s.l.	Asteraceae				X
	Rough Spear-grass	Austrostipa scabra subsp. falcata	Poaceae				X
	Rough-grain Love-grass	Eragrostis trachycarpa	Poaceae			r	
	Ruby Saltbush	Enchylaena tomentosa var. tomentosa	Chenopodiaceae				X
	Rye Beetle-grass	Tripogon loliiformis	Poaceae			r	
#	Sallow Wattle	Acacia longifolia subsp. longifolia	Mimosaceae				X
*	Serrated Tussock	Nassella trichotoma	Poaceae				X
	Short-bristle Wallaby-grass	Rytidosperma setaceum var. brevisetum	Poaceae			r	
	Sieber Crassula	Crassula sieberiana s.l.	Crassulaceae				X
	Silver Wattle	Acacia dealbata	Mimosaceae				X
	Slender Bindweed	Convolvulus angustissimus subsp. omnigracilis	Convolvulaceae			k	
	Slender Clematis	Clematis decipiens	Ranunculaceae			k	
	Slender Dock	Rumex brownii	Polygonaceae				X
	Slender Tick-trefoil	Desmodium varians	Fabaceae			k	
	Small Golden Moths	Diuris basaltica	Orchidaceae	E	f	v	
	Small Milkwort	Comesperma polygaloides	Polygalaceae		f	v	
*	Small Nettle	Urtica urens	Urticaceae				X
	Small Scurf-pea	Cullen parvum	Fabaceae		f	e	
	Small-leaved Clematis	Clematis microphylla s.l.	Ranunculaceae				X
	Smooth Solenogyne	Solenogyne dominii	Asteraceae				X
#	Snowy Mint-bush	Prostanthera nivea var. nivea	Lamiaceae			r	
*	Soursob	Oxalis pes-caprae	Oxalidaceae				X
*	Spear Thistle	Cirsium vulgare	Asteraceae				X
	Spiny Rice-flower	Pimelea spinescens	Thymelaeaceae		f	e	
	Spiny Rice-flower	Pimelea spinescens subsp. spinescens	Thymelaeaceae	C	f	e	
	Spiny-headed Mat-rush	Lomandra longifolia	Xanthorrhoeaceae				X
#	Spotted Gum	Corymbia maculata	Myrtaceae			v	
*	Sugar Gum	Eucalyptus cladocalyx	Myrtaceae				X
	Sunshine Diuris	Diuris fragrantissima	Orchidaceae	E	f	e	
	Supple Spear-grass	Austrostipa mollis	Poaceae				X
	Swamp Diuris	Diuris palustris	Orchidaceae		f	v	
*	Swamp Water-starwort	Callitriche palustris var. palustris	Veronicaceae			k	
*	Sweet Briar	Rosa rubiginosa	Rosaceae				X
	Sweet Bursaria	Bursaria spinosa	Pittosporaceae				X
*	Sweet Vernal-grass	Anthoxanthum odoratum	Poaceae				X

Origin	Common Name	Scientific Name	Family Name	Conservation Status			Recorded
				EPBC	FFG	DSE	
	Tall Bluebell	Wahlenbergia stricta subsp. stricta	Campanulaceae				X
*	Toowoomba Canary-grass	Phalaris aquatica	Poaceae				X
	Tough Scurf-pea	Cullen tenax	Fabaceae		f	e	
	Tree Violet	Melicytus dentatus s.l.	Violaceae				X
*	Turnip	Brassica spp.	Brassicaceae				X
*	Twiggy Turnip	Brassica fruticulosa	Brassicaceae				X
	Variable Groundsel	Senecio pinnatifolius	Asteraceae				X
	Variable Sword-sedge	Lepidosperma laterale	Cyperaceae				X
*	Variegated Thistle	Silybum marianum	Asteraceae				X
	Veined Spear-grass	Austrostipa rudis	Poaceae				X
*	Velvety Pink	Petrorhagia dubia	Caryophyllaceae				X
	Wallaby Grass	Rytidosperma spp.	Poaceae				X
	Water Ribbons	Triglochin procera s.l.	Juncaginaceae				X
	Weeping Grass	Microlaena stipoides var. stipoides	Poaceae				X
*	White Clover	Trifolium repens var. repens	Fabaceae				X
*	Wild Oat	Avena fatua	Poaceae				X
	Yellow Box	Eucalyptus melliodora	Myrtaceae				X
	Yellow Star	Hypoxis vaginata var. brevistigmata	Hypoxidaceae			k	
*	Yorkshire Fog	Holcus lanatus	Poaceae				X

***** = introduced species; **#** = native species occurring outside of natural range; **L** =listed as threatened; **EPBC** = status under EPBC Act; **DSE** = status under DSE's Advisory List; **C** = critically endangered; **E, e** = endangered; **V, v** = vulnerable; **R, r** = rare; **k** = insufficiently known

Appendix 2: Vertebrate terrestrial and aquatic fauna species that occur or are likely to occur in the study area

Common Name	Scientific Name	Recorded	EPBC	FFG	DSE
Birds					
Australasian Grebe	*Tachybaptus novaehollandiae*	X			
Australasian Pipit	*Anthus novaeseelandiae*				
Australasian Shoveler	*Anas rhynchotis*				VU
Australian Hobby	*Falco longipennis*				
Australian Magpie	*Gymnorhina tibicen*	X			
Australian Owlet-nightjar	*Aegotheles cristatus*				
Australian Raven	*Corvus coronoides*				
Australian Shelduck	*Tadorna tadornoides*				
Australian Spotted Crake	*Porzana fluminea*				
Australian White Ibis	*Threskiornis molucca*	X			
Australian Wood Duck	*Chenonetta jubata*	X			
Black Falcon	*Falco subniger*				VU
Black Kite	*Milvus migrans*				
Black Swan	*Cygnus atratus*				
Black-chinned Honeyeater	*Melithreptus gularis*				NT
Black-eared Cuckoo	*Chrysococcyx osculans*				NT
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	X			
Black-fronted Dotterel	*Elseyornis melanops*	X			
Black-shouldered Kite	*Elanus axillaris*	X			
Brown Falcon	*Falco berigora*	X			
Brown Goshawk	*Accipiter fasciatus*	X			
Brown Quail	*Coturnix ypsilophora*				NT
Brown Songlark	*Cincloramphus cruralis*				
Brown Thornbill	*Acanthiza pusilla*	X			
Brown-headed Honeyeater	*Melithreptus brevirostris*	X			
Buff-rumped Thornbill	*Acanthiza reguloides*				
Cattle Egret	*Ardea ibis*				
Chestnut Teal	*Anas castanea*				
Clamorous Reed Warbler	*Acrocephalus stentoreus*				
Collared Sparrowhawk	*Accipiter cirrhocephalus*	X			
Common Blackbird	*Turdus merula*	X			*
Common Bronzewing	*Phaps chalcoptera*				
Common Myna	*Acridotheres tristis*	X			*
Common Starling	*Sturnus vulgaris*	X			*
Crested Pigeon	*Ocyphaps lophotes*	X			
Crested Shrike-tit	*Falcunculus frontatus*				
Crimson Rosella	*Platycercus elegans elegans*	X			
Darter	*Anhinga novaehollandiae*				
Diamond Firetail	*Stagonopleura guttata*			L	VU
Dusky Moorhen	*Gallinula tenebrosa*	X			
Dusky Woodswallow	*Artamus cyanopterus*	X			
Eastern Great Egret	*Ardea modesta*			L	VU
Eastern Rosella	*Platycercus eximius*	X			
Eastern Spinebill	*Acanthorhynchus tenuirostris*				
Eurasian Coot	*Fulica atra*				
Eurasian Tree Sparrow	*Passer montanus*				*
European Goldfinch	*Carduelis carduelis*	X			*
European Greenfinch	*Carduelis chloris*	X			*
European Skylark	*Alauda arvensis*	X			*
Fairy Martin	*Hirundo ariel*	X			
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	X			
Flame Robin	*Petroica phoenicea*				
Fork-tailed Swift	*Apus pacificus*				
Galah	*Eolophus roseicapilla*	X			
Gang-gang Cockatoo	*Callocephalon fimbriatum*				
Golden Whistler	*Pachycephala pectoralis*				
Golden-headed Cisticola	*Cisticola exilis*	X			
Great Cormorant	*Phalacrocorax carbo*				
Grey Butcherbird	*Cracticus torquatus*				
Grey Currawong	*Strepera versicolor*				
Grey Fantail	*Rhipidura albiscarpa*	X			
Grey Shrike-thrush	*Colluricincla harmonica*	X			
Grey Teal	*Anas gracilis*	X			
Hardhead	*Aythya australis*				VU

Common Name	Scientific Name	Recorded	EPBC	FFG	DSE
Hoary-headed Grebe	*Poliocephalus poliocephalus*				
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	X			
Horsfield's Bushlark	*Mirafra javanica*				
House Sparrow	*Passer domesticus*	X			*
Jacky Winter	*Microeca fascinans*				
Laughing Kookaburra	*Dacelo novaeguineae*	X			
Lewin's Rail	*Lewinia pectoralis*			L	VU
Little Black Cormorant	*Phalacrocorax sulcirostris*				
Little Corella	*Cacatua sanguinea*	X			
Little Eagle	*Hieraaetus morphnoides*	X			
Little Grassbird	*Megalurus gramineus*				
Little Lorikeet	*Glossopsitta pusilla*				
Little Pied Cormorant	*Microcarbo melanoleucos*	X			
Little Raven	*Corvus mellori*	X			
Little Wattlebird	*Anthochaera chrysoptera*				
Long-billed Corella	*Cacatua tenuirostris*	X			
Magpie-lark	*Grallina cyanoleuca*	X			
Masked Lapwing	*Vanellus miles*	X			
Mistletoebird	*Dicaeum hirundinaceum*				
Musk Lorikeet	*Glossopsitta concinna*				
Nankeen Kestrel	*Falco cenchroides*				
Nankeen Night Heron	*Nycticorax caledonicus*				NT
New Holland Honeyeater	*Phylidonyris novaehollandiae*	X			
Noisy Miner	*Manorina melanocephala*	X			
Olive-backed Oriole	*Oriolus sagittatus*				
Pacific Barn Owl	*Tyto javanica*	X			
Pacific Black Duck	*Anas superciliosa*	X			
Pallid Cuckoo	*Cuculus pallidus*	X			
Peregrine Falcon	*Falco peregrinus*				
Pied Currawong	*Strepera graculina*				
Purple Swamphen	*Porphyrio porphyrio*				
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	X			
Rainbow Bee-eater	*Merops ornatus*				
Rainbow Lorikeet	*Trichoglossus haematodus*	X			
Red Wattlebird	*Anthochaera carunculata*	X			
Red-browed Finch	*Neochmia temporalis*	X			
Red-capped Robin	*Petroica goodenovii*				
Red-rumped Parrot	*Psephotus haematonotus*	X			
Restless Flycatcher	*Myiagra inquieta*				
Rock Dove	*Columba livia*	X			*
Royal Spoonbill	*Platalea regia*				VU
Rufous Fantail	*Rhipidura rufifrons*				
Rufous Songlark	*Cincloramphus mathewsi*	X			
Rufous Whistler	*Pachycephala rufiventris*				
Sacred Kingfisher	*Todiramphus sanctus*				
Scarlet Robin	*Petroica boodang*				
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*	X			
Silvereye	*Zosterops lateralis*	X			
Singing Honeyeater	*Lichenostomus virescens*				
Song Thrush	*Turdus philomelos*				*
Southern Boobook	*Ninox novaeseelandiae*				
Southern Whiteface	*Aphelocephala leucopsis*				
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*				
Spotless Crake	*Porzana tabuensis*				
Spotted Harrier	*Circus assimilis*				NT
Spotted Pardalote	*Pardalotus punctatus*	X			
Spotted Turtle-Dove	*Streptopelia chinensis*				*
Straw-necked Ibis	*Threskiornis spinicollis*	X			
Striated Fieldwren	*Calamanthus fuliginosus*				
Striated Pardalote	*Pardalotus striatus*	X			
Striated Thornbill	*Acanthiza lineata*				
Stubble Quail	*Coturnix pectoralis*				
Sulphur-crested Cockatoo	*Cacatua galerita*	X			
Superb Fairy-wren	*Malurus cyaneus*	X			
Swamp Harrier	*Circus approximans*				
Swift Parrot	*Lathamus discolor*		EN	L	EN

Common Name	Scientific Name	Recorded	EPBC	FFG	DSE
Tawny Frogmouth	*Podargus strigoides*				
Tree Martin	*Hirundo nigricans*	X			
Varied Sittella	*Daphoenositta chrysoptera*	X			
Wedge-tailed Eagle	*Aquila audax*	X			
Weebill	*Smicrornis brevirostris*				
Welcome Swallow	*Hirundo neoxena*	X			
Whistling Kite	*Haliastur sphenurus*	X			
White-browed Scrubwren	*Sericornis frontalis*				
White-browed Woodswallow	*Artamus superciliosus*				
White-eared Honeyeater	*Lichenostomus leucotis*				
White-faced Heron	*Egretta novaehollandiae*	X			
White-fronted Chat	*Epthianura albifrons*				
White-naped Honeyeater	*Melithreptus lunatus*				
White-necked Heron	*Ardea pacifica*	X			
White-plumed Honeyeater	*Lichenostomus penicillatus*	X			
White-throated Needletail	*Hirundapus caudacutus*				
White-throated Treecreeper	*Cormobates leucophaeus*				
White-winged Triller	*Lalage sueurii*	X			
Willie Wagtail	*Rhipidura leucophrys*	X			
Yellow Thornbill	*Acanthiza nana*				
Yellow-billed Spoonbill	*Platalea flavipes*	X			
Yellow-faced Honeyeater	*Lichenostomus chrysops*	X			
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	X			
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*				
Yellow-tufted Honeyeater	*Lichenostomus melanops*				
Zebra Finch	*Taeniopygia guttata*				
Mammals					
Black Rat	*Rattus rattus*				*
Black Wallaby	*Wallabia bicolor*	X			
Brown Rat	*Rattus norvegicus*				*
Cat	*Felis catus*				*
Chocolate Wattled Bat	*Chalinolobus morio*				
Common Brushtail Possum	*Trichosurus vulpecula*	X			
Common Ringtail Possum	*Pseudocheirus peregrinus*	X			
Dingo/Dog (feral)	*Canis lupus*				
Eastern Grey Kangaroo	*Macropus giganteus*	X			
European Hare	*Lepus europeaus*	X			*
European Rabbit	*Oryctolagus cuniculus*	X			*
Freetail Bat (eastern form)	*Mormopterus sp. EG*				
Gould's Long-eared Bat	*Nyctophilus gouldi*				
Gould's Wattled Bat	*Chalinolobus gouldii*				
House Mouse	*Mus musculus*	X			*
Inland Broad-nosed Bat	*Scotorepens balstoni*				
Koala	*Phascolarctos cinereus*				
Large Forest Bat	*Vespadelus darlingtoni*				
Lesser Long-eared Bat	*Nyctophilus geoffroyi*				
Little Forest Bat	*Vespadelus vulturnus*				
Platypus	*Ornithorhynchus anatinus*	X			
Red Fox	*Vulpes vulpes*	X			*
Short-beaked Echidna	*Tachyglossus aculeatus*	X			
Southern Forest Bat	*Vespadelus regulus*				
Southern Freetail Bat (long penis)	*Mormopterus sp. 1*				
Sugar Glider	*Petaurus breviceps*				
Swamp Rat	*Rattus lutreolus*	X			
Water Rat	*Hydromys chrysogaster*	X			
White-striped Freetail Bat	*Tadarida australis*				
Reptiles					
Bearded Dragon	*Pogona barbata*				DD
Black Rock Skink	*Egernia saxatilis intermedia*				
Bougainville's Skink	*Lerista bougainvillii*	X			
Common Blue-tongued Lizard	*Tiliqua scincoides*	X			
Common Long-necked Turtle	*Chelodina longicollis*				
Cunningham's Skink	*Egernia cunninghami*				
Eastern Brown Snake	*Pseudonaja textilis*				
Eastern Small-eyed Snake	*Rhinoplocephalus nigrescens*				
Eastern Three-lined Skink	*Bassiana duperreyi*				

Common Name	Scientific Name	Recorded	EPBC	FFG	DSE
Garden Skink	*Lampropholis guichenoti*	X			
Large Striped Skink	*Ctenotus robustus*				
Little Whip Snake	*Suta flagellum*				
Lowland Copperhead	*Austrelaps superbus*				
Marbled Gecko	*Christinus marmoratus*				
Red-bellied Black Snake	*Pseudechis porphyriacus*				
Southern Water Skink	*Eulamprus tympanum tympanum*	X			
Tiger Snake	*Notechis scutatus*				
Tree Dragon	*Amphibolurus muricatus*	X			
Tussock Skink	*Pseudemoia pagenstecheri*				
White's Skink	*Egernia whitii*				
Frogs					
Brown Toadlet	*Pseudophryne bibronii*			L	EN
Common Froglet	*Crinia signifera*	X			
Common Spadefoot Toad	*Neobatrachus sudelli*				
Growling Grass Frog	*Litoria raniformis*		VU	L	EN
Lesueur's Frog	*Litoria lesueuri*				
Peron's Tree Frog	*Litoria peronii*				
Southern Brown Tree Frog	*Litoria ewingii*	X			
Southern Bullfrog	*Limnodynastes dumerilii*	X			
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	X			
Striped Marsh Frog	*Limnodynastes peronii*				
WhistlingTree Frog	*Litoria verreauxii verreauxii*	X			
Fish					
Australian Smelt	*Retropinna semoni*				
Brown Trout	*Salmo trutta*				*
Common Carp	*Cyprinus carpio*				*
Common Galaxias	*Galaxias maculatus*	X			
Eastern Gambusia	*Gambusia holbrooki*				*
Flat-headed Gudgeon	*Philypnodon grandiceps*	X			
Goldfish	*Carassius auratus*				*
Mountain Galaxias	*Galaxias olidus*	X			
Oriental Weatherloach	*Misgurnus anguillicaudatus*				*
Redfin Perch	*Perca fluviatilis*	X			*
Short-finned Eel	*Anguilla australis*	X			
Southern Pigmy Perch	*Nannoperca australis*				
Tench	*Tinca tinca*	X			*
Tupong	*Pseudaphritis urvillii*				

DSE – Status from DSE Advisory List; **EPBC** – Status under EPBC Act; **FFG** – Status under FFG Act; **EN** – Endangered; **VU**– Vulnerable; **NT** – Lower risk near threatened; **DD** = data deficient; **L** – Listed under FFG Act; ***** = introduced species; **X** = recorded.

Appendix 3: Aquatic Assessment undertaken by John McGuckin (Streamline Research Pty. Ltd.)

Melbourne Airport Link to OMR/Bulla Bypass - aquatic fauna assessment

Deep Creek habitat to the north of Bulla

John McGuckin

Streamline Research Pty. Ltd.

Updated report prepared for

VicRoads

November 2012

EXECUTIVE SUMMARY

This report provides an updated field assessment of the aquatic fauna in the vicinity of the Melbourne Airport Link to OMR and various alignment options for the Bulla Bypass.

No threatened fish species were found in the study area.

Deep Creek is considered of moderate conservation value for aquatic fauna.

Melbourne Airport Link to OMR will most likely have no impact on Deep Creek aquatic fauna or habitat.

Bulla Bypass options BB1 North, BB2 and BB3 will most likely have no impact on aquatic fauna or habitat.

Bulla Bypass Option BB1 South is likely to have a greater impact on aquatic fauna and instream habitat as it passes along 250 metres of Deep Creek, increasing the likelihood that piers would be needed to be placed instream.

CONTENTS

1.0 INTRODUCTION

The purpose of this report is to provide an updated field assessment of the aquatic fauna in the vicinity of the Melbourne Airport Link to the Outer Metropolitan Ring (OMR)/Bulla Bypass.

A field investigation was made to determine whether any threatened fish species exist within the proposed works area. Two nationally threatened fish species, the Australian grayling (*Prototroctes maraena*) and the Yarra pygmy perch (*Nannoperca obscura*) could potentially be found within the study area. Australian grayling are known to occur downstream in the Maribrynong River, and Yarra pygmy perch are known from upstream reaches of Deep Creek near Romsey and Lancefield. Although there is no known record of either species within the Melbourne Airport Link to the OMR/Bulla Bypass study area, floodwaters in 2010/11 could have potentially moved these species into the study area.

A third nationally threatened fish species, the dwarf galaxias (*Galaxiella pusilla*) was listed for a targeted survey in this investigation, but as the species has never been recorded in the Maribrynong River drainage basin, it was not expected to be found in the field survey.

This study summarises the aquatic fauna in the Melbourne Airport Link to the OMR/Bulla Bypass study area and assesses the potential impact for each of the Bulla Bypass Options.

1.2 Project objectives.

The objectives of this study are to:

- identify aquatic fauna (particularly threatened species) that could occur within the study area
- identify valued aquatic habitat on proposed Bulla Bypass Options
- determine the potential impacts that each of the Bulla Bypass Options has on aquatic ecological values
- provide recommendations that will minimise/avoid interference to aquatic ecological values

1.3 Study area

The Melbourne Airport Link to OMR/Bulla Bypass is located to the north-east of Melbourne and is close to Melbourne Airport (Figure 1).

This alignment begins at the end of Tullamarine Freeway (east of Melbourne Airport), travelling north towards Somerton Road. After Somerton Road, this alignment then heads north to north west and connects into the future proposed OMR. The ultimate form is a 6 lane freeway.

The Bulla Bypass Options (BB1 North, BB1 South, BB2 and BB3) are shown in Figure 1.

Bulla Bypass consists of four options. All options begin at vicinity of the junction of Somerton and Oaklands Road and travels west along Somerton Road. The options all end on Sunbury Road, south of the OMR/E6 Reservation. The ultimate form is a six lane arterial.

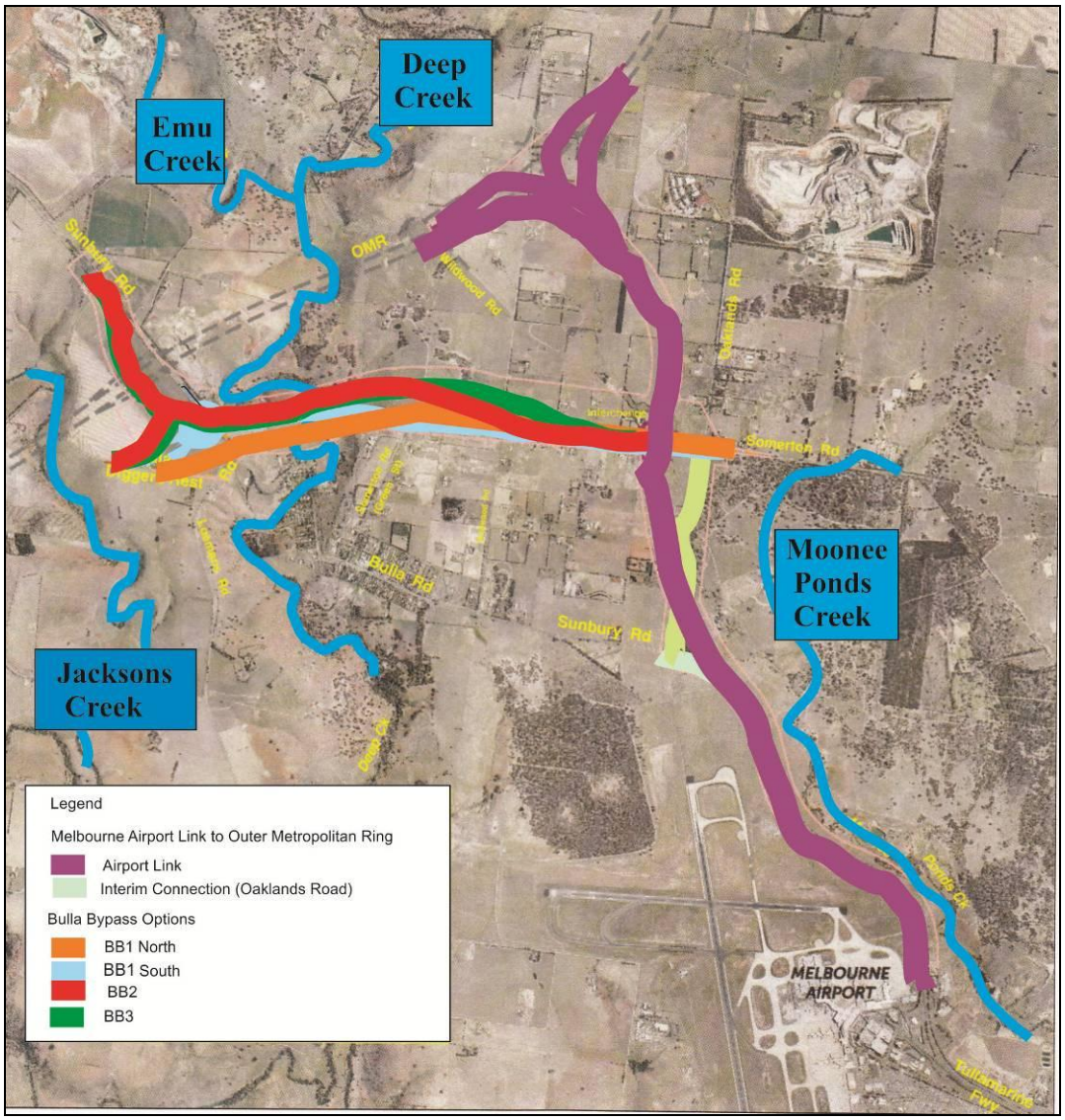

Figure 1. The Melbourne Airport Link to OMR and the Bulla Bypass Options.