Appendices

Appendix A – Risk assessment

Risk ID	Potential threat and effect on the environment	INITIAL RISK							RESIDUAL RISK							
		Initial EPR	Magnitude of consequence			Overall conseque	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequ	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
	CONSTRUCTION														
EC01	Land clearing during construction impacting threatened flora and ecological communities	FF2 - Minimise and offset native vegetation removal FF5 - FFG Act permits LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan	Corridor	Very high	7+ years	Severe	Planned	Planned	FF2 - Minimise and offset native vegetation removal FF5 - FFG Act permits FF7 - Salvage and translocation plan for Matted Flax-lily LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan AR3 - Tree Canopy Replacement Plan	Municipality	Low	7+ years	Moderate	Planned	Planned
EC02	Land clearing during construction impacting non-threatened flora and ecological communities	FF2 - Minimise and offset native vegetation removal AR1 - Tree retention AR2 - Tree Protection Plan LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans	Corridor	Low	7+ years	Moderate	Planned	Planned	FF2 - Minimise and offset native vegetation removal AR1 - Tree retention AR2 - Tree Protection Plan LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans	Corridor	Low	7+ years	Moderate	Planned	Planned
EC03	Construction activities resulting in erosion/sedimentation, dust, litter or release of contaminants leading to loss or degradation of non-threatened flora and ecological communities	FF4 - Protect aquatic habitat EMF2 - Environmental Strategy and Management Plans CL5 - Manage chemicals, fuels and hazardous materials SCC4 - Minimise and appropriately manage waste SW1 - Design of discharges and runoff	Municipality	Low	2-7 years	Minor	Possible	Low	FF4 - Protect aquatic habitat EMF2 - Environmental Strategy and Management Plans CL5 - Manage chemicals, fuels and hazardous materials SCC4 - Minimise and appropriately manage waste SW1 - Design of discharges and runoff	Municipality	Low	2-7 years	Minor	Possible	Low
EC04	Construction activities resulting in erosion/sedimentation, dust, litter or release of contaminants leading to loss or degradation of threatened flora and ecological communities	EMF2 - Environmental Strategy and Management Plans CL5 - Manage chemicals, fuels and hazardous materials AR2 - Tree Protection Plan SW1 - Design of discharges and runoff FF4 - Protect aquatic habitat SCC4 - Minimise and appropriately manage waste	Local	High	2-7 years	Moderate	Unlikely	Low	EMF2 - Environmental Strategy and Management Plans CL5 - Manage chemicals, fuels and hazardous materials AR2 - Tree Protection Plan SW1 - Design of discharges and runoff FF4 - Protect aquatic habitat SCC4 - Minimise and appropriately manage waste	Local	High	2-7 years	Moderate	Rare	Low
EC05	Construction activity leading to the introduction or spread of weeds, pest species, or pathogens that leads to the reduction of ecological values	FF3 - Avoid spreading weeds and pathogens EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan SCC4 - Minimise and appropriately manage waste	Corridor	Medium	3 months to 2 years	Moderate	Unlikely	Low	FF3 - Avoid spreading weeds and pathogens EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan SCC4 - Minimise and appropriately manage waste	Corridor	Medium	3 months to 2 years	Moderate	Unlikely	Low
EC06	Dewatering of groundwater during construction resulting in changes to terrestrial groundwater dependent ecosystems	EMF2 - Environmental Strategy and Management Plans GW2 - Groundwater monitoring GM1 - Geotechnical model and assessment FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan FF2 - Minimise and offset native vegetation removal	Local	High	2-7 years	Moderate	Likely	Medium	EMF2 - Environmental Strategy and Management Plans GW2 - Groundwater monitoring GM1 - Geotechnical model and assessment FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan FF2 - Minimise and offset native vegetation removal	Local	Medium	2-7 years	Moderate	Possible	Medium
EC07	Construction activity causes soil compaction that leads to the loss or degradation of threatened flora and ecological communities	EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan AR2 - Tree Protection Plan FF2 - Minimise and offset native vegetation removal	Local	Medium	2-7 years	Moderate	Unlikely	Low	EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan AR2 - Tree Protection Plan FF2 - Minimise and offset native vegetation removal	Local	Medium	2-7 years	Moderate	Unlikely	Low
EC08	Construction activity causes soil compaction that leads to the loss or degradation of non-threatened flora and ecological communities	EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan AR2 - Tree Protection Plan FF2 - Minimise and offset native vegetation removal	Corridor	Low	2-7 years	Moderate	Possible	Medium	EMF2 - Environmental Strategy and Management Plans CL1 - Spoil Management Plan AR2 - Tree Protection Plan FF2 - Minimise and offset native vegetation removal	Corridor	Low	2-7 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	INITIAL RISK							RESIDUAL RISK						
		Initial EPR	Magnitude of consequence			Overall conseque	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequ	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
	CONSTRUCTION														
EC09	Construction noise, vibration and/or lighting resulting in elevated disturbance of threatened fauna	LV3 - Minimise construction lighting impacts NV2 - Monitor traffic noise NV3 - Minimise noise and vibration impacts during construction NV4 - Construction Noise and Vibration Management Plan (CNVMP) FF8 - Minimise intense noise and vibration impacts on Australian Grayling	Wider region	High	3 months to 2 years	Major	Possible	High	LV3 - Minimise construction lighting impacts NV2 - Monitor traffic noise NV3 - Minimise noise and vibration impacts during construction NV4 - Construction Noise and Vibration Management Plan (CNVMP) FF8 - Minimise intense noise and vibration impacts on Australian Grayling	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low
EC10	Construction noise, vibration and/or lighting resulting in a significant impact on non-threatened fauna	LV3 - Minimise construction lighting impacts NV2 - Monitor traffic noise NV3 - Minimise noise and vibration impacts during construction NV4 - Construction Noise and Vibration Management Plan (CNVMP) FF8 - Minimise intense noise and vibration impacts on Australian Grayling	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low	LV3 - Minimise construction lighting impacts NV2 - Monitor traffic noise NV3 - Minimise noise and vibration impacts during construction NV4 - Construction Noise and Vibration Management Plan (CNVMP) FF8 - Minimise intense noise and vibration impacts on Australian Grayling	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low
EC11	Land clearing during construction resulting in the loss or degradation of habitat supporting threatened fauna	FF2 - Minimise and offset native vegetation removal LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan	Local	Low	7+ years	Minor	Possible	Low	FF2 - Minimise and offset native vegetation removal LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan	Local	Low	7+ years	Minor	Possible	Low
EC12	Land clearing during construction resulting in the loss or degradation of habitat supporting non-threatened fauna	FF2 - Minimise and offset native vegetation removal LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan	Corridor	Low	7+ years	Moderate	Planned	Planned	FF2 - Minimise and offset native vegetation removal LP1 - Minimise design footprint EMF2 - Environmental Strategy and Management Plans AR1 - Tree retention AR2 - Tree Protection Plan	Corridor	Low	7+ years	Moderate	Planned	Planned
EC13	Construction activities resulting in the loss of important habitat for EPBC Act Migratory species	EMF2 - Environmental Strategy and Management Plans FF2 - Minimise and offset native vegetation removal FF4 - Protect aquatic habitat GM1 - Geotechnical model and assessment GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW5 - Surface water management (construction) SW8 - Waterway modifications	Local	Medium	7+ years	Moderate	Rare	Low	EMF2 - Environmental Strategy and Management Plans FF2 - Minimise and offset native vegetation removal FF4 - Protect aquatic habitat GM1 - Geotechnical model and assessment GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW5 - Surface water management (construction) SW8 - Waterway modifications	Local	Medium	7+ years	Moderate	Rare	Low
EC14	Habitat fragmentation resulting in reduced effectiveness of terrestrial wildlife corridors and creation of barriers to fauna movement	EMF2 - Environmental Strategy and Management Plans AR2 - Tree Protection Plan LP1 - Minimise design footprint SW8 - Waterway modifications AR3 - Tree Canopy Replacement Plan	Municipality	Medium	7+ years	Moderate	Unlikely	Low	EMF2 - Environmental Strategy and Management Plans AR2 - Tree Protection Plan LP1 - Minimise design footprint SW8 - Waterway modifications AR3 - Tree Canopy Replacement Plan	Municipality	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	INITIAL RISK							RESIDUAL RISK							
		Initial EPR	Magnitude of consequence			Overall conseque	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequ	Likelihood	Risk level	
			Extent	Severity	Duration					Extent	Severity	Duration				
	CONSTRUCTION															
EC15	Construction activities resulting in erosion/sedimentation, litter or release of contaminants into wetlands and waterways leading to degradation of terrestrial fauna habitat	FF4 - Protect aquatic habitat LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability SCC4 - Minimise and appropriately manage waste CL5 - Manage chemicals, fuels and hazardous materials EMF2 - Environmental Strategy and Management Plans	Local	Medium	2-7 years	Moderate	Unlikely	Low	FF4 - Protect aquatic habitat LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability SCC4 - Minimise and appropriately manage waste CL5 - Manage chemicals, fuels and hazardous materials EMF2 - Environmental Strategy and Management Plans	Local	Medium	2-7 years	Moderate	Unlikely	Low
EC16	Construction activities resulting in erosion/sedimentation, litter or release of contaminants into wetlands and waterways leading to degradation of aquatic fauna habitat	FF4 - Protect aquatic habitat LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability SCC4 - Minimise and appropriately manage waste CL5 - Manage chemicals, fuels and hazardous materials EMF2 - Environmental Strategy and Management Plans	Municipality	Low	2-7 years	Minor	Possible	Low	FF4 - Protect aquatic habitat LP1 - Minimise design footprint SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability SCC4 - Minimise and appropriately manage waste CL5 - Manage chemicals, fuels and hazardous materials EMF2 - Environmental Strategy and Management Plans	Municipality	Low	2-7 years	Minor	possible	Low
EC17	Land clearing during construction resulting in reduced viability of non-threatened native fauna populations	EMF2 - Environmental Management Plans LP1 - Minimise design footprint FF1 - Fauna management measures FF2 - Minimise and offset native vegetation removal	Municipality	Low	7+ years	Moderate	Unlikely	Low	EMF2 - Environmental Management Plans LP1 - Minimise design footprint FF1 - Fauna management measures FF2 - Minimise and offset native vegetation removal	Municipality	Low	7+ years	Moderate	Unlikely	Low
EC18	Waterway modification (e.g. channelisation, piping, bank stabilisation) resulting in loss or degradation of habitat for non-threatened native aquatic fauna	SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability EMF2 - Environmental Strategy and Management Plans	Corridor	Low	3 months to 2 years	Minor	Possible	Low	SW4 - Monitor water quality SW5 - Surface water management (construction) SW8 - Waterway modifications SW9 - Maintain bank stability EMF2 - Environmental Strategy and Management Plans	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low
EC19	Construction activities resulting in the death or injury of native fauna	FF1 - Minimise impacts on fauna EMF2 - Environmental Strategy and Management Plans	Local	Low	3 months to 2 years	Minor	Possible	Low	FF1 - Minimise impacts on fauna EMF2 - Environmental Strategy and Management Plans	Local	Low	3 months to 2 years	Minor	Possible	Low
EC20	Construction activities within/around waterways resulting in loss or degradation of habitat for threatened aquatic and terrestrial fauna	FF4 - Protect aquatic habitat FF9 - Protect fauna habitat in waterbodies EMF2 - Environmental Strategy and Management Plans SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW9 - Maintain bank stability CL5 - Manage chemicals, fuels and hazardous materials	Local	Medium	3 months to 2 years	Minor	Possible	Low	FF4 - Protect aquatic habitat FF9 - Protect fauna habitat in waterbodies EMF2 - Environmental Strategy and Management Plans SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW9 - Maintain bank stability CL5 - Manage chemicals, fuels and hazardous materials	Local	Medium	3 months to 2 years	Minor	Possible	Low
EC21	Construction activities within/around waterways resulting in loss of connectivity and impeded passage for threatened aquatic species	FF4 - Protect aquatic habitat NV4 - Construction Noise and Vibration Management Plan (CNVMP) SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW6 - Minimise flood levels, flows and velocities CL5 - Manage chemicals, fuels and hazardous	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low	FF4 - Protect aquatic habitat NV4 - Construction Noise and Vibration Management Plan (CNVMP) SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW6 - Minimise flood levels, flows and velocities CL5 - Manage chemicals, fuels and hazardous	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	INITIAL RISK							RESIDUAL RISK						
		Initial EPR	Magnitude of consequence			Overall conseque	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequ	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
	CONSTRUCTION														
EC22	Construction activities within/around waterways resulting in loss of connectivity and impeded passage for non-threatened native aquatic species	FF4 - Protect aquatic habitat NV4 - Construction Noise and Vibration Management Plan (CNVMP) SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW6 - Minimise flood levels, flows and velocities CL5 - Manage chemicals, fuels and hazardous materials	Wider region	Low	3 months to 2 years	Moderate	Possible	Medium	FF4 - Protect aquatic habitat NV4 - Construction Noise and Vibration Management Plan (CNVMP) SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW6 - Minimise flood levels, flows and velocities CL5 - Manage chemicals, fuels and hazardous materials	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low
EC23	Construction activities within/around waterways resulting in loss or degradation of habitat for non-threatened native aquatic and terrestrial fauna	FF4 - Protect aquatic habitat FF9 - Protect fauna habitat in waterbodies EMF2 - Environmental Strategy and Management Plans SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW9 - Maintain bank stability CL5 - Manage chemicals, fuels and hazardous materials	Municipality	Medium	2-7 years	Moderate	Possible	Medium	FF4 - Protect aquatic habitat FF9 - Protect fauna habitat in waterbodies EMF2 - Environmental Strategy and Management Plans SW1 - Design of discharges and runoff SW4 - Monitor water quality SW5 - Surface water management (construction) SW9 - Maintain bank stability CL5 - Manage chemicals, fuels and hazardous materials	Municipality	Medium	2-7 years	Moderate	Unlikely	Low
EC24	Dewatering of groundwater during construction resulting in changes to aquatic groundwater dependent ecosystems	GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods GW4 - Groundwater Management Plan SW4 - Monitor water quality FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan	Local	Medium	2-7 years	Moderate	Likely	Medium	GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods GW4 - Groundwater Management Plan SW4 - Monitor water quality FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan	Local	Low	2-7 years	Minor	Possible	Low
EC25	Construction of tunnels causes ground settlement that changes drainage flow and/or hydrology of wetlands	GM1 - Geotechnical model and assessment GM2 - Implement a Ground Movement Plan GM3 - Condition surveys for property and infrastructure GM4 - Rectify damage by ground movement	Local	Low	7+ years	Minor	Unlikely	Low	GM1 - Geotechnical model and assessment GM2 - Implement a Ground Movement Plan GM3 - Condition surveys for property and infrastructure GM4 - Rectify damage by ground movement	Local	Low	7+ years	Minor	Unlikely	Low
EC26	Construction of tunnels causes ground settlement or tree root interactions causing death of native trees, degradation of vegetation quality or vitality of native vegetation	EMF2 - Environmental Management Plans AR1 - Tree retention and arboriculture assessment AR2 - Tree Protection Plan FF2 - Native vegetation removal and offsets FF6 - GDE monitoring	Local	Low	2-7 years	Minor	Possible	Low	EMF2 - Environmental Management Plans AR1 - Tree retention and arboriculture assessment AR2 - Tree Protection Plan FF2 - Native vegetation removal and offsets FF6 - GDE monitoring	Local	Low	2-7 years	Minor	Possible	Low
	OPERATION														
EC27	Shading from structures causing the loss or degradation of non-threatened flora and ecological communities	FF2 - Minimise and offset native vegetation removal LV1 - Urban Design Strategy	Corridor	Low	7+ years	Minor	Possible	Low	FF2 - Minimise and offset native vegetation removal LV1 - Urban Design Strategy	Corridor	Low	7+ years	Minor	Possible	Low
EC28	Shading from structures causing the loss or degradation of threatened flora and ecological communities	FF2 - Minimise and offset native vegetation removal LV1 - Urban Design Strategy	Local	Medium	7+ years	Moderate	Possible	Medium	FF2 - Minimise and offset native vegetation removal LV1 - Urban Design Strategy	Local	Medium	7+ years	Moderate	Unlikely	Low
EC29	Groundwater changes during operation resulting in changes to terrestrial groundwater dependent ecosystems	GW2 - Groundwater monitoring FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan FF2 - Minimise and offset native vegetation removal	Local	Medium	7+ years	Moderate	Possible	Medium	GW2 - Groundwater monitoring FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan FF2 - Minimise and offset native vegetation removal	Local	Medium	7+ years	Moderate	Possible	Medium
EC30	Shading of waterways from structures causing the loss or degradation of aquatic and riparian vegetation that degrades aquatic habitat quality	FF4 - Protect aquatic habitat SW8 - Waterway modifications LV1 - Urban Design Strategy	Local	Low	7+ years	Minor	Almost certain	Medium	FF4 - Protect aquatic habitat SW8 - Waterway modifications LV1 - Urban Design Strategy	Local	Low	7+ years	Minor	Almost certain	Medium

Risk ID	Potential threat and effect on the environment	INITIAL RISK							RESIDUAL RISK						
		Initial EPR	Magnitude of consequence			Overall conseque	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequ	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
	CONSTRUCTION														
EC31	Operational noise, vibration or lighting resulting in elevated disturbance to threatened fauna	EMF2 - Environmental Strategy and Management Plans LV4 - Minimise operation lighting impacts NV2 - Monitor traffic noise AR3 - Tree Canopy Replacement Plan	Local	Medium	7+ years	Moderate	Possible	Medium	EMF2 - Environmental Strategy and Management Plans LV4 - Minimise operation lighting impacts NV2 - Monitor traffic noise AR3 - Tree Canopy Replacement Plan	Local	Low	7+ years	Minor	Possible	Low
EC32	Operational noise, vibration or lighting resulting in significant impact on non-threatened native fauna	EMF2 - Environmental Strategy and Management Plans LV4 - Minimise operation lighting impacts NV2 - Monitor traffic noise AR3 - Tree Canopy Replacement Plan	Corridor	Very low	7+ years	Minor	Possible	Low	EMF2 - Environmental Strategy and Management Plans LV4 - Minimise operation lighting impacts NV2 - Monitor traffic noise AR3 - Tree Canopy Replacement Plan	Local	Very low	7+ years	Minor	Possible	Low
EC33	Enclosing waterways resulting in reduced viability of native aquatic species	FF4 - Protect aquatic habitat SW8 - Waterway modifications	Local	Low	7+ years	Minor	Unlikely	Low	FF4 - Protect aquatic habitat SW8 - Waterway modifications	Local	Low	7+ years	Minor	Unlikely	Low
EC34	Increased volumes of traffic resulting in death or injury of native fauna	EMF2 - Environmental Strategy and Management Plans	Corridor	Very low	7+ years	Minor	Possible	Low	EMF2 - Environmental Strategy and Management Plans	Corridor	Very low	7+ years	Minor	Possible	Low
EC35	Groundwater changes during operation resulting in changes to aquatic groundwater dependent ecosystems	FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan GW2 - Groundwater monitoring GW5 - Manage groundwater during operation SW4 - Monitor water quality CL2 - Minimise disturbance of acid sulfate soils	Local	Medium	7+ years	Moderate	Likely	Medium	FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan GW2 - Groundwater monitoring GW5 - Manage groundwater during operation SW4 - Monitor water quality CL2 - Minimise disturbance of acid sulfate soils	Local	Low	7+ years	Minor	Possible	Low
EC36	Changed waterway form resulting in loss of connectivity and impeded passage for native aquatic species	FF4 - Protect aquatic habitat SW6 - Minimise flood levels, flows and velocities SW8 - Waterway modifications	Municipality	Low	7+ years	Moderate	Likely	Medium	FF4 - Protect aquatic habitat SW6 - Minimise flood levels, flows and velocities SW8 - Waterway modifications	Municipality	Low	7+ years	Moderate	Likely	Medium
EC37	Changes to stormwater drainage resulting in hydraulic impact to waterways that degrades aquatic ecosystems	FF4 - Protect aquatic habitat SW6 - Minimise flood levels, flows and velocities SW8 - Waterway modifications SW11 - Water Sensitive Urban and Road Design	Wider region	Low	7+ years	Moderate	Possible	Medium	FF4 - Protect aquatic habitat SW6 - Minimise flood levels, flows and velocities SW8 - Waterway modifications SW11 - Water Sensitive Urban and Road Design	Wider region	Low	7+ years	Moderate	Unlikely	Low
EC38	Increased road traffic resulting in increased pollutants (metals, hydrocarbons) in stormwater runoff to waterways that degrades aquatic ecosystems	FF4 - Protect aquatic habitat SW1 - Design of discharges and runoff SW2 - Spill containment SW8 - Waterway modifications SW11 - Water Sensitive Urban and Road Design	Wider region	Low	7+ years	Moderate	Unlikely	Low	FF4 - Protect aquatic habitat SW1 - Design of discharges and runoff SW2 - Spill containment SW8 - Waterway modifications SW11 - Water Sensitive Urban and Road Design	Wider region	Low	7+ years	Moderate	Unlikely	Low
EC39	Shading of waterways resulting in reduced nutrient processing, leading to increased nutrient transport that degrades downstream aquatic ecosystems	FF4 - Protect aquatic habitat SW8 - Waterway modifications LV1 - Urban Design Strategy	Wider region	Low	7+ years	Moderate	Possible	Medium	FF4 - Protect aquatic habitat SW8 - Waterway modifications LV1 - Urban Design Strategy	Wider region	Low	7+ years	Moderate	Possible	Medium
EC40	Groundwater changes in the vicinity of the tunnel causing long-term detrimental changes in terrestrial and aquatic ecosystems	GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods GW5 - Manage groundwater during operation FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan	Local	Medium	7+ years	Moderate	Rare	Low	GW1 - Groundwater model GW2 - Groundwater monitoring GW3 - Tunnel drainage design and construction methods GW5 - Manage groundwater during operation FF4 - Protect aquatic habitat FF6 - Groundwater Dependent Ecosystem Monitoring and Mitigation Plan	Local	Medium	7+ years	Moderate	Rare	Low

Severity definitions for ecology

Qualitative Descriptor	Very low	Low	Medium	High	Very high
ECOLOGY Native vegetation	Insignificant loss of endangered or very high conservation significance EVC (<0.1 Ha) or total loss of EVC (<0.5 Ha).	Minor loss of endangered or very high conservation significance EVC (>0.1-0.5 Ha) or total loss of EVC (>0.5- 5 Ha).	Moderate loss of endangered or very high conservation significance EVC (>0.5-5 Ha) or total loss of EVC (>5-10 Ha).	Substantial loss of endangered or very high conservation significance EVC (>5 -10 Ha) or total loss of EVC (>10-30 Ha).	Significant loss of endangered or very high conservation significance EVC (>10 Ha) or total loss of EVC (>30 Ha).
ECOLOGY Threatened ecological communities	Changes to threatened ecological communities not detectable.	Changes to threatened ecological communities not detectable outside natural variation.	Loss (<0.5% of total distribution) of an FFG/EPBC listed community.	Loss (between 0.5 and 1% of total distribution) of an FFG/EPBC listed community.	Significant loss (>1% of total distribution) of an FFG/EPBC listed community.
ECOLOGY Flora/fauna species	No change in populations of state or commonwealth listed threatened species (no loss of habitat within Victoria). Insignificant change to common species population.	Insignificant change in populations of state or commonwealth listed threatened species (<0.05% loss of habitat within Victoria). Measurable change to common species population.	Measurable change in populations of a state or commonwealth listed threatened species (between 0.05% and 0.5% loss of habitat within Victoria). Substantial change to common species population.	Substantial change in populations of a state or commonwealth listed threatened species (between 0.5% and 1% loss of habitat within Victoria). Threat to the viability of common species.	Threat to the viability of a state or commonwealth listed species (>1% loss of habitat within Victoria). Complete loss of common species in Victoria.
ECOLOGY Aquatic ecosystems	No measureable decrease in aquatic ecosystem services and habitat values.	Some change in waterways of limited aquatic ecosystem services and habitat values.	Significant change in waterways of limited aquatic ecosystem services and habitat values.	Some change in waterways of high aquatic ecosystem services and habitat values.	Significant loss of high value aquatic ecosystem services and habitat values.

Characterisation of consequence

Extent	Local Municipality Corridor Wider region	
Severity of impact	Very high, high, medium, low, very low	See table above
Duration of threat	Short term construction (0 – 3 months) Medium term construction (>3 months – 2 years) Long term construction (>2 – 7 years) Permanent (7+ years)	

Likelihood of an event occurring and consequence being realised

Almost certain	The event is almost certain to occur one or more times a year
Likely	The event is likely to occur several times within a five-year timeframe
Possible	The event may occur once within a five-year timeframe
Unlikely	The event may occur under unusual circumstances but is not expected (ie once within a 20-year timeframe)
Rare	The event is very unlikely to occur but may occur in exceptional circumstances (ie once within a 100-year timeframe)

Risk ratings

Likelihood	Consequence level				
	Negligible	Minor	Moderate	Major	Severe
Almost Certain	Low	Medium	High	Very high	Very high
Likely	Low	Medium	Medium	High	Very high
Possible	Low	Low	Medium	High	High
Unlikely	Very low	Low	Low	Medium	High
Rare	Very low	Very low	Low	Medium	Medium

Appendix B – Threatened flora – likelihood of occurrence assessment

Table 48 Threatened flora species likelihood of occurrence within project boundary

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Acacia boormanii	Snowy River Wattle	-	-	r	2 (1996)	Not detected	Mostly open-forest on rocky slopes and along banks of the Snowy River and tributaries.	Low – outside of species range, records most likely to be planted specimens.
Acacia cupularis	Cup Wattle	-	-	r	1 (2002)	Not detected	Grows in sand, sometimes on dunes, or in loam or sandy clay in mallee communities. Known in Victoria only from Wyperfeld and Little Desert National Parks.	Low – outside of species range, records most likely to be planted specimens.
Acacia howittii	Sticky Wattle	-	-	r	5 (2014)	Not detected	Confined to eastern Victoria from the upper Macalister River near Mt Howitt south to near Yarram and east to near Tabberabbera. Grows in moist forest.	Low – outside of species range, records most likely to be planted specimens.
Acacia stictophylla	Dandenong Wattle	-	-	r	3 (2013)	Not detected	Naturally restricted to Dandenong Ranges but has isolated records as far west as Doncaster, Wonga Park in the riparian zone of hillsides in tall forest and open woodland.	Low – project boundary generally west of species range or where it may overlap (Koonung Creek) there is not appropriate habitat.
Adiantum capillus-veneris	Venus-hair Fern	-	L	e	3 (1999)	Not detected	Grows on calcareous soils. Three isolated localities in Victoria: near Cape Schanck, just outside Bendigo and in the Plenty River Gorge near Greensborough.	Low – outside of species range, records most likely to be garden escapes.
Amphibromus fluitans	River Swamp Wallaby-grass	VU	-	-	4 (2011), PMST	Yes	Inhabits both natural and man-made water-bodies, including swamps, lagoons, billabongs and dams. Known from Trinity Grammar wetlands.	Present

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Austrostipa rudis subsp. *Australis*	Veined Spear-grass	-	-	r	5 (2011)	Not detected	Uncommon, mostly found in cool areas of moderate altitude in open-forest on sandy or sandstone-derived soils.	High
Billardiera scandens s.s.	Velvet Apple-berry	-	-	r	17 (2015)	Not detected	Common in woodland and dry open forests from near sea-level to the subalps. Numerous records on the Atlas of Living Australia.	High
Caladenia amoena	Charming Spider-orchid	EN	L	e	3 (1997), PMST	Not detected	Endemic to south-central Victoria where known from a few sites on ridges and sheltered slopes in open forests on shallow clay loams (eg Plenty Gorge Parklands).	Moderate
Caladenia oenochila	Wine-lipped Spider-orchid	-	-	v	1 (2005)	Not detected	Confined in Victoria to southern foothills of the Great Dividing Range between west Gippsland and the Grampians. Relatively common on moist, often grassy forest or woodland, often in shaded habitats.	Moderate
Caladenia patersonii s.s.	Cream Spider-orchid	-	-	e	1 (2005)	Not detected	Grows in coastal heathland and heathy woodlands east of Wilsons Promontory on well-drained sandy soils.	Low – project boundary unlikely to support suitable habitat.
Caladenia rosella	Little Pink Spider-orchid	EN	L	e	PMST	Not detected	Known from only a few sites in the north-eastern outer suburbs of Melbourne and near the Grampians. Grows in woodland on skeletal soils.	Low – modelled data only, no records in local area.

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Callitriche brachycarpa	Short Water-starwort	-	L	v	1 (2013)	Not detected	In Victoria currently known only from the Otway Ranges and adjacent plains, and northern outskirts of Melbourne on sites subject to inundation.	High. Previously recorded by Practical Ecology (2007 and 2017a) in close proximity to the project boundary.
Callitriche umbonata	Winged Water-starwort	-	-	r	Practical Ecology (2017a)	Not detected	Damp and swampy areas	High. Previously recorded by Practical Ecology (2017a) in close proximity to the project boundary.
Corybas fimbriatus	Fringed Helmet-orchid	-	-	r	2 (1996)	Not detected	Occurs on moist, shaded sandy soil near the coast and generally east of Western Port, but with isolated occurrences near Melbourne at Gembrook, Warrandyte and Greensborough.	Moderate
Cymbonotus lawsonianus	Bear's ears	-	-	r	1 (1995)	Not detected	Scattered in woodland communities across Victoria. A few eastern collections from dryish areas south of the Great Dividing Range	Moderate
Dianella amoena	Matted Flax-lily	EN	L	e	66 (2014), PMST	Yes	Associated with drier grasslands and grassy woodlands south of the Dividing Range.	Present
Dianella longifolia var. *grandis*	Arching Flax-lily	-	-	v	2 (2011)	Yes	Occurs in lowland plains grassland and grassy woodlands (eg Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes.	Present

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Diuris fragrantissima	Sunshine Diuris	EN	L	e	PMST	Not detected	Grassland plains immediately west of Melbourne. The sole remaining natural population occurs at Sunshine, where about 30 plants remain.	Low – modelled data only, no records in local area.
Echinopogon caespitosus var. *caespitosus*	Bushy Hedgehog-grass	-	-	e	1 (1995)	Not detected	Recorded only from the Heyfield-Bairnsdale area, and in the vicinity of Mallacoota. Probably more widespread and likely to occur in other dryish lowland forest sites in the east.	Low – outside of species range.
Eucalyptus aff. *cinerea* (Beechworth)	Beechworth Silver Stringybark	-	-	v	1 (1989)	Not detected	Confined to a few sites north of Beechworth. Commonly planted ornamental.	Low – outside of species range, records most likely to be planted specimens.
Eucalyptus fulgens	Green Scentbark	-	-	r	6 (1991)	Yes	Occurs east from Healesville and Woori Yallock to the La Trobe Valley near Driffield.	Moderate – Historical 1989 VBA record within the project boundary but likely to have been cleared for Eastern Fwy construction and not observed during field assessments.
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow Gum	-	-	v	15 (2014)	Not detected	Grows on skeletal soils at Long Forest between Bacchus Marsh and Melton, and at Studley Park (Kew) where it grows on soil derived from Silurian sandstone.	High – Records known close to project boundary near the Eastern Freeway at Yarra Bend.

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Eucalyptus X*studleyensis*	Studley Park Gum	-	-	e	17 (2006)	Yes	A morphologically variable hybrid between *E. camaldulensis* subsp. *Camaldulensis* and *E. ovata* subsp. *Ovata* from the lower Yarra River north-east of Melbourne (Kew, Viewbank, Watsonia). Plants are intermediate between the two parent taxa in leaf, bud and fruit characters, often showing a closer affinity to either parent in one or more of these features.	Present
Eucalyptus yarraensis	Yarra Gum	-	-	r	2 (2006)	Not detected	Disjunct distribution primarily in heavier soils of gullies and streams. Endemic to Victoria, extending from Glengarry (near Traralgon) north-west to Ararat and Daylesford.	Moderate. No individuals observed within theproject boundary by ecology or arboricultural teams.
Fimbristylis velata	Veiled Fringe-sedge	-	-	r	3 (2011)	Not detected	Occasional on drying mud beside lakes and rivers and in seasonally wet depressions; mostly in northern Victoria, but recent collections in the south	Moderate
Geijera parviflora	Wilga	-	L	e	1 (1989)	Not detected	Found on calcareous red clays or sands soils in open woodland throughout inland eastern Australia. Victorian records confined to the north-west of the State in dry woodland.	Low – outside of species range, records most likely to be planted specimens.
Geranium solanderi var. *solanderi s.s.*	Austral Crane's-bill	-	-	v	2 (2011)	Not detected	Occurs in damp to dryish, usually sheltered sites in grassy woodlands, often along drainage lines or seepage areas.	High

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Geranium sp. 1	Large-flower Crane's-bill	-	L	e	3 (2010)	Not detected	Generally associated with EVC 132_61: Heavier-soils Plains Grassland on basalt around Glenroy-Broadmeadows, Riddells Creek and Malmsbury.	Low – outside of species range.
Geranium sp. 3	Pale-flower Crane's-bill	-	-	r	13 (2011)	Not detected	Currently known only from Stawell, Yan Yean, Eltham, and Bonegilla areas. Occurs in open grassy areas of dry woodland to forest.	Moderate – nearby records in Westerfolds Park
Glycine latrobeana	Clover Glycine	VU	L	v	8 (2011), PMST	Not detected	Sporadically dispersed in grasslands and grassy woodlands.	Moderate – nearby records in Plenty Gorge Parklands, Kalparrin Gardens and Harry Pottage Reserve.
Goodia medicaginea	Western Golden-tip	-	-	r	1 (2002)	Not detected	Found sporadically in the south-west, at Long Forest west of Melbourne, in central Victoria near Eaglehawk and Killawarra Forest. Favours dry, inland sites.	Low – project boundary unlikely to support suitable habitat.
Grevillea rosmarinifolia subsp. *rosmarinifolia*	Rosemary Grevillea	-	-	r	1 (2006)	Not detected	Grows in open eucalypt forest or woodland, or in riparian shrub associations, on rocky slopes or near creeks. Patchy distribution and widely planted on road verges and in gardens.	Moderate
Hakea decurrens subsp. *platytaenia*	Coast Needlewood	-	-	r	1 (1995)	Not detected	Currently recorded only from windswept coastal heaths on Wilsons Prom and in the Mallacoota area.	Low – outside of species range, records most likely to be planted specimens.
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	L	v	PMST	Not detected	Occurs in slightly saline, seasonally wet areas within the volcanic plains.	Low – modelled data only, no records in local area.

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Lepidium hyssopifolium	Basalt Peppercress	EN	L	e	1 (1990), PMST	Not detected	Scattered sites on the volcanic plain, most recent collections from disturbed, weedy sites.	Low – outside of species range.
Levenhookia sonderi	Slender Stylewort	-	-	r	2 (2011)	Not detected	Found in seasonally damp ground and drying swamps in lowland areas, mostly in the south-west, but extending eastward to Rushworth in the north and Beaconsfield in the south.	Moderate
Limonium australe	Yellow Sea-lavender	-	-	r	1 (1991)	Not detected	Confined to mangrove and saltmarsh communities near Point Lonsdale, Western Port, Shallow Inlet and Corner Inlet.	Low – outside of species range.
Microtis orbicularis	Swamp Onion-orchid	-	-	v	1 (1992)	Not detected	Semi-aquatic species occurring in shallow water around the margins of swamps. Occurs in south-west Victoria, and east of Melbourne on French Island, Wonthaggi area and Wilsons Prom.	Low – outside of species range.
Nicotiana suaveolens	Austral Tobacco	-	-	r	3 (2008)	Not detected	Widespread distribution but found particularly in drier inland areas, often in rocky or gravelled areas around rivers and streams from west of Melbourne to Mount Mercer.	Moderate
Oreomyrrhis brevipes	Branched Caraway	-	-	v	1 (2001)	Not detected	Known only from basalt outcrops on the Bogong High Plains and on granite outcrops of the Cobberas.	Low – outside of species range.

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	L	e	PMST	Not detected	Grows in grassland, open shrubland and occasionally woodland, usually on basalt-derived soils. Mostly west of Melbourne (to near Horsham), but extending as far north as Echuca.	Low – modelled data only, no records in local area.
Pomaderris vacciniifolia	Round-leaf Pomaderris	CR	L	e	PMST	Not detected	Endemic in moist forest and scrubs in the upper catchment of the Yarra, Plenty and Yea Rivers in an area bounded by Healesville, Marysville and Whittlesea.	Low – modelled data only, no records in local area.
Prasophyllum colemaniae	Lilac Leek- orchid	VU	-	x	PMST	Not detected	Last recorded in 1922 from grassy woodland near Bayswater; probably extinct.	Low – modelled data only, no records in local area.
Prasophyllum frenchii	Maroon Leek- orchid	EN	L	e	PMST	Not detected	Occurs in grassland, heathland and open forest on well-drained or water-retentive sand or clay loams. Predominantly occurs in or near coastal swamps and rarely occupies sites more than 10 km inland.	Low – modelled data only, no records in local area.
Prostanthera nivea var. *nivea*	Snowy Mint-bush	-	-	r	2 (2010)	Not detected	Largely confined to shrubland and open woodland associated with granite outcrops.	Low – unlikely to be suitable habitat.
Pterostylis chlorogramma	Green-striped Greenhood	VU	L	v	7 (1995), PMST	Not detected	Grows in moist areas of heathy and shrubby forest, on well-drained soils.	Moderate – Records in Plenty Gorge Parklands and Kalparrin Gardens.
Pterostylis clivosa	Red-tip Greenhood	-	-	r	1 (2014)	Not detected	Widespread across southern Victoria on slopes and ridges in drier open forests and woodlands on well-drained soils.	Moderate

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Pterostylis cucullata	Leafy Greenhood	VU	L	v	PMST	Not detected	Widely distributed but disjunct, mostly occurring in coastal areas, rarely inland. Recent records from volcanic soils. Coastal populations occur on stabilised sand dunes under open to closed scrub of Coast Tea-tree or Moonah.	Low – modelled data only, no records in local area.
Pterostylis smaragdyna	Emerald-lip Greenhood	-	-	r	12 (2016)	Not detected	Occurs in outer north-eastern suburbs of Melbourne, Brisbane Ranges and Ararat. Grows in drier forests and woodlands on well-drained shallow clay loam.	Moderate – Records in Plenty Gorge Parklands and Kalparrin Gardens
Pterostylis sp. Aff. *Sstriata* (Silurian)	Silurian Striped Greenhood	-	-	e	1 (2001)	Not detected	This species is known from a few sites around Nilumbik. Grows in eucalypt woodland.	Moderate
Rhagodia parabolica	Fragrant Saltbush	-	-	r	7 (2010)	Not detected	Confined to steep rocky slopes and broad ridges west of Melbourne.	Low – outside of species range.
Rutidosis leptorrhynchoides	Button Wrinklewort	EN	L	e	PMST	Not detected	Confined to basaltic grasslands. In Victoria, known distribution is between Rokewood and Melbourne.	Low – modelled data only, no records in local area.
Senecio campylocarpus	Floodplain Fireweed	-	-	r	4 (2014)	Not detected	Moist to wet clay soils in winter wet areas of forests and woodlands in central Victoria between Melbourne and the Murray River.	Moderate
Senecio glomeratus subsp. *longifructus*	Annual Fireweed	-	-	r	2 (2011)	Not detected	Grows adjacent to streams and swamps throughout the south and north-east of the state	Moderate
Senecio psilocarpus	Swamp Fireweed	VU	-	v	2 (2014)	Not detected	Occurs in winter-wet swamps on volcanic clays or peaty soils.	Low – unlikely to be suitable habitat.

Scientific Name	Common Name	EPBC	FFG	VROT (DELWP)	Record	Present within project boundary?	Habitat Preference	Likelihood of occurrence within project boundary
Tragus australianus	Small Burr-grass	-	-	r	1 (1992)	Not detected	Occurs on sandy soils and is known to colonise disturbed sites (eg 1992 record from Kensington). Found throughout north-central and north-western Victoria.	Low – outside of species range.
Tripogonella loliiformis	Rye Beetle-grass	-	-	r	2 (2009)	Not detected	Dry and mostly rocky grasslands and plains. Usually occurring on shallow soils overlying rock.	Low – unlikely to be suitable habitat.
Utricularia gibba	Floating Bladderwort	-	-	v	2 (2005)	Not detected	Freshwater swamps and wetlands at low elevations. Collections from urban areas around Melbourne are probably introduced.	Low – outside of species natural range.
Xerochrysum palustre	Swamp Everlasting	VU	L	v	1 (2014), PMST	Not detected	Sedge-rich lowland swamps and wetlands, usually on black cracking clay soils. Scattered from near South Australian border north-west of Portland to Bairnsdale.	Low – unlikely to be suitable habitat.

Legend

EPBC Act
CR – Critically Endangered
EN – Endangered
VU – Vulnerable

FFG Act
L – Listed
N – Nominated for listing
I – Invalid or ineligible
D – Delisted

VROTS
c – Critically Endangered
e – Endangered
v – Vulnerable
r – Rare

Records
(####) – VBA results: number of records (year of last record)
PMST – Protected Matters Search Tool

Note: The descriptions of preferred habitat for threatened flora species have been generated based on published species accounts – particularly from the Species Profile and Threats Database (SPRAT) database of DoEE (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>) and Flora of Victoria available online via the VicFlora website (https://vicflora.rbg.vic.gov.au/) – and reference books including, but not limited to, Flora of Melbourne: A Guide to the Indigenous Plants of the Greater Melbourne Area (Bull and Stolfo, 2014).
Records column represents the number of records of a species within the VBA output rather than a count of individuals recorded. This approach was taken for consistency as not all records include count data.

Appendix C – Threatened fauna – likelihood of occurrence assessment

Table 49 Threatened fauna likelihood of occurrence within the project boundary

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Mammals							
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	EN	L	en	1(1930), PMST	Woodlands and forests	Low. Extinct from the Melbourne area
Brush-tailed Phascogale	*Phascogale tapoatafa*	-	L	vu	1(2010)	Drier woodlands and forests, particularly where trees form small hollows suitable for denning	Low. No suitable habitat remaining in the project boundary. Numerous VBA records east of the project boundary, but only one within 5 km of the project boundary (4.95 km east of Plenty River).
Swamp Antechinus	*Antechinus minimus maritimus*	VU	L	nt	PMST	Swampy areas with dense grassy cover	Low. Potentially suitable habitats likely to be too degraded and disturbed to support this species. No VBA records in the Melbourne area.
Common Dunnart	*Sminthopsis murina*	-	-	vu	1(1991)	Heathy dry forest and mallee heath	Low. Potentially suitable habitats likely to be too degraded and disturbed to support this species. VBA records north of the study area, on the outskirts of suburban Melbourne.
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	EN	L	nt	3(1955), PMST	Typically occurs in heathland, shrubland, heathy forest and woodland, and coastal scrub habitat across southern Victoria.	Low. Extinct from the study area.
Greater Glider	*Petauroides volans*	VU	-	vu	PMST	Eucalypt-dominated low open forests on coast to tall forests in the ranges and low woodland W of Great Dividing Range; not in rainforests.	Low. Easily detectable species, but no historical records within or near the study area.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU	L	vu	444(2013), PMST	Densely vegetated flowering and fruiting trees, mainly east of Melbourne. Roosts in dense gullies. Uses a wide range of habitats in Victoria, from lowland rainforest and coastal Stringybark forests to agricultural land and suburban gardens. Established colonies known in Melbourne, Geelong and Mallacoota.	High. Known camp/colony at Yarra Bend Park near Eastern Freeway upgrade. Species forages on flowering and fruiting trees across the study area.
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	-	L	dd	1(1990)	Most environments from deserts to wet forests. Reported to roost singly or in small groups, mostly in tree hollows and buildings.	Low. Wide-ranging species across northern and eastern Australia, but a rare summer/autumn visitor to the southerly part of its range in Victoria.
Common Bent-wing Bat (eastern ssp.)	*Miniopterus schreibersii oceanensis*	-	L	vu	6(2004)	Cave-roosting and cave-breeding species. May occur anywhere within flying distance of suitable caves. Forages above canopy.	Moderate. A mostly uncommon bat, particularly in the inner suburban Melbourne area. Likely to forage occasionally in the airspace of the project boundary, particularly along the waterways and in larger patches of vegetation.
Broad-toothed Rat	*Mastacomys fuscus*	VU	L	en	PMST	Wet sedges and grasslands in forested areas, from alpine areas to sea level	Low. No historical records within or near the study area.
Smoky Mouse	*Pseudomys fumeus*	EN	L	nt	PMST	Dry heathy forest on ridges. Coastal and sub-alpine heath.	Low. No historical records within or near the study area.
Birds							
Plains-wanderer	*Pedionomus torquatus*	CR	L	cr	V:8(1980), B:1(2000), PMST	Grasslands	Low. No suitable habitat in the study area.
Diamond Dove	*Geopelia cuneata*	-	L	nt	V:3(2001)	Woodland and shrubland in dry areas	Low. Abundant species in northern parts of Australia. Study area is at the southern limit of species' normal range, and birds here are occasional to rare.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Lewin's Rail	*Rallus pectoralis*	-	L	vu	V:6(1999), B:1(1999)	Densely vegetated wetlands	Moderate. Secretive species; may be under-reported. A handful of historical records exist along the Yarra watercourse, including one near Banyule Swamp. May be resident along Yarra River, and may occur occasionally along Banyule Creek and Koonung Creek. The largest area of suitable habitat is being avoided by tunnelling.
Baillon's Crake	*Porzana pusilla*	-	L	vu	V:30(2007), B:33(2017)	Densely vegetated wetlands	High. Secretive species; may be under-reported. Historical records exist along the Yarra watercourse, including some near Banyule Swamp and one along Koonung Creek, west of Elgar Road. May be resident along Yarra River, and may occur along Banyule Creek and Koonung Creek. The largest area of suitable habitat is being avoided by tunnelling.
Caspian Tern	*Sterna caspia*	-	L	nt	V:3(1988)	Coastal areas and large inland wetlands and rivers. Exposed ocean beaches, sheltered coastal bays, harbours, lagoons, inlets, estuaries, usually with sandy or muddy margins. Breeds in a variety of coastal habitats including banks, ridges and beaches of sand and shell, often in open or among low or sparse vegetation.	Low. No suitable habitat within the project boundary.
Eastern Curlew	*Numenius madagascariensis*	CR	L	vu	PMST	Non-breeding migrant to Australia during the austral summer. Coastal. Sheltered coastal habitats, usually with large sand flats or intertidal mudflats with seagrass, estuaries, open sandy beaches. Occasionally on coastal rock platforms.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Common Sandpiper	*Actitis hypoleucos*	-	-	vu	V:4(1976), PMST	Migrates to Australia for austral summer. In Australia, inhabits a wide variety of coastal and inland wetlands with muddy margins, including lakes, rivers, sewage ponds.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.
Common Greenshank	*Tringa nebularia*	-	-	vu	PMST	Non-breeding migrant to Australia during the austral summer. Coastal mudflats, estuaries, salt marshes, mangroves, lakes and swamps.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.
Marsh Sandpiper	*Tringa stagnatilis*	-	-	vu	V:2(1991), B:3(2004)	Non-breeding migrant to Australia during the austral summer. Estuaries, and coastal and inland shallow wetlands.	Low. Habitats in the project boundary are marginally suitable at best. A small number of VBA and BLA records, including one from Bolin Bolin Billabong in 1999.
Curlew Sandpiper	*Calidris ferruginea*	CR	L	en	V:2(1966), PMST	Regular summer migrant to Victoria. Occurs in a variety of wetland habitats with fringing mudflats including bays, coastal lagoons, lakes, swamps, creeks, inundated grasslands, saltmarshes and artificial wetlands.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.
Red Knot	*Calidris canutus*	EN	-	en	V:1(1966), PMST	Non-breeding migrant to Australia during the austral summer. Coastal. Typically occurs on intertidal mudflats, sandflats and sandy beaches of sheltered coasts, and a range of other coastal and near-coastal environments such as lakes, lagoons, pools and pans, sewage ponds and saltworks. Inland lakes and swamps less commonly used.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Australian Painted Snipe	*Rostratula australis*	EN	L	cr	V:4(2001), B:17(2012), PMST	Generally in shallow, terrestrial freshwater wetlands with rank, emergent tussocks of grass, sedges and rushes. Occurs in well vegetated lakes, swamps, inundated pasture, saltmarsh and dams. Fresh to saline water. May use riverine forest.	Low. There is a cluster of 16 BLA records of this species (maximum two birds) at and around Banyule Swamp. All from October/November 2001. The VBA also contains 2 of those records. Species not recorded in the study area since then, and only one record before then (1970). There is one exceptional and possibly erroneous BLA record of 80 birds in 2012, in Darebin parklands ~2 km north of the Eastern Freeway alignment near Chandler Highway. There is potentially suitable habitat also at Bolin Bolin Billabong, although there are no historical records of the species at that location. The largest area of suitable habitat is being avoided by tunnelling.
Bush Stone-curlew	*Burhinus grallarius*	-	L	en	V:3(2001)	Open woodlands with coarse woody debris. In Victoria, occurs mostly north of the Great Divide.	Low. Species greatly threatened by introduced predators (cats and foxes), and now all but absent from the Melbourne area. Most suitable habitat in the project boundary is at Simpson Barracks, where species has not been recorded.
Brolga	*Grus rubicunda*	-	L	vu	V:1(1991)	Wetlands, dams, flooded fields	Low. Wide-ranging species which tends to occur west and north of Melbourne. There is one VBA record in the study area.
Little Egret	*Egretta garzetta*	-	L	en	V:15(2000), B:20(2018)	Uses wide range of wetlands, mudflats, estuaries. Typically prefers shallows of wetlands for foraging. Occasionally in small waterways or wet grassland areas.	Moderate. Likely to visit wetlands associated with the Yarra watercourse to forage occasionally. The largest area of suitable habitat is being avoided by tunnelling.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Intermediate Egret	*Ardea intermedia*	-	L	en	V:8(2008), B:5(2011)	Wetlands, river margins, mudflats, estuaries. Breeds in flooded or fringing trees alongside wetlands. Forages more widely.	Moderate. Likely to visit wetlands associated with the Yarra watercourse to forage occasionally. The largest area of suitable habitat is being avoided by tunnelling.
Eastern Great Egret	*Ardea modesta (=alba)*	-	L	vu	V:260(2013), B:271(2017)	Saltwater and freshwater wetlands, lakes, dams, river margins, estuaries, mudflats	High. The most commonly reported egret in southern Victoria. Likely to visit wetlands associated with the Yarra watercourse to forage. May occasionally visit Banyule and Koonung Creeks. The largest area of suitable habitat is being avoided by tunnelling.
Little Bittern	*Ixobrychus minutus*	-	L	en	V:12(2003), B:7(2003)	Dense tall vegetation in swamps and wetlands	Moderate. Secretive species and rarely reported. May occur along the Yarra watercourse in small numbers. The largest area of suitable habitat is being avoided by tunnelling.
Australasian Bittern	*Botaurus poiciloptilus*	EN	L	en	V:10(2007), B:1(1999), PMST	Wetlands with tall, dense vegetation in permanent freshwater habitats, particularly when dominated by sedges, rushes and reeds.	Moderate. Cryptic species, difficult to detect. Few records in or around the study area, but notable records of no more than one bird (up to 2007) around the Banyule Swamp. A VBA record shown at the Freeway Public Golf Course is mis-located and actually from Dandenong. May visit the Yarra watercourse occasionally. The largest area suitable habitat is being avoided by tunnelling.
Magpie Goose	*Anseranas semipalmata*	-	L	nt	V:5(2008), B:1(2007)	Seasonal wetlands, flooded fields. Aquatic and terrestrial habitat, mostly in wetlands on flood plains. Historically occurred in SE Australia, but extinct in Victoria by early 1900s. Re-introduction attempts have had mixed results.	Low. Rarely reported in Melbourne. May visit larger wetlands along the Yarra watercourse occasionally, perhaps as a vagrant. The largest area of suitable habitat is being avoided by tunnelling.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Australasian Shoveler	*Anas rhynchotis*	-	-	vu	V:16(2007)	Well vegetated larger wetlands, dams, lakes	Moderate. Records at Banyule Swamp. Likely to be an occasional visitor to larger wetlands along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.
Freckled Duck	*Stictonetta naevosa*	-	L	en	V:1(2001), B:11(2014)	Well vegetated shallow wetlands	Low. Occasional records at Banyule Swamp and along the Yarra watercourse. Reports never of more than one bird. Likely to be a rare visitor to larger wetlands along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.
Hardhead	*Aythya australis*	-	-	vu	V:84(2013)	Deep permanent wetlands, dams, lakes, slow-flowing rivers. Also occurs in brackish wetlands and water storage ponds. Occasionally in estuarine and littoral habitats such as saltpans, coastal lagoons and sheltered inshore waters.	High. Numerous records at Banyule Swamp. Likely to be a regular visitor to larger wetlands along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.
Blue-billed Duck	*Oxyura australis*	-	L	en	V:17(2003), B:73(2015)	Deep open water in wetlands, dams, lakes, slow-flowing rivers	Moderate. Occasional records at Banyule Swamp and Yarra Flats. Likely to be an occasional visitor to larger wetlands along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.
Musk Duck	*Biziura lobata*	-	-	vu	V:13(2011)	Deep open water in wetlands, dams, lakes, slow-flowing rivers	Moderate. Records at Banyule Swamp and Bolin Bolin Billabong. Likely to be an occasional visitor to larger wetlands along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Grey Goshawk	*Accipiter novaehollandiae*	-	L	vu	V:33(2008), B:10(2018)	Woodlands, forests and riparian habitats, mainly in wetter areas	Moderate. Records from Banyule Flats up to 2017. Likely to be an occasional visitor to well-treed patches along the Yarra watercourse. The largest area of suitable habitat is being avoided by tunnelling.
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	-	L	vu	V:2(1998), B:3(2009)	Coastal, marine and inland. Estuaries, beaches, large wetlands, including deep freshwater swamps, lakes, reservoirs, billabongs and rivers. Uses tall trees in or near water for breeding.	Low. No records in the project boundary. May be a rare visitor along the Yarra watercourse. The largest area of potentially suitable habitat is being avoided by tunnelling.
Square-tailed Kite	*Lophoictinia isura*	-	L	vu	V:2(1987), B:1(2014)	Woodland and open forest in drier areas	Low. No suitable habitat in project boundary.
Black Falcon	*Falco subniger*	-	L	vu	V:16(2008)	Grassy woodlands	Low. Occasional records across the Melbourne area, but rarely in the project boundary. May be an occasional visitor to larger patches of open grassy woodland in the northern part of the project boundary (eg Simpson Barracks).
Barking Owl	*Ninox connivens*	-	L	en	V:26(2001), B:5(2011)	Woodland and dry open forest	Low. Occasional records across the Melbourne area, particularly Gresswell Reserve in Bundoora. Rarely in the project boundary. May be a rare visitor to larger patches of woodland in the northern part of the project boundary (eg Simpson Barracks).
Powerful Owl	*Ninox strenua*	-	L	vu	V:61(2013), B:167(2017)	Forests and woodland. Dense gullies.	High. Numerous records within the study area, including recent records and breeding records. Most likely in well-treed habitats along the Yarra watercourse, but also possible along Koonung and Banyule Creeks.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Masked Owl	*Tyto novaehollandiae*	-	L	en	V:3(2001)	Tall eucalypt forest	Low. Rarely recorded in the Melbourne area. Most recently recorded at La Trobe University (2001), west of the project boundary.
Sooty Owl	*Tyto tenebricosa*	-	L	vu	V:1(2008)	Rainforest and wet forests.	Low. Occurs mostly in the ranges east of Melbourne. Nearest record is 3 km from the project, near Springvale Road, south of the Eastern Freeway.
Major Mitchell's Cockatoo	*Cacatua leadbeateri*	-	L	vu	V:9(2008)	Uses open, sparsely wooded country in arid areas, including grassland, open mulga and mallee, and areas dominated by callitris and casuarina.	Low. Study area is outside species' normal distribution.
Superb Parrot	*Polytelis swainsonii*	VU	L	en	V:3(1999)	Open woodland and riverine forest. Nests in eucalypt hollows.	Low. Study area is outside species' normal distribution.
Turquoise Parrot	*Neophema pulchella*	-	L	nt	V:1(1999)	Uses open grassland and woodland, generally in the north-east of Victoria, and into NSW and SE Qld.	Low. Study area is outside species' normal distribution.
Orange-bellied Parrot	*Neophema chrysogaster*	CR	L	cr	PMST	Winter migrant to coastal Victoria and South Australia from breeding areas in south-west Tasmania. Forages in coastal or near-coastal areas such as saltmarshes, coastal dunes, pastures, shrublands, estuaries, islands, beaches.	Low. No suitable habitat within the study area.
Swift Parrot	*Lathamus discolor*	CR	L	en	V:87(2009), B:90(2018), PMST	Winter migrant to Victoria (and other parts of SE Australia) from breeding areas in Tasmania. In Victoria, prefers dry, open eucalypt forests and woodlands, especially Box Ironbark Forest in north-central Victoria. Occasionally recorded in urban parks, gardens, street trees and golf courses with flowering ornamental trees and shrubs.	Moderate. Numerous records in or near the study area, including recent records west of Greensborough Road (Macleod Station and La Trobe University). May visit any flowering tree (mostly eucalypts) within the project boundary occasionally. More likely towards the northern and south-western parts than the south-eastern extent. For parts of the project boundary where trees would be removed or impacted significantly, there is little evidence of those trees or habitat patches being favoured or visited regularly by this species.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
White-throated Needletail	*Hirundapus caudacutus*	-	L	vu	V:148(2006), B:43(2017), PMST	Almost exclusively aerial within Australia, occurring over most types of habitat, particularly wooded areas. Less often seen over open farm paddocks but has been recorded in vineyards flying between the rows of trees.	Moderate. Likely to forage occasionally in the airspace of the project boundary, but association with the terrestrial habitats is minimal.
Hooded Robin	*Melanodryas cucullata*	-	L	nt	V:4(1992)	Woodlands, generally in drier areas.	Low. Very occasional reports of this species in the study area, mainly around Banyule Flats. May be rare visitor to larger patches of woodland.
Speckled Warbler	*Chthonicola sagittata*	-	L	vu	V:11(1990)	Woodlands. Generally absent from very wet and very dry areas.	Low. Rarely recorded in the study area; most VBA records are north and east of the project. May be rare visitor to larger patches of less-disturbed woodland (eg Simpson Barracks).
Painted Honeyeater	*Grantiella picta*	VU	L	vu	V:2(1990), B:1(2013), PMST	Forest, woodland, dry scrub, often with abundant mistletoe. Nomadic or migratory; uncommon.	Low. Rarely recorded in the Melbourne area. One BLA record (2013) from Banyule Flats area. May be rare visitor to any well-treed area.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Regent Honeyeater	*Anthochaera phrygia*	CR	L	cr	V:78(2001), B:1(1998), PMST	Open forests and woodlands. Generally, absent from very wet and very dry areas. Dry woodlands and forests dominated by Box Ironbark eucalypts. May be restricted to the Chiltern-Mt Pilot National Park (NE Victoria) following population decline and range contraction.	Low. Rarely recorded in the Melbourne area. Scattered records occur across the entire Melbourne area, but there are no records since 2001. Closest to the project boundary, there is a 1977 record west of Macleod Station, one 1993 record along Merri Creek north of the Eastern Freeway, and one 1986 record immediately north of the Eastern Freeway in Bulleen. Within the project boundary, there is one VBA record (1998) from Banyule Swamp/Flats area. May be very rare visitor.
Diamond Firetail	*Stagonopleura guttata*	-	L	nt	V:6(2001)	Grasslands and open woodlands. Generally absent from very wet and very dry areas	Low. Some old records across the Melbourne area, most recently in Bundoora (2001). May be a rare visitor to larger patches of woodland in the northern part of the project boundary (eg Simpson Barracks).
Reptiles							
Striped Legless Lizard	*Delma impar*	VU	L	vu	2(1975), PMST	Native and some non-native grasslands and grassy woodlands, where soil is little disturbed	Low. No suitable habitat within the project boundary. One very old record (1975) at the junction of the Yarra River and Merri Creek. No others in the study area.
Lace Monitor	*Varanus varius*	-	-	en	1(2005)	Partly arboreal. Occurs in well-timbered areas, from dry woodland to southern temperate forests.	Low. May no longer occur within the study area. One 2005 record from Plenty River gorge, north of the study area.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Glossy Grass Skink	*Pseudemoia rawlinsoni*	-	-	vu	2(1991)	Swamp and lake edges, saltmarshes, boggy creeks with dense vegetation.	Low. Poorly known species, with only two VBA records in the study area, both along the Yarra River watercourse – One record at Bolin Bolin Billabong (1991) and another along the Plenty River (1988), which is potentially mis-located (labelled as “Barber Creek: 1 km. S. of Yan Yean”). Targeted searches in December 2018 at seven locations determined the possible presence of this species at three locations (Bolin Bolin Billabong, Trinity Grammar Wetland D, Kew Billabong), but all locations are outside the project boundary, and no similarly suitable habitat lay within the project boundary near those locations.
Broad-Shelled Turtle	*Chelodina expansa*	-	L	en	2007	Permanent deep water in large, slow moving or still bodies of water. Murray-Darling Basin	Moderate. Records known from upstream in the Yarra River
Murray River Turtle	*Emydura macquarii*	-	-	vu	2011	Permanent deep water in large, slow moving or still bodies of water. Murray-Darling Basin	Moderate. Records known from upstream in the Yarra River & Koonung Creek

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Frogs							
Brown Toadlet	*Pseudophryne bibronii*	-	L	en	13(2005)	Dams and watercourses in woodland and open forest, where sufficient litter occurs	Low. Potentially suitable habitat present, but most nearby VBA records are old (pre-1980). One 2005 record from Alphington Park/Wetlands suggests species may persist in small areas of suitable habitat. Old records (1956) along Koonung Creek. Species not detected during targeted surveys in April-May 2018. If present, species likely to be in small numbers. The largest area that provides potentially suitable habitat is being avoided by tunnelling.
Southern Toadlet	*Pseudophryne semimarmorata*	-	-	vu	23(2012)	Moist soaks, depressions, dams and watercourses in woodland and open forest and heathlands, with sufficient litter or other ground cover. Adults shelter beneath leaf litter and other debris. Eggs and tadpoles develop in depressions that flood following autumn rains.	Low. Potentially suitable habitat present. Species may persist in small areas of suitable habitat. Species not detected during targeted surveys in April 2018. If present, species likely to be in small numbers. The largest area that provides potentially suitable habitat is being avoided by tunnelling.
Growling Grass Frog	*Litoria raniformis*	VU	L	vu	69(2014), PMST	Permanent and semi-permanent waterbodies, generally containing abundant submerged and emergent vegetation. Within lowland grasslands, woodlands and open forests. Open vegetated wetlands, flooded paddocks, drains, farm dams, river pools.	Moderate. Potentially suitable habitat present. Numerous records across the Melbourne area, but mostly not within the project boundary. A handful of records along the Yarra watercourse near the alignment (eg Willesmere Park) have unknown dates (1788). Species not detected during targeted surveys. If present, species likely to be in small numbers. The largest area that provides potentially suitable habitat is being avoided by tunnelling.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Invertebrates							
Eltham Copper Butterfly	*Paralucia pyrodiscus lucida*	EN	L	en	V:20(1988), PMST	Around Melbourne occurs exclusively in the Eltham to Greensborough area. Found in dry open woodlands. Its occurrence is dependent upon an obligatory association between a dwarfed form of the Sweet Bursaria *Bursaria spinosa* and colonies of *Notoncus* sp. Of ants.	Low. Numerous recent records identified for the study area, but all are from suitable habitat east of the project. No suitable habitat within the project boundary.
Golden Sun Moth	*Synemon plana*	CR	L	cr	PMST	Native grasslands and grassy woodlands, particularly where Austrodanthonia (Rytidosperma) dominant. Now recognised to occur also in exotic grasslands dominated by Chilean Needle Grass.	Low. No suitable habitat within the study area. No historical records identified for the study area.
Fish							
Murray Hardyhead	*Craterocephalus fluviatilis*	EN	L	cr	1989	Ephemeral lakes and billabongs.	Low. Historical records considered misidentification. Present isolated popualtions known from Murray Darling Basin.
Dwarf Galaxias	*Galaxiella pusilla*	VU	L	en	2010, PMST	Amongst marginal vegetation in still or gently flowing water of roadside ditches, swamps and backwaters of creeks. Occupies both ephemeral and permanent habitats.	Low- Suitable habitat present but species not recorded in Yarra catchment except for isolated translocated populations.
Murray Cod	*Maccullochella peelii*	VU	L	vu	2015, PMST	Slowly flowing, turbid Rivers and streams at low elevations, and also fast moving, clear rocky upland streams.	High – Suitable habitat in the Yarra River and potentially tributaries. Known population in the Yarra River.
Macquarie Perch	*Macquaria australasica*	EN	L	en	2015	Cool, clear water of rivers and lakes and reservoirs. Prefers slow-flowing, deep rocky pools.	High – Suitable habitat in the Yarra River and potentially tributaries. Known population in the Yarra River.
Yarra Pygmy Perch	*Nannoperca obscura*	VU	L	vu	PMST	Prefers still or slow flowing waters, with abundant aquatic vegetation and woody debris.	Low. Known populations from fragmented distribution, but Yarra catchment not considered likely population habitat.

Common name	Scientific name	EPBC Act	FFG Act	DELWP	Source	Habitat preference	Likelihood of occurrence within the project boundary
Australian Grayling	*Prototroctes maraena*	VU	L	vu	2015, PMST	Clear, moderate to fast flowing streams in the upper reaches of rivers. Typically found in gravel bottom pools. Often forming aggregations below barriers to upstream movement. Known in the Yarra catchment.	High – Suitable habitat in the Yarra River and potentially tributaries. Species known from the Yarra River.
Australian Mudfish	*Neochanna cleaver*	-	L	cr	1991	Coastal waterways with dense aquatic or inundated terrestrial vegetation and mud or silt substrate, upto 35m elevation	High. Seldom recorded in surveys, but records from Yarra and low elevation of waterways indicate suitable habitat may be present.
Freshwater Catfish	*Tandanus tandanus*	-	l	en	2010	Lakes, wetlands and rivers with abundant submerged and emergent aquatic plants.	Low, records from Yarra River, although outside natural range

Legend

EPBC Act
CR – Critically Endangered
EN – Endangered
VU – Vulnerable

DELWP
cr – Critically Endangered
en – Endangered
vu – Vulnerable
nt – Near Threatened
dd – Data Deficient

FFG Act
L – Listed

Record
V:##(####) – VBA results: number of records (year of last record)
B:##(####) – BLA results: number of records (year of last record)
PMST – Protected Matters Search Tool

Note: The descriptions of preferred habitat for threatened, migratory and/or marine species have been generated based on published species accounts – particularly from the Species Profile and Threats Database (SPRAT) database of DoEE (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>) and the Viridans Atlas and Field Guide to Plants and Animals of Melbourne Area (<https://viridans.com/wtajammel/>) – and reference books including, but not limited to, the Handbook of Australian and New Zealand and Antarctic Birds (HANZAB) Volumes 1 to 7 (1990-2006) and field guides to the mammals of Australia (Menkhorst and Knight, 2010), birds of Australia (Morcombe, 2004; Pizzey and Knight, 2012), frogs of Victoria (Hero et al, 1991) and Australia (Tyler and Knight, 2009), reptiles of Australia (Cogger, 2014; Wilson and Swan, 2013) and fish of Australia (Wager and Jackson, 1993; Allen et al, 2002).
Records column presents the number of records of a species within the VBA output rather than a count of individuals recorded. This approach was taken for consistency as not all records include count data. Records are limited to those recorded since 1987, unless the species was identified by the PMST also.

Appendix D – Migratory species – likelihood of occurrence assessment

Table 50 Migratory fauna likelihood of occurrence within the project boundary

Common name	Scientific name	Source	Habitat preference	Likelihood of occurrence within the project boundary	Likelihood of important habitat occurring within project boundary
Short-tailed Shearwater	*Puffinus tenuirostris*	V:1(2004)	Breeds at Phillip Island. Likely to forage across Victorian oceans and coasts.	Low. No suitable habitat in the project boundary.	Low
Caspian Tern	*Sterna caspia*	V:3(1988)	Coastal areas and large inland wetlands and rivers. Exposed ocean beaches, sheltered coastal bays, harbours, lagoons, inlets, estuaries, usually with sandy or muddy margins. Breeds in a variety of coastal habitats including banks, ridges and beaches of sand and shell, often in open or among low or sparse vegetation.	Low. No suitable habitat in the project boundary.	Low
Crested Tern	*Sterna bergii*	V:14(1994), B:1(1994)	Coastal and marine species.	Low. No suitable habitat in the project boundary.	Low
Common Tern	*Sterna hirundo*	V:1(1976)	Coastal and marine species.	Low. No suitable habitat in the project boundary.	Low
Ruddy Turnstone	*Arenaria interpres*	V:1(1943)	Non-breeding migrant, regular to Victoria. Typically coastal, on intertidal mudflats, sandflats and sandy beaches, rocky shores and intertidal reefs.	Low. No suitable habitat in the project boundary.	Low
Pacific Golden Plover	*Pluvialis fulva*	V:1(1943)	Non-breeding migrant to Australia during the austral summer. Usually in coastal habitats including mudflats, sandflats rocky shores and saltmarsh. Also sub-coastal wetlands and sewage ponds.	Low. No suitable habitat in the project boundary.	Low
Double-banded Plover	*Charadrius bicinctus*	V:1(1899)	Breeds in New Zealand. Regular winter migrant to Victoria. Occurs in a variety of habitats including bays, mudflats, saltmarshes.	Low. No suitable habitat in the project boundary.	Low
Eastern Curlew	*Numenius madagascariensis*	PMST	Non-breeding migrant to Australia during the austral summer. Coastal. Sheltered coastal habitats, usually with large sand flats or intertidal mudflats with seagrass, estuaries, open sandy beaches. Occasionally on coastal rock platforms.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.	Low
Bar-tailed Godwit	*Limosa lapponica*	V:1(1943)	Mudflats, sandflats, estuaries, large wetlands. Coastal, but occasionally inland.	Low. No suitable habitat in the project boundary.	Low

Common name	Scientific name	Source	Habitat preference	Likelihood of occurrence within the project boundary	Likelihood of important habitat occurring within project boundary
Common Sandpiper	*Actitis hypoleucos*	V:4(1976), PMST	Migrates to Australia for austral summer. In Australia, inhabits a wide variety of coastal and inland wetlands with muddy margins, including lakes, rivers, sewage ponds.	Low. No suitable habitat in the project boundary.	Low
Common Greenshank	*Tringa nebularia*	PMST	Non-breeding migrant to Australia during the austral summer. Coastal mudflats, estuaries, salt marshes, mangroves, lakes and swamps.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.	Low
Marsh Sandpiper	*Tringa stagnatilis*	V:2(1991), B:3(2004)	Non-breeding migrant to Australia during the austral summer. Estuaries and coastal and inland shallow wetlands.	Low. Habitats in the study area are marginally suitable at best. A small number of VBA and BLA records, including one from Bolin Bolin Billabong in 1999.	Low
Curlew Sandpiper	*Calidris ferruginea*	V:2(1966), PMST	Regular summer migrant to Victoria. Occurs in a variety of wetland habitats with fringing mudflats including bays, coastal lagoons, lakes, swamps, creeks, inundated grasslands, saltmarshes and artificial wetlands.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.	Low
Red-necked Stint	*Calidris ruficollis*	V:2(1966)	Regular summer migrant to Victoria. Occurs in a variety of wetland habitats with fringing mudflats including bays, coastal lagoons, lakes, swamps, creeks, inundated grasslands, saltmarshes and artificial wetlands.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.	Low
Sharp-tailed Sandpiper	*Calidris acuminata*	V:4(1999), B:3(1999), PMST	Non-breeding migrant to Australia during the austral summer. Prefers muddy edges of shallow fresh or brackish wetlands with inundated or emergent low vegetation.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.	Low
Red Knot	*Calidris canutus*	V:1(1966), PMST	Non-breeding migrant to Australia during the austral summer. Coastal. Typically occurs on intertidal mudflats, sandflats and sandy beaches of sheltered coasts, and a range of other coastal and near-coastal environments such as lakes, lagoons, pools and pans, sewage ponds and saltworks. Inland lakes and swamps less commonly used.	Low. Habitats in the project boundary are marginally suitable at best. Only a small number of old VBA records.	Low

Common name	Scientific name	Source	Habitat preference	Likelihood of occurrence within the project boundary	Likelihood of important habitat occurring within project boundary
Pectoral Sandpiper	*Calidris melanotos*	PMST	Non-breeding migrant to Australia during the austral summer. Occurs in a variety of wetland habitats with fringing mudflats including bays, coastal lagoons, lakes, swamps, creeks, inundated grasslands, saltmarshes and artificial wetlands. Mostly recorded from Port Phillip Bay and Murray River Valley region.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.	Low
Latham's Snipe	*Gallinago hardwickii*	V:104(2013), B:187(2015), PMST	Non-breeding migrant to Australia during the austral summer. Uses a wide variety of permanent and ephemeral wetlands, generally freshwater wetlands with cover. Also recorded along creeks, rivers and floodplains. Forages in soft mud at edge of wetlands and roosts in a variety of vegetation around wetlands including tussock grasslands, reeds and rushes, tea-tree scrub, woodlands and forests.	High – Numerous and regular reports along the Yarra River in the Banyule Flats area. The species has also been recorded in small numbers within the Bolin Bolin Billabong area, a no-go zone for the project.	High. More than 18 individuals have been reported at least once from the Banyule Swamp area, which makes that area potentially considered as important habitat for this species. This area is being tunnelled to avoid impacts
Glossy Ibis	*Plegadis falcinellus*	V:6(2002), B:2(2002)	Wetlands, dams, flooded fields, mudflats, mangroves	Low. Very few records of this species across the Melbourne area. Species may be an occasional visitor to larger wetlands.	Low
Osprey	*Pandion haliaetus*	PMST	Primarily a coastal bird of prey around most of Australia. Least common along, and perhaps absent from, central Victorian coast.	Low. No suitable habitat in the project boundary, and no historical records on VBA or BLA.	Low
White-throated Needletail	*Hirundapus caudacutus*	V:148(2006), B:43(2017), PMST	Almost exclusively aerial within Australia, occurring over most types of habitat, particularly wooded areas. Less often seen over open farm paddocks but has been recorded in vineyards flying between the rows of trees.	Moderate. Likely to forage occasionally in the airspace of the project boundary. Unlikely to have a strong association with the terrestrial habitats.	Low
Fork-tailed Swift	*Apus pacificus*	V:22(1995), B:2(2013), PMST	Aerial species, occurring over a wide range of environments, predominately over open countryside but sometimes over forests and urban landscapes.	Moderate. Likely to forage occasionally in the airspace of the project boundary. Unlikely to have a strong association with the terrestrial habitats.	Low

Common name	Scientific name	Source	Habitat preference	Likelihood of occurrence within the project boundary	Likelihood of important habitat occurring within project boundary
Rufous Fantail	*Rhipidura rufifrons*	V:42(2010), B:27(2010), PMST	Uncommon summer visitor to forests, particularly densely vegetated gullies.	High. Numerous reports along the Yarra River habitats.	Low – Widespread species that is unlikely to depend on habitats within the project boundary.
Satin Flycatcher	*Myiagra cyanoleuca*	V:25(2010), B:12(2010), PMST	Uncommon summer migrant in forests, particularly densely vegetated gullies.	High. Numerous records along the Yarra River habitats.	Low – Widespread species that is unlikely to depend on habitats within the project boundary.
Black-faced Monarch	*Monarcha melanopsis*	PMST	Summer migrant to rainforests, forests, denser woodlands and densely vegetated gullies.	Low. No records in the project boundary. Species may be rare visitor.	Low
Yellow Wagtail	*Motacilla flava*	PMST	Primarily a rare coastal visitor. Prefers open country, such as those near airfields, swamps, sewage ponds.	Low. No records in the project boundary. Species may be rare visitor or vagrant.	Low

Legend

Record

V:##(####) – VBA results: number of records (year of last record)

B:##(####) – BLA results: number of records (year of last record)

PMST – Protected Matters Search Tool

*Note: The descriptions of preferred habitat for threatened, migratory and/or marine species have been generated based on published species accounts – particularly from the Species Profile and Threats Database (SPRAT) database of DoEE (<*http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl*>) and the Viridans Atlas and Field Guide to Plants and Animals of Melbourne Area (*https://viridans.com/wtajammel/*) – and reference books including, but not limited to, the Handbook of Australian and New Zealand and Antarctic Birds (HANZAB) Volumes 1 to 7 (1990-2006) and field guides to the mammals of Australia (Menkhorst and Knight, 2010), birds of Australia (Morcombe, 2004; Pizzey and Knight, 2012), frogs of Victoria (Hero et al, 1991) and Australia (Tyler and Knight, 2009), reptiles of Australia (Cogger, 2014; Wilson and Swan, 2013) and fish of Australia (Wager and Jackson, 1993; Allen et al, 2002).*

Records column presents the number of records of a species within the VBA output rather than a count of individuals recorded. This approach was taken for consistency as not all records include count data.

Appendix E – Observed flora

Table 51 Flora species observed within study area

Status	Scientific name	Common name
	Indigenous species	
P	*Acacia acinacea*	Gold-dust Wattle
P	*Acacia aculeatissima*	Thin-leaf Wattle
-	*Acacia dealbata*	Silver Wattle
P	*Acacia genistifolia*	Spreading Wattle
-	*Acacia implexa*	Lightwood
P	*Acacia mearnsii*	Black Wattle
-	*Acacia melanoxylon*	Blackwood
-	*Acacia paradoxa*	Hedge Wattle
P, #	*Acacia provincialis*	Wirilda
P	*Acacia pycnantha*	Golden Wattle
P	*Acacia verticillata*	Prickly Moses
-	*Acaena echinata*	Sheep's Burr
-	*Acaena novae-zelandiae*	Bidgee-widgee
-	*Allocasuarina littoralis*	Black Sheoak
-	*Allocasuarina verticillata*	Drooping Sheoak
-	*Alternanthera denticulata*	Lesser Joyweed
-	*Amyema pendula* subsp. *pendula*	Drooping Mistletoe
-	*Amyema quandong*	Grey Mistletoe
-	*Anthosachne scabra*	Common Wheat-grass
-	*Arthropodium strictum*	Chocolate Lily
-	*Asperula conferta*	Common Woodruff
P	*Astroloma humifusum*	Cranberry Heath
-	*Atriplex semibaccata*	Berry Saltbush
-	*Austrostipa elegantissima*	Feather Spear-grass
-	*Austrostipa mollis*	-
-	*Austrostipa rudis* subsp. *rudis*	-
-	*Austrostipa* spp.	Spear Grass
-	*Billardiera mutabilis*	Velvet Apple-berry
-	*Bossiaea prostrata*	Creeping Bossiaea
-	*Bossiaea* spp.	Bossiaea
P	*Brachyscome multifida*	Cut-leaf Daisy
-	*Bulbine bulbosa*	Bulbine Lily
-	*Burchardia umbellata*	Milkmaids
-	*Bursaria spinosa*	Sweet Bursaria
P	*Caladenia carnea*	Pink Fingers
P	*Caladenia* sp.	-
-	*Callistemon sieberi*	River Bottlebrush
-	*Calystegia sepium*	Large Bindweed
-	*Carex appressa*	Tall Sedge
-	*Carex fascicularis*	Tassel Sedge
-	*Carex* spp.	Sedge

Status	Scientific name	Common name
P	*Cassinia aculeata*	Dogwood
P	*Cassinia sifton*	Drooping Cassinia
P	*Cassinia longifolia*	Shiny Cassinia
-	*Cassytha glabella*	Slender Dodder-laurel
-	*Chenopodium* spp.	Goosefoot
-	*Chloris truncata*	Windmill Grass
P	*Chrysocephalum apiculatum*	Common Everlasting
-	*Clematis aristata*	Mountain Clematis
-	*Clematis microphylla*	Small-leaved Clematis
-	*Comesperma volubile*	Love Creeper
-	*Convolvulus angustissimus*	Blushing Bindweed
-	*Coprosma quadrifida*	Prickly Currant-bush
P	*Correa glabra* var. *glabra*	Rock Correa
P	*Correa reflexa*	Common Correa
-	*Cycnogeton procerum*	Common Water-ribbons
-	*Cyperus gunnii* subsp. *gunnii*	Flecked Flat-sedge
-	*Cyperus lucidus*	Leafy Flat-sedge
-	*Cyperus* spp.	Flat Sedge
-	*Deyeuxia quadriseta*	Red Bent Grass
EN, L, e, P	*Dianella amoena*	Matted Flax-lily
-	*Dianella caerula* var. *caerula*	Paroo Lily
v	*Dianella longifolia* var. *grandis*	Arching Flax-lily
-	*Dianella longifolia* var. *longifolia*	-
-	*Dianella revoluta*	Black-anther Flax-lily
-	*Dianella tasmanica*	Tasman Flax-lily
-	*Dichondra repens*	Kidney-weed
P	*Dipodium* spp.	Hyacinth Orchid
-	*Dodonaea viscosa*	Sticky Hop-bush
-	*Einadia hastata*	Saloop
-	*Einadia nutans* subsp. *nutans*	Nodding Saltbush
-	*Eleocharis acuta*	Common Spike-sedge
-	*Eleocharis sphacelata*	Tall Spike-sedge
-	*Enchylaena tomentosa* var. *tomentosa*	Ruby Saltbush
-	*Epilobium hirtigerum*	Hairy Willow-herb
-	*Eragrostis* spp.	Love Grass
-	*Eucalyptus camaldulensis*	River Red-gum
-	*Eucalyptus cephalocarpa*	Mealy Stringybark
-	*Eucalyptus goniocalyx* subsp. *goniocalyx*	-
-	*Eucalyptus leucoxylon*	Yellow Gum
-	*Eucalyptus macrorhyncha*	Red Stringybark
-	*Eucalyptus melliodora*	Yellow Box
-	*Eucalyptus obliqua*	Messmate Stringybark
-	*Eucalyptus ovata*	Swamp Gum
-	*Eucalyptus polyanthemos* subsp. *vestita*	Red Box

Status	Scientific name	Common name
-	*Eucalyptus radiata* subsp. *radiata*	Narrow-leaved Peppermint
e	*Eucalyptus Xstudleyensis*	Studley Park Gum
-	*Eucalyptus tricarpa*	Red Ironbark
-	*Eucalyptus viminalis* subsp. *viminalis*	Manna Gum
-	*Exocarpos cupressiformis*	Cherry Ballart
-	*Ficinia nodosa*	Knobby Club-sedge
-	*Gahnia radula*	Thatch Saw-sedge
-	*Geranium* spp.	Crane's Bill
-	*Glyceria australis*	Australian Sweet-grass
-	*Glycine clandestina*	Twining Glycine
-	*Gonocarpus tetragynus*	Common Raspwort
-	*Goodenia ovata*	Hop Goodenia
-	*Gynatrix pulchella*	Hemp Bush
-	*Haloragis heterophylla*	Varied Raspwort
P	*Hardenbergia violacea*	Purple Coral-pea
-	*Hydrocotyle laxiflora*	Stinking Pennywort
-	*Indigofera australis*	Austral Indigo
-	*Isolepis* spp.	Club Sedge
-	*Juncus amabilis*	Hollow Rush
-	*Juncus australis*	Austral Rush
-	*Juncus bufonius*	Toad Rush
-	*Juncus gregiflorus*	Green Rush
-	*Juncus pallidus*	Pale Rush
-	*Juncus procerus*	Tall Rush
-	*Juncus* spp.	Rush
-	*Juncus subsecundus*	Finger Rush
-	*Kennedia prostrata*	Running Postman
-	*Kunzea ericoides* spp. agg.	Burgan
-	*Lachnagrostis filiformis*	Common Blown-grass
P	*Laphangium luteoalbum*	Jersey Cudweed
-	*Lepidosperma laterale*	Variable Sword-sedge
-	*Lepidosperma* spp.	Sword Sedge
-	*Leptospermum continentale*	Prickly Tea-tree
-	*Leptospermum lanigerum*	Woolly Tea-tree
-	*Leptospermum myrsinoides*	Heath Tea-tree
-	*Leptospermum obovatum*	River Tea-tree
-	*Linum marginale*	Native Flax
-	*Lomandra filiformis*	Wattle Mat-rush
-	*Lomandra longifolia*	Spiny-headed Mat-rush
-	*Lomandra nana*	Dwarf Mat-rush
-	*Luzula meridionalis*	Common Woodrush
-	*Melaleuca ericifolia*	Swamp Paperbark
-	*Melicytus dentatus*	Tree Violet
-	*Mentha* spp.	Mint

Status	Scientific name	Common name
-	*Microlaena stipoides* var. *stipoides*	Weeping Grass
P	*Microseris walteri*	Murnong
P	*Microtis unifolia*	Common Onion-orchid
#	*Myoporum insulare*	Common Boobialla
-	*Myriophyllum* spp.	Water Milfoil
P	*Olearia lirata*	Snowy Daisy-bush
-	*Opercularia varia*	Variable Stinkweed
-	*Oxalis exilis*	Shady Wood-sorrel
-	*Oxalis perennans*	Grassland Wood-sorrel
P	*Ozothamnus ferrugineus*	Tree Everlasting
-	*Persicaria decipiens*	Slender Knotweed
-	*Persicaria prostrata*	Creeping Knotweed
-	*Persicaria* spp.	Knotweed
-	*Phragmites australis*	Common Reed
-	*Pimelea flava*	Yellow Rice-flower
-	*Pimelea humilis*	Common Rice-flower
-	*Plantago gaudichaudii*	Narrow Plantain
-	*Platylobium obtusangulum*	Common Flat-pea
-	*Poa ensiformis*	Sword Tussock-grass
-	*Poa labillardierei*	Common Tussock-grass
-	*Poa morrisii*	Soft Tussock-grass
-	*Poa sieberiana* var. *sieberiana*	Grey Tussock-grass
-	*Poa* spp.	Tussock Grass
-	*Pomaderris aspera*	Hazel Pomaderris
-	*Pomaderris racemosa*	Cluster Pomaderris
-	*Poranthera microphylla*	Small Poranthera
-	*Portulaca oleracea*	Pigweed
-	*Potamogeton* spp.	Pondweed
P	*Prostanthera lasianthos*	Victorian Christmas-bush
P	*Prostanthera melissifolia*	Balm Mint-bush
-	*Pteridium esculentum*	Austral Bracken
P	*Pterostylis nutans*	Nodding Greenhood
P	*Pterostylis concinna*	-
-	*Pultenea pedunculata*	Matted Bush Pea
-	*Ranunculus* spp.	Buttercup
-	*Rhagodia candolleana* subsp. *candolleana*	Seaberry Saltbush
-	*Rumex brownii*	Slender Dock
-	*Rytidosperma caespitosum*	Common Wallaby-grass
-	*Rytidosperma carphoides*	Short Wallaby-grass
-	*Rytidosperma fulvum*	Wallaby-grass
-	*Rytidosperma pallidum*	Silvertop Wallaby-grass
-	*Rytidosperma racemosum* var. *racemosum*	Slender Wallaby-grass
-	*Rytidosperma setaceum*	Bristly Wallaby-grass
-	*Rytidosperma* spp.	Wallaby Grass

Status	Scientific name	Common name
-	*Schoenoplectus tabernaemontani*	-
-	*Schoenus apogon*	Common Bog Rush
P	*Senecio glomeratus* subsp. *glomeratus*	-
P	*Senecio hispidulus*	Rough Fireweed
P	*Senecio phelleus*	Rock Fireweed
P	*Senecio quadridentatus*	Cotton Fireweed
P	*Senecio* spp.	Groundsel
-	*Solanum aviculare*	Kangaroo Apple
-	*Solanum* spp.	Nightshade
P	*Solenogyne* spp.	Solenogyne
P	*Thelymitra* spp.	Sun Orchid
-	*Themeda triandra*	Kangaroo Grass
-	*Tricoryne elatior*	Yellow Rush-lily
-	*Typha orientalis*	Broadleaf Cumbungi
-	*Veronica gracilis*	Slender Speedwell
-	*Veronica plebeia*	Trailing Speedwell
-	*Viminaria juncea*	Golden Spray
-	*Viola hederacea*	Ivy-leaf Violet
-	*Wahlenbergia* sp.	Bluebell
-	*Wahlenbergia stricta* subsp. *stricta*	Tall Bluebell
P	*Xerochrysum viscosum*	Shiny Everlasting
	Introduced species	
*	*Acacia baileyana*	Cootamundra Wattle
#	*Acacia longifolia* subsp. *longifolia*	Sallow Wattle
*	*Acer* spp.	Maple
*	*Acetosella vulgaris*	Sheep Sorrel
*	*Agapanthus praecox* subsp. *orientalis*	Agapanthus
*	*Agrostis capillaris*	Brown-top Bent
*	*Aira* spp.	Hair Grass
*, RR	*Allium triquetrum*	Angled Onion
*	*Aloe vera*	Aloe vera
*	*Amaranthus spp.*	Amaranth
*	*Anthoxanthum odoratum*	Sweet Vernal-grass
*	*Araujia sericifera*	White Bladder-flower
*	*Arctotheca calendula*	Capeweed
*, RR	*Asparagus asparagoides*	Bridal Creeper
*, RR	*Asparagus officinalis*	Asparagus
*	*Avena barbata*	Bearded Oat
*	*Avena* spp.	Oat
*	*Bellis perennis*	English Daisy
*	*Brassica* spp.	Turnip
*	*Briza maxima*	Large Quaking-grass
*	*Briza minor*	Lesser Quaking-grass
*	*Bromus diandrus*	Great Brome

Status	Scientific name	Common name
*	*Bromus hordeaceus*	Soft Brome
*	*Bromus* spp.	Brome
*	*Casuarina cunninghamiana* subsp. *cunninghamiana*	River Oak
*	*Catapodium rigidum*	Fern Grass
*	*Cenchrus clandestinus*	Kikuyu
*	*Centaurium erythraea*	Common Centaury
*	*Cerastium glomeratum*	Sticky Mouse-ear Chickweed
*	*Cichorium intybus*	Chicory
*, RC	*Cirsium vulgare*	Spear Thistle
*	*Coprosma repens*	Mirror Bush
*	*Cortaderia selloana*	Pampas Grass
*	*Cotoneaster pannosus*	Cotoneaster
*, RC	*Crataegus monogyna*	Hawthorn
*	*Cynodon dactylon*	Couch
*	*Cyperus eragrostis*	Drain Flat-sedge
*, RC	*Cytisus scoparius*	English Broom
*	*Dactylis glomerata*	Cocksfoot
*	*Delairea odorata*	Cape Ivy
*, RC	*Echium plantagineum*	Paterson's Curse
*	*Ehrharta erecta* var. *erecta*	Panic Veldt-grass
*	*Ehrharta longiflora*	Annual Veldt-grass
*	*Ehrharta* spp.	Veldt Grass
*	*Erica lusitanica*	Spanish Heath
*	*Erigeron bonariense*	Flaxleaf Fleabane
#	*Eucalyptus botryoides*	Southern Mahogany
*	*Euphorbia peplus*	Petty Spurge
*, RR	*Foeniculum vulgare*	Fennel
*	*Fraxinus angustifolia*	Desert Ash
*	*Freesia* spp.	Freesia
*	*Fumaria bastardii*	Bastard's Fumitory
-	*Fumaria capreolata*	White Fumitory
-	*Fumaria muralis* subsp. *muralis*	-
*	*Galenia pubescens* var. *pubescens*	Galenia
*	*Galium aparine*	Cleavers
*	*Galium* spp.	Bedstraw
*	*Gazania* spp.	Gazania
*, RC	*Genista linifolia*	Flax-leaf Broom
*, RC	*Genista monspessulana*	Montpellier Broom
*	*Geranium dissectum*	Cut-leaf Crane's-bill
*	*Geranium molle*	-
*	*Hakea salicifolia* subsp. *salicifolia*	Willow-leaf Hakea
*	*Hedera helix*	English Ivy
*	*Helminthotheca echioides*	Ox-tongue
*	*Holcus lanatus*	Yorkshire Fog

Status	Scientific name	Common name
*	*Hordeum* spp.	Barley Grass
*, RC	*Hypericum perforatum* subsp. *veronense*	St John's Wort
*	*Hypochaeris radicata*	Flatweed
*	*Lactuca serriola*	Prickly Lettuce
*	*Lavandula* spp.	Lavender
*	*Leontodon taraxacoides*	Lesser Hawkbit
*	*Lepidium africanum*	Common Peppercress
*	*Lepidium* spp.	Peppercress
*	*Ligustrum lucidum*	Large-leaf Privet
*	*Lolium perenne*	Perennial Rye-grass
*	*Lolium* sp.	Rye Grass
*, RC	*Lycium ferocissimum*	African Box-thorn
*	*Lysimachia arvensis*	Pimpernel
*	*Malva parviflora*	Small-flower Mallow
*	*Medicago polymorpha*	Burr Medic
*	*Medicago* spp.	Medic
#	*Melaleuca armillaris* subsp. *armillaris*	Giant Honey-myrtle
#	*Melaleuca parvistaminea*	Rough-barked Honey-myrtle
*	*Modiola caroliniana*	Red-flower Mallow
*, RR	*Nassella neesiana*	Chilean Needle-grass
*, RC	*Nassella trichotoma*	Serrated Tussock
*	*Nasturtium* spp.	Watercress
*	*Olea europaea*	Olive
*	*Opuntia* spp.	Prickly Pear
*, RR	*Oxalis pes-caprae*	Soursob
*	*Oxalis purpurea*	Large-flower Wood-sorrel
*	*Paspalum dilatatum*	Paspalum
*	*Paspalum distichum*	Water Couch
*	*Phalaris aquatica*	Toowoomba Canary-grass
*	*Phoenix canariensis*	Canary Island Date-palm
*	*Pinus radiata*	Radiata Pine
#	*Pittosporum undulatum*	Sweet Pittosporum
*	*Plantago coronopus*	Buck's-horn Plantain
*	*Plantago lanceolata*	Ribwort
*	*Plantago major*	Greater Plantain
*	*Plantago* spp.	Plantain
*	*Poa annua*	Annual Meadow-grass
*	*Polygonum aviculare*	Hogweed
*	*Prunus* spp.	Prunus
*	*Quercus* spp.	Oak
*	*Ranunculus repens*	Creeping Buttercup
*	*Romulea rosea*	Onion Grass
*, RC	*Rosa rubiginosa*	Sweet Briar
*, RC	*Rubus fruticosus* spp. agg.	Blackberry

Status	Scientific name	Common name
*	*Rumex conglomeratus*	Clustered Dock
*	*Rumex crispus*	Curled Dock
*	*Salix* spp.	Willow
*	*Senecio vulgaris*	Common Groundsel
*	*Solanum nigrum*	Black Nightshade
*	*Sonchus asper*	Rough Sow-thistle
*	*Sonchus oleraceus*	Common Sow-thistle
*	*Spergularia rubra*	Red Sand-spurrey
*	*Stellaria media*	Chickweed
*	*Symphyotrichum subulatum*	Aster-weed
*	*Taraxacum officinale* spp. agg.	Dandelion
*	*Tradescantia fluminensis*	Wandering Trad
*	*Tragopogon porrifolius*	Salsify
*	*Trifolium campestre* var. *campestre*	Hop Clover
*	*Trifolium dubium*	Suckling Clover
*	*Trifolium repens* var. *repens*	White Clover
*, RC	*Ulex europaeus*	Gorse
*	*Vicia sativa*	Common Vetch
*	*Vinca major*	Blue Periwinkle
*	*Viola odorata*	Common Violet
*	*Vulpia* spp.	Fescue
*	*Watsonia meriana* var. *bulbillifera*	Watsonia
#	*Westringia spp.*	Westringia
*	*Zantedeschia aethiopica*	White Arum-lily

Appendix F – PMST search

Australian Government
Department of the Environment and Energy

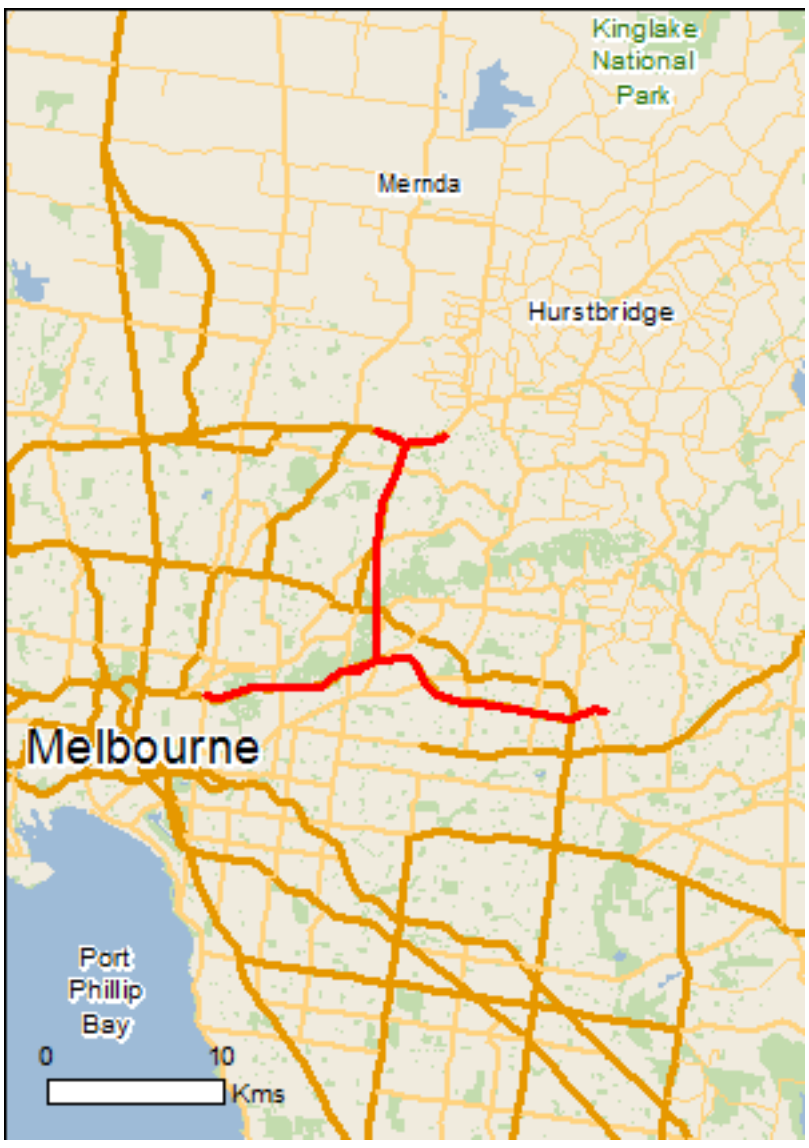
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

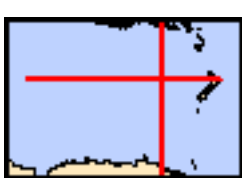
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/03/18 13:32:00



Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	8
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	45
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	15
Commonwealth Heritage Places:	11
Listed Marine Species:	24
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	4
Regional Forest Agreements:	1
Invasive Species:	56
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Royal Exhibition Building and Carlton Gardens	VIC	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Abbotsford Convent	VIC	Listed place
High Court of Australia (former)	VIC	Listed place
ICI Building (former)	VIC	Listed place
Melbourne Cricket Ground	VIC	Listed place
Melbourne's Domain Parkland and Memorial Precinct	VIC	Listed place
Newman College	VIC	Listed place
Royal Exhibition Building National Historic Place	VIC	Listed place
Sidney Myer Music Bowl	VIC	Listed place

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community may occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community may occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Breeding known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Nannoperca obscura Yarra Pygmy Perch [26177]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Paralucia pyrodiscus lucida Eltham Copper Butterfly [66766]	Endangered	Species or species habitat known to occur within area
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Mastacomys fuscus mordicus Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Caladenia amoena Charming Spider-orchid [64502]	Endangered	Species or species habitat likely to occur within area
Caladenia rosella Rosella Spider-orchid, Little Pink Spider-orchid [5086]	Endangered	Species or species habitat likely to occur within area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
Diuris fragrantissima Sunshine Diuris, Fragrant Doubletail, White Diuris [21243]	Endangered	Species or species habitat may occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Lachnagrostis adamsonii Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat likely to occur within area
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat known to occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
Pomaderris vacciniifolia Round-leaf Pomaderris [4256]	Critically Endangered	Species or species habitat likely to occur within area
Prasophyllum colemaniae Lilac Leek-orchid [41647]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Pterostylis cucullata](#) Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
[Rutidosis leptorrhynchoides](#) Button Wrinklewort [7384]	Endangered	Species or species habitat may occur within area
[Xerochrysum palustre](#) Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
[Delma impar](#) Striped Legless Lizard [1649]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Breeding known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - BOUGAINVILLE BARRACKS
Defence - CARLTON TRAINING DEPOT (Watsonia)
Defence - Cordel House
Defence - DEFENCE PLAZA MELBOURNE
Defence - Defence Depot
Defence - English Electric House
Defence - HAWTHORN TRAINING DEPOT
Defence - IVANHOE TRAINING DEPOT
Defence - Office Accomodation
Defence - SIMPSON BARRACKS - WATSONIA
Defence - SOUTH MELBOURNE TRAINING DEPOT
Defence - SURREY HILLS TRAINING DEPOT
Defence - Sands & Mcdougall Bldg
Defence - VICTORIA BARRACKS - MELBOURNE

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Canterbury Post Office	VIC	Listed place
Commonwealth Offices Building	VIC	Listed place
Melbourne General Post Office	VIC	Listed place
Victoria Barracks A Block	VIC	Listed place
Victoria Barracks C Block	VIC	Listed place
Victoria Barracks F Block	VIC	Listed place
Victoria Barracks G Block	VIC	Listed place
Victoria Barracks Guardhouse (former)	VIC	Listed place
Victoria Barracks J Block	VIC	Listed place
Victoria Barracks Precinct	VIC	Listed place
Victoria Barracks, The Keep	VIC	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Gresswell Forest (part a) N.C.R.	VIC
Gresswell Forest (part b) N.C.R.	VIC
Gresswell Hill N.C.R.	VIC
Ironbark Road N.C.R.	VIC

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Central Highlands RFA	Victoria

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species

Name	Status	Type of Presence
		habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-37.689808 145.113119,-37.691811 145.106939,-37.69266 145.096768,-37.693713 145.093421,-37.690895 145.088743,-37.687634 145.078186,-37.691064 145.088572,-37.693815 145.092906,-37.700844 145.090674,-37.706413 145.088486,-37.710996 145.085095,-37.717039 145.081491,-37.734893 145.078572,-37.780019 145.07883,-37.784157 145.069045,-37.785175 145.060247,-37.790839 145.051064,-37.791042 145.015444,-37.79562 144.998578,-37.794773 144.991497,-37.795722 144.999994,-37.791076 145.0148,-37.79111 145.049647,-37.784632 145.061749,-37.78392 145.068959,-37.78046 145.078744,-37.779714 145.094494,-37.78063 145.097755,-37.788872 145.102519,-37.793891 145.109428,-37.797214 145.12256,-37.797011 145.129899,-37.804369 145.177106,-37.800164 145.190238,-37.8003 145.192727,-37.800741 145.195173

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix G – Potentially threatening processes – likelihood of occurrence

Table 52 Key threatening processes identified in the EPBC Act and FFG Act and their likelihood of occurrence

Key threatening processes	Source	Likelihood of occurrence within study area	Project likely to exacerbate key threatening processes?
Dieback caused by the root-rot fungus *Phytophthora cinnamomi*	EPBC Act	Low No signs of dieback were observed in the project boundary Little documented evidence of Cinnamon Fungus in fragmented, urban landscapes. Few higher risk plants such as Banksia and Xanthorrhoea	Given the amount of soil movements that will occur during construction, there is the potential, if inappropriately managed. However, if the CEMP has a specific section addressing *Phytophthora*, then the risk can be managed such that the project is unlikely to exacerbate the threatening process.
Land clearance	EPBC Act	Present Land will be cleared to facilitate North East Link	Yes Clearing of up to 53 hectares of patches native vegetation, 74 large trees in patches and 284 scattered trees. None of the patches constitutes a threatened community under the EPBC Act or the FFG Act.
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	EPBC Act	Moderate Project located in urban area already invaded with garden species	No Much of the native vegetation and indigenous planted vegetation recorded within the project boundary will be removed to facilitate the project, reducing the risk.
Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	EPBC Act/FFG Act	Unlikely Project boundary occurs within highly urbanised area and large existing transport corridor (Greensborough Road, the M80 Ring Road and the Eastern Freeway).	No
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	EPBC Act/FFG Act	Moderate – High. The Amphibian Chytrid Fungus is likely to be widespread throughout frog populations and habitats within the project boundary already, and additional local movements of chytrid fungus (eg through transport of soil, wet or muddy equipment) are unlikely to cause ecologically significant impacts on frog populations in the area.	No, through site-specific hygiene measures that will limit the movements of soil and water between sites. The project would not involve activities that would be likely to introduce or increase the spread of chytrid fungus.

Key threatening processes	Source	Likelihood of occurrence within study area	Project likely to exacerbate key threatening processes?
Novel biota and their impact on biodiversity	EPBC Act	Unlikely The project would be constructed in an already disturbed and urbanised landscape where indigenous and non-indigenous biota already occur.	No
Alteration to the natural flow regimes of rivers and streams.	FFG Act	Moderate Existing flow regimes of waterways in the study area are currently impacted by river regulation and increased stormwater connectivity.	No (with mitigation)
Alteration to the natural temperature regimes of rivers and streams.	FFG Act	Low Existing streams are modified channels incuding covered or tunnelled reaches, but no thermal impacts from impoundments.	No Thermal impacts of planned channel modification would be minimal.
Degradation of native riparian vegetation along Victorian rivers and streams.	FFG Act	High All riparian vegetation within the project boundary has already been degraded historically to some degree through urbanisation associated with development of Melbourne. The project would further degrade riparian vegetation at some locations.	Yes The project would impact on native riparian vegetation along Koonung and Banyule Creeks. Additional impacts are not expected to alter the ecological effectiveness of the waterways, given the extent of existing degradation.
Habitat fragmentation as a threatening process for fauna in Victoria	FFG Act	Unlikely The project would be constructed in an already fragmented urban landscape.	No Any additional fragmentation is not expected to be extensive enough to alter the ecological effectiveness of existing habitat or wildlife corridors, or to create new barriers to fauna movement.

Key threatening processes	Source	Likelihood of occurrence within study area	Project likely to exacerbate key threatening processes?
Increase in sediment input into Victorian rivers and streams due to human activities.	FFG Act	High The project would be constructed in an urbanised area where sediment input into rivers and streams is already occurring from human activities. Project boundary occurs within close proximity of waterways (eg Koonung Creek, Banyule Creek, Plenty River and Yarra River).	No A CEMP would be developed for the project's construction works detailing best-practice measures to prevent sediment runoff and discharges during construction. Discharge and spillways will also be designed to prevent movement of sediment into local rivers and waterways from built infrastructure.
Input of toxic substances into Victorian rivers and streams.	FFG Act	High The project would be constructed in an urbanised area where input of toxic substances into rivers and streams already occurs occasionally from human activities. Project boundary occurs within close proximity of waterways (eg Koonung Creek, Banyule Creek, Plenty River and Yarra River).	No A CEMP would be developed for the project's construction works detailing best-practice measures to prevent discharges of toxic substances into waterways during construction. Discharge and spillways will also be designed to prevent discharges of toxic substances into local rivers and waterways from built infrastructure.
Invasion of native vegetation by Blackberry *Rubus fruticosus* spp. agg.	FFG Act	High Blackberry recorded within the project boundary	No Native vegetation within the project boundary is already heavily invaded by Blackberry and the project is therefore unlikely to exacerbate this threatening process.
Invasion of native vegetation by 'environmental weeds'.	FFG Act	High. Declared weed species recorded within project boundary.	No Native vegetation within the project boundary is already heavily invaded by 'environmental weeds' and the project is therefore unlikely to exacerbate this threatening process.
Invasion of native vegetation communities by Tall Wheat-grass *Lophopyrum ponticum*.	FFG Act	Unlikely. Species not recorded or identified by VBA as occurring within five kilometres of the project boundary.	No

Key threatening processes	Source	Likelihood of occurrence within study area	Project likely to exacerbate key threatening processes?
Loss of biodiversity as a result of the spread of Coast Wattle (*Acacia longifolia* subsp. *sophorae*) and Sallow Wattle (*Acacia longifolia* subsp. *longifolia*) into areas outside its natural range.	FFG Act	High Sallow Wattle present within project boundary.	Possible Clearance of native vegetation may create opportunities for Sallow Wattle to invade further into the project boundary. Ongoing monitoring and mitigation will be required to reduce the likelihood of this threatening process being exacerbated by this project.
Loss of coarse woody debris from Victorian native forests and woodlands	FFG Act	High Coarse woody debris has been lost from many of the patches of native vegetation across the study area.	No. Direct impacts on native forests and woodlands would comprise removal of vegetation and habitat rather than removal of coarse woody debris alone.
Loss of hollow-bearing trees from Victorian native forests	FFG Act	Moderate. All occurrence of loss of moderate and large trees from across the study area is likely to involve loss of hollows (even if small) that may be used by fauna. Few hollows were observed within the project boundary, but small hollows are likely to be present in some locations (eg Yarra Flats, Banyule Flats).	No. Most vegetation loss associated with the project is from areas where trees are relatively young and unlikely to have hollows. Some areas (eg Simpson Barracks) support larger trees that may have small hollows. Extent of hollow loss is not expected to be extensive enough to exacerbate the threatening process.
Spread of *Pittosporum undulatum* in areas outside its natural distribution.	FFG Act	High. Sweet Pittosporum present within project boundary.	Possible. Clearance of native vegetation may create opportunities for Sweet Pittosporum to invade further into the project boundary. Ongoing monitoring and mitigation would be required to reduce the likelihood of this threatening process being exacerbated by the project.

Key threatening processes	Source	Likelihood of occurrence within study area	Project likely to exacerbate key threatening processes?
The spread of *Phytophthora cinnamomi* from infected sites into parks and reserves, including roadsides, under the control of a state or local government authority.	FFG Act	Low No signs of dieback were observed in the project boundary. Little documented evidence of Cinnamon Fungus in fragmented, urban landscapes.	No (with mitigation)
Use of Phytophthora-infected gravel in construction of roads, bridges and reservoirs.	FFG Act	Low No signs of dieback were observed in the project boundary. Little documented evidence of Cinnamon Fungus in fragmented, urban landscapes.	No (with mitigation).
Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing	FFG Act	High Most of the wetlands and waterways in the study area are highly modified and degraded due to human intervention.	Possible. Groundwater changes as a result of tunnelling may cause further loss or degradation of wetlands and waterways. Groundwater changes are discussed in Section 10 on groundwater dependent ecosystems and section 12 (impact assessment).

Appendix H – Summary of large trees in patches within the project boundary

Table 53 Large trees in patches within project boundary

Tree number	Scientific name	Common name	DBH (cm)	Circumference (cm)	HZ#	HH_EVC
40	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	34-M	GipP0056
133	*Eucalyptus ovata*	Swamp Gum	102.0	320.4	348-C	GipP0083
144	*Eucalyptus melliodora*	Yellow Box	74.0	232.5	12-E	GipP0047
146	*Eucalyptus viminalis* subsp. *viminalis*	Manna Gum	104.0	326.7	16-C	GipP0083
151	*Eucalyptus viminalis*	Eucalypt	84.0	263.9	15-C	GipP0083
152	*Eucalyptus viminalis* subsp. *viminalis*	Manna Gum	80.0	251.3	15-C	GipP0083
191	*Eucalyptus viminalis*	Manna Gum	91.0	285.9	96-C	GipP0083
194	*Eucalyptus viminalis*	Manna Gum	87.0	273.3	96-C	GipP0083
199	*Eucalyptus viminalis*	Manna Gum	94.0	295.3	96-C	GipP0083
208	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	97-C	GipP0083
229	*Eucalyptus* X *studleyensis*	Studley Park Gum	105.0	329.9	20-C	GipP0083
233	*Eucalyptus viminalis*	Manna Gum	89.0	279.6	20-C	GipP0083
236	*Eucalyptus* spp.	Eucalypt	89.0	279.6	93-O	GipP0175
240	*Eucalyptus camaldulensis*	River Red Gum	101.0	317.3	34-M	GipP0056
241	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	34-M	GipP0056
242	*Eucalyptus camaldulensis*	River Red Gum	119.0	373.8	125-M	GipP0056
248	*Eucalyptus camaldulensis*	River Red Gum	103.0	323.6	125-M	GipP0056
250	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	31-M	GipP0056
252	*Eucalyptus camaldulensis*	River Red Gum	90.0	282.7	31-M	GipP0056
253	*Eucalyptus camaldulensis*	River Red Gum	130.0	408.4	31-M	GipP0056
254	*Eucalyptus camaldulensis*	River Red Gum	98.0	307.9	31-M	GipP0056
255	*Eucalyptus camaldulensis*	River Red Gum	105.0	329.9	31-M	GipP0056
256	*Eucalyptus camaldulensis*	River Red Gum	182.0	571.8	31-M	GipP0056
257	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	57-M	GipP0056
259	*Eucalyptus camaldulensis*	River Red Gum	106.0	333.0	54-M	GipP0056
260	*Eucalyptus camaldulensis*	River Red Gum	89.0	279.6	54-M	GipP0056
261	*Eucalyptus viminalis*	Manna Gum	91.0	285.9	54-M	GipP0056
262	*Eucalyptus camaldulensis*	River Red Gum	99.0	311.0	54-M	GipP0056
279	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	22-L	GipP0068
281	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	58-S	GipP0055

Tree number	Scientific name	Common name	DBH (cm)	Circumference (cm)	HZ#	HH_EVC
282	*Eucalyptus camaldulensis*	River Red Gum	100.0	314.2	58-S	GipP0055
284	*Eucalyptus camaldulensis*	River Red Gum	99.0	311.0	58-S	GipP0055
285	*Eucalyptus camaldulensis*	River Red Gum	136.0	427.3	58-S	GipP0055
309	*Eucalyptus melliodora*	Yellow Box	85.0	267.0	40-I	HSF_0018
317	*Eucalyptus melliodora*	Yellow Box	94.0	295.3	40-I	HSF_0018
321	*Eucalyptus melliodora*	Yellow Box	93.0	292.2	26-N	HSF_0022
322	*Eucalyptus viminalis*	Manna Gum	85.0	267.0	40-I	HSF_0018
323	*Eucalyptus viminalis*	Manna Gum	92.0	289.0	40-I	HSF_0018
324	*Eucalyptus melliodora*	Yellow Box	70.0	219.9	26-N	HSF_0022
325	*Eucalyptus melliodora*	Yellow Box	71.0	223.1	26-N	HSF_0022
335	*Eucalyptus melliodora*	Yellow Box	87.0	273.3	18-N	HSF_0022
555	*Eucalyptus camaldulensis*	River Red Gum	111.0	348.7	81-M	GipP0056
557	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	81-M	GipP0056
674	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	72-L	GipP0068
700	*Eucalyptus* X *studleyensis*	Studley Park Gum	82.0	257.6	58-S	GipP0055
701	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	58-S	GipP0055
702	*Eucalyptus camaldulensis*	River Red Gum	103.0	323.6	58-S	GipP0055
703	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	58-S	GipP0055
704	*Eucalyptus camaldulensis*	River Red Gum	125.0	392.7	58-S	GipP0055
705	*Eucalyptus camaldulensis*	River Red Gum	117.0	367.6	58-S	GipP0055
706	*Eucalyptus ovata*	Swamp Gum	91.0	285.9	58-S	GipP0055
707	*Eucalyptus camaldulensis*	River Red Gum	91.0	285.9	58-S	GipP0055
709	*Eucalyptus camaldulensis*	River Red Gum	81.0	254.5	58-S	GipP0055
710	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	58-S	GipP0055
711	*Eucalyptus* X *studleyensis*	Studley Park Gum	96.0	301.6	58-S	GipP0055
712	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	58-S	GipP0055
713	*Eucalyptus* X *studleyensis*	Studley Park Gum	88.0	276.5	58-S	GipP0055
715	*Eucalyptus* X *studleyensis*	Studley Park Gum	86.0	270.2	61-S	GipP0055
717	*Eucalyptus camaldulensis*	River Red Gum	95.0	298.5	58-S	GipP0055
718	*Eucalyptus camaldulensis*	River Red Gum	134.0	421.0	58-S	GipP0055
720	*Eucalyptus camaldulensis*	River Red Gum	94.0	295.3	58-S	GipP0055

Tree number	Scientific name	Common name	DBH (cm)	Circumference (cm)	HZ#	HH_EVC
721	*Eucalyptus camaldulensis*	River Red Gum	115.0	361.3	58-S	GipP0055
723	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	58-S	GipP0055
724	*Eucalyptus camaldulensis*	River Red Gum	110.0	345.6	58-S	GipP0055
725	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	58-S	GipP0055
726	*Eucalyptus* X *studleyensis*	Studley Park Gum	88.0	276.5	58-S	GipP0055
727	*Eucalyptus camaldulensis*	River Red Gum	102.0	320.4	58-S	GipP0055
728	*Eucalyptus* X *studleyensis*	Studley Park Gum	94.0	295.3	61-S	GipP0055
729	*Eucalyptus camaldulensis*	River Red Gum	88.0	276.5	58-S	GipP0055
731	*Eucalyptus* X *studleyensis*	Studley Park Gum	96.0	301.6	58-S	GipP0055
732	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	58-S	GipP0055
733	*Eucalyptus* X *studleyensis*	Studley Park Gum	95.0	298.5	58-S	GipP0055
734	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	61-S	GipP0055
736	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	58-S	GipP0055
820	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	144-A	GipP0055
836	*Eucalyptus camaldulensis*	River Red Gum	90.0	282.7	86-S	GipP0055
900	*Eucalyptus viminalis* subsp. *viminalis*	Manna Gum	83.0	260.8	104-F	GipP0937
901	*Eucalyptus viminalis* subsp. *viminalis*	Manna Gum	74.0	232.5	104-F	GipP0937
904	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	75-S	GipP0055
914	*Eucalyptus camaldulensis*	River Red Gum	91.0	285.9	113-E	GipP0047
915	*Eucalyptus camaldulensis*	River Red Gum	79.0	248.2	113-E	GipP0047
916	*Eucalyptus camaldulensis*	River Red Gum	83.0	260.8	136-A	GipP0055
917	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	87-S	GipP0055
918	*Eucalyptus leucoxylon* subsp. *leucoxylon*	Yellow Gum	48.0	150.8	38-N	HSF_0022
919	*Eucalyptus camaldulensis*	River Red Gum	83.0	260.8	115-S	GipP0055
920	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	34-M	GipP0056
922	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	119-M	GipP0056
923	*Eucalyptus camaldulensis*	River Red Gum	81.0	254.5	81-M	GipP0056
924	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	57-M	GipP0056
925	*Eucalyptus camaldulensis*	River Red Gum	90.0	282.7	128-M	GipP0056
926	*Eucalyptus camaldulensis*	River Red Gum	82.0	257.6	128-M	GipP0056
927	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	58-S	GipP0055

Appendix I – Summary of scattered trees within project boundary

Table 54 Scattered trees directly impacted within project boundary and indirectly impacted outside of project boundary via groundwater drawdown

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
21	*Eucalyptus camaldulensis*	River Red Gum	105.0	329.9	178-X	GipP0126	Large Scattered Tree	Direct
22	*Eucalyptus camaldulensis*	River Red Gum	111.0	348.7	179-X	GipP0056	Large Scattered Tree	Direct
60	*Eucalyptus camaldulensis*	River Red Gum	107.0	336.2	180-X	GipP0056	Large Scattered Tree	Direct
65	*Eucalyptus camaldulensis*	River Red Gum	101.0	317.3	181-X	GipP0055	Large Scattered Tree	Direct
70	*Eucalyptus camaldulensis*	River Red Gum	190.0	596.9	182-X	GipP0055	Large Scattered Tree	Direct
111	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	177-X	GipP0055	Large Scattered Tree	Direct
123	*Eucalyptus dives*	Broad-leaf Peppermint	73.0	229.3	183-X	GipP0127	Large Scattered Tree	Direct
136	*Eucalyptus viminalis/rubida*		111.0	348.7	184-X	GipP0126	Large Scattered Tree	Direct
143	*Eucalyptus melliodora*	Yellow Box	111.0	348.7	185-X	GipP0127	Large Scattered Tree	Direct
165	*Eucalyptus camaldulensis*	River Red Gum	76.0	238.8	187-X	GipP0126	Large Scattered Tree	Direct
192	*Eucalyptus viminalis*	Manna Gum	71.0	223.1	188-X	GipP0126	Large Scattered Tree	Direct
196	*Eucalyptus viminalis*	Manna Gum	85.0	267.0	189-X	GipP0126	Large Scattered Tree	Direct
223	*Eucalyptus melliodora*	Yellow Box	107.0	336.2	191-X	GipP0126	Large Scattered Tree	Direct
234	*Eucalyptus melliodora*	Yellow Box	88.0	276.5	192-X	GipP0937	Large Scattered Tree	Direct
235	*Eucalyptus camaldulensis*	River Red Gum	94.0	295.3	193-X	GipP0055	Large Scattered Tree	Direct
249	*Eucalyptus camaldulensis*	River Red Gum	93.0	292.2	194-X	GipP0056	Large Scattered Tree	Direct
251	*Eucalyptus camaldulensis*	River Red Gum	125.0	392.7	195-X	GipP0056	Large Scattered Tree	Direct
283	*Eucalyptus camaldulensis*	River Red Gum	97.0	304.7	196-X	GipP0068	Large Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
528	*Eucalyptus camaldulensis*	River Red Gum	105.0	329.9	197-X	GipP0055	Large Scattered Tree	Direct
541	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	198-X	GipP0056	Large Scattered Tree	Direct
543	*Eucalyptus camaldulensis*	River Red Gum	97.0	304.7	199-X	GipP0056	Large Scattered Tree	Direct
560	*Eucalyptus camaldulensis*	River Red Gum	123.0	386.4	200-X	GipP0055	Large Scattered Tree	Direct
574	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	201-X	GipP0056	Large Scattered Tree	Direct
647	*Eucalyptus camaldulensis*	River Red Gum	77.0	241.9	145-X	GipP0055	Large Scattered Tree	Direct
676	*Eucalyptus camaldulensis*	River Red Gum	116.0	364.4	202-X	GipP0055	Large Scattered Tree	Direct
708	*Eucalyptus camaldulensis*	River Red Gum	120.0	377.0	203-X	GipP0055	Large Scattered Tree	Direct
714	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	204-X	GipP0055	Large Scattered Tree	Direct
716	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	205-X	GipP0055	Large Scattered Tree	Direct
737	*Eucalyptus melliodora*	Yellow Box	102.0	320.4	206-X	GipP0022	Large Scattered Tree	Direct
800	*Eucalyptus melliodora*	Yellow Box	85.0	267.0	207-X	HSF_0056	Large Scattered Tree	Direct
801	*Eucalyptus melliodora*	Yellow Box	96.0	301.6	208-X	HSF_0047	Large Scattered Tree	Direct
802	*Eucalyptus camaldulensis*	River Red Gum	74.0	232.5	209-X	HSF_0047	Large Scattered Tree	Direct
809	*Eucalyptus camaldulensis*	River Red Gum	90.0	282.7	210-X	GipP0055	Large Scattered Tree	Direct
813	*Eucalyptus camaldulensis*	River Red Gum	92.0	289.0	211-X	GipP0055	Large Scattered Tree	Direct
829	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	212-X	GipP0055	Large Scattered Tree	Direct
830	*Eucalyptus camaldulensis*	River Red Gum	100.0	314.2	213-X	GipP0055	Large Scattered Tree	Direct
835	*Eucalyptus camaldulensis*	River Red Gum	82.0	257.6	214-X	GipP0068	Large Scattered Tree	Direct
839	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	215-X	GipP0055	Large Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
846	*Eucalyptus camaldulensis*	River Red Gum	95.0	298.5	216-X	GipP0055	Large Scattered Tree	Direct
853	*Eucalyptus camaldulensis*	River Red Gum	82.0	257.6	217-X	GipP0068	Large Scattered Tree	Direct
902	*Eucalyptus camaldulensis*	River Red Gum	98.0	307.9	218-X	GipP0937	Large Scattered Tree	Direct
903	*Eucalyptus camaldulensis*	River Red Gum	91.0	285.9	219-X	GipP0047	Large Scattered Tree	Direct
905	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	220-X	GipP0055	Large Scattered Tree	Direct
906	*Eucalyptus camaldulensis*	River Red Gum	87.0	273.3	221-X	GipP0056	Large Scattered Tree	Direct
907	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	222-X	GipP0055	Large Scattered Tree	Direct
908	*Eucalyptus camaldulensis*	River Red Gum	88.0	276.5	223-X	GipP0055	Large Scattered Tree	Direct
911	*Eucalyptus melliodora*	Yellow Box	94.0	295.3	224-X	HSF_0022	Large Scattered Tree	Direct
912	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	225-X	HSF_0047	Large Scattered Tree	Direct
913	*Eucalyptus goniocalyx*	Bundy	80.0	251.3	226-X	HSF_0047	Large Scattered Tree	Direct
921	*Eucalyptus camaldulensis*	River Red Gum	81.0	254.5	118-X	GipP0055	Large Scattered Tree	Direct
935	*Eucalyptus camaldulensis*	River Red Gum	86.0	270.2	227-X	GipP0068	Large Scattered Tree	Direct
936	*Eucalyptus camaldulensis*	River Red Gum	96.0	301.6	228-X	GipP0068	Large Scattered Tree	Direct
943	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	229-X	GipP0068	Large Scattered Tree	Direct
945	*Eucalyptus camaldulensis*	River Red Gum	85.0	267.0	230-X	GipP0068	Large Scattered Tree	Direct
952	*Eucalyptus camaldulensis*	River Red Gum	115.0	361.3	231-X	GipP0055	Large Scattered Tree	Direct
1082	*Eucalyptus melliodora*	Yellow Box	80.0	251.3	146-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1093	*Eucalyptus* X *studleyensis*	Studley Park Gum	130.0	408.4	147-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1147	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	148-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
1149	*Eucalyptus camaldulensis*	River Red Gum	84.0	263.9	149-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1211	*Eucalyptus melliodora*	Yellow Box	113.0	355.0	150-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1221	*Eucalyptus melliodora*	Yellow Box	117.5	369.1	151-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1227	*Eucalyptus* X *studleyensis*	Studley Park Gum	105.0	329.9	152-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1233	*Eucalyptus camaldulensis*	River Red Gum	97.0	304.7	153-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1352	*Eucalyptus* X *studleyensis*	Studley Park Gum	80.0	251.3	154-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1433	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	232-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1483	*Eucalyptus camaldulensis*	River Red Gum	82.0	257.6	155-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1484	*Eucalyptus camaldulensis*	River Red Gum	81.0	254.5	156-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1489	*Eucalyptus camaldulensis*	River Red Gum	107.0	336.2	157-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1490	*Eucalyptus camaldulensis*	River Red Gum	92.0	289.0	158-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1491	*Eucalyptus camaldulensis*	River Red Gum	107.0	336.2	159-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1492	*Eucalyptus camaldulensis*	River Red Gum	81.0	254.5	160-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1493	*Eucalyptus camaldulensis*	River Red Gum	106.0	333.0	161-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1495	*Eucalyptus camaldulensis*	River Red Gum	82.0	257.6	162-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1496	*Eucalyptus camaldulensis*	River Red Gum	117.0	367.6	163-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1497	*Eucalyptus camaldulensis*	River Red Gum	137.0	430.4	164-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1501	*Eucalyptus camaldulensis*	River Red Gum	166.0	521.5	165-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1503	*Eucalyptus camaldulensis*	River Red Gum	90.0	282.7	166-X	GipP0056	Large Scattered Tree	Indirect (g'water drawdown
1515	*Eucalyptus camaldulensis*	River Red Gum	102.0	320.4	167-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
1516	*Eucalyptus camaldulensis*	River Red Gum	91.0	285.9	168-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1517	*Eucalyptus camaldulensis*	River Red Gum	112.0	351.9	169-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1518	*Eucalyptus camaldulensis*	River Red Gum	93.0	292.2	170-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1519	*Eucalyptus camaldulensis*	River Red Gum	89.5	281.2	171-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1521	*Eucalyptus camaldulensis*	River Red Gum	86.5	271.7	172-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1522	*Eucalyptus camaldulensis*	River Red Gum	97.5	306.3	173-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1523	*Eucalyptus melliodora*	Yellow Box	138.0	433.5	174-X	GipP0022	Large Scattered Tree	Indirect (g'water drawdown
1524	*Eucalyptus camaldulensis*	River Red Gum	103.0	323.6	175-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
1549	*Eucalyptus* spp.	Eucalypt	68.5	215.2	176-X	GipP0055	Large Scattered Tree	Indirect (g'water drawdown
19	*Eucalyptus camaldulensis*	River Red Gum	80.0	251.3	237-X	GipP0056	Small Scattered Tree	Direct
20	*Eucalyptus camaldulensis*	River Red Gum	69.0	216.8	238-X	GipP0056	Small Scattered Tree	Direct
23	*Eucalyptus camaldulensis*	River Red Gum	60.0	188.5	239-X	GipP0056	Small Scattered Tree	Direct
24	*Eucalyptus camaldulensis*	River Red Gum	51.0	160.2	240-X	GipP0126	Small Scattered Tree	Direct
28	*Eucalyptus camaldulensis*	River Red Gum	54.0	169.6	241-X	GipP0056	Small Scattered Tree	Direct
48	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	242-X	GipP0056	Small Scattered Tree	Direct
49	*Eucalyptus camaldulensis*	River Red Gum	50.0	157.1	243-X	GipP0056	Small Scattered Tree	Direct
50	*Eucalyptus camaldulensis*	River Red Gum	50.0	157.1	244-X	GipP0056	Small Scattered Tree	Direct
52	*Eucalyptus camaldulensis*	River Red Gum	50.0	157.1	245-X	GipP0056	Small Scattered Tree	Direct
53	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	246-X	GipP0056	Small Scattered Tree	Direct
54	*Eucalyptus camaldulensis*	River Red Gum	50.0	157.1	247-X	GipP0056	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
63	*Eucalyptus camaldulensis*	River Red Gum	66.0	207.3	248-X	GipP0055	Small Scattered Tree	Direct
64	*Eucalyptus camaldulensis*	River Red Gum	77.0	241.9	249-X	GipP0055	Small Scattered Tree	Direct
73	*Eucalyptus camaldulensis*	River Red Gum	47.0	147.7	250-X	GipP0055	Small Scattered Tree	Direct
74	*Eucalyptus camaldulensis*	River Red Gum	66.0	207.3	251-X	GipP0068	Small Scattered Tree	Direct
75	*Eucalyptus camaldulensis*	River Red Gum	20.0	62.8	252-X	GipP0055	Small Scattered Tree	Direct
76	*Eucalyptus camaldulensis*	River Red Gum	58.0	182.2	253-X	GipP0055	Small Scattered Tree	Direct
77	*Eucalyptus camaldulensis*	River Red Gum	35.0	110.0	254-X	GipP0068	Small Scattered Tree	Direct
78	*Eucalyptus camaldulensis*	River Red Gum	54.0	169.6	255-X	GipP0055	Small Scattered Tree	Direct
79	*Eucalyptus camaldulensis*	River Red Gum	58.0	182.2	256-X	GipP0055	Small Scattered Tree	Direct
80	*Eucalyptus camaldulensis*	River Red Gum	44.0	138.2	257-X	GipP0055	Small Scattered Tree	Direct
81	*Eucalyptus camaldulensis*	River Red Gum	59.0	185.4	258-X	GipP0068	Small Scattered Tree	Direct
82	*Eucalyptus camaldulensis*	River Red Gum	39.0	122.5	259-X	GipP0068	Small Scattered Tree	Direct
83	*Eucalyptus camaldulensis*	River Red Gum	32.0	100.5	260-X	GipP0068	Small Scattered Tree	Direct
84	*Eucalyptus camaldulensis*	River Red Gum	42.0	131.9	261-X	GipP0068	Small Scattered Tree	Direct
85	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	262-X	GipP0068	Small Scattered Tree	Direct
86	*Eucalyptus camaldulensis*	River Red Gum	64.0	201.1	263-X	GipP0068	Small Scattered Tree	Direct
87	*Eucalyptus camaldulensis*	River Red Gum	25.0	78.5	264-X	GipP0068	Small Scattered Tree	Direct
88	*Eucalyptus camaldulensis*	River Red Gum	25.0	78.5	265-X	GipP0068	Small Scattered Tree	Direct
89	*Eucalyptus camaldulensis*	River Red Gum	43.0	135.1	266-X	GipP0068	Small Scattered Tree	Direct
90	*Eucalyptus camaldulensis*	River Red Gum	40.0	125.7	267-X	GipP0068	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
91	*Eucalyptus camaldulensis*	River Red Gum	35.0	110.0	268-X	GipP0068	Small Scattered Tree	Direct
92	*Eucalyptus camaldulensis*	River Red Gum	35.0	110.0	269-X	GipP0068	Small Scattered Tree	Direct
93	*Eucalyptus camaldulensis*	River Red Gum	29.0	91.1	270-X	GipP0068	Small Scattered Tree	Direct
94	*Eucalyptus camaldulensis*	River Red Gum	72.0	226.2	271-X	GipP0068	Small Scattered Tree	Direct
95	*Eucalyptus camaldulensis*	River Red Gum	15.0	47.1	272-X	GipP0068	Small Scattered Tree	Direct
96	*Eucalyptus camaldulensis*	River Red Gum	29.0	91.1	273-X	GipP0068	Small Scattered Tree	Direct
97	*Eucalyptus camaldulensis*	River Red Gum	29.0	91.1	274-X	GipP0055	Small Scattered Tree	Direct
108	*Eucalyptus camaldulensis*	River Red Gum	43.0	135.1	233-X	GipP0055	Small Scattered Tree	Direct
109	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	234-X	GipP0055	Small Scattered Tree	Direct
110	*Eucalyptus camaldulensis*	River Red Gum	51.0	160.2	235-X	GipP0055	Small Scattered Tree	Direct
112	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	236-X	GipP0055	Small Scattered Tree	Direct
115	*Eucalyptus melliodora*	Yellow Box	60.0	188.5	275-X	GipP0055	Small Scattered Tree	Direct
124	*Eucalyptus camaldulensis*	River Red Gum	65.0	204.2	276-X	GipP0127	Small Scattered Tree	Direct
193	*Eucalyptus viminalis*	Manna Gum	47.0	147.7	277-X	GipP0126	Small Scattered Tree	Direct
216	*Eucalyptus camaldulensis*	River Red Gum	45.0	141.4	278-X	GipP0126	Small Scattered Tree	Direct
218	*Eucalyptus camaldulensis*	River Red Gum	32.0	100.5	279-X	GipP0126	Small Scattered Tree	Direct
220	*Eucalyptus viminalis*	Manna Gum	55.0	172.8	280-X	GipP0126	Small Scattered Tree	Direct
221	*Eucalyptus viminalis*	Manna Gum	43.0	135.1	281-X	GipP0126	Small Scattered Tree	Direct
222	*Eucalyptus viminalis*	Manna Gum	35.0	110.0	282-X	GipP0126	Small Scattered Tree	Direct
280	*Eucalyptus camaldulensis*	River Red Gum	65.0	204.2	283-X	GipP0055	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
290	*Eucalyptus polyanthemos*	Red Box	57.0	179.1	284-X	GipP0055	Small Scattered Tree	Direct
299	*Eucalyptus camaldulensis*	River Red Gum	40.0	125.7	285-X	GipP0055	Small Scattered Tree	Direct
517	*Eucalyptus camaldulensis*	River Red Gum	20.0	62.8	286-X	GipP0055	Small Scattered Tree	Direct
518	*Eucalyptus camaldulensis*	River Red Gum	62.0	194.8	287-X	GipP0055	Small Scattered Tree	Direct
519	*Eucalyptus camaldulensis*	River Red Gum	20.0	62.8	288-X	GipP0055	Small Scattered Tree	Direct
520	*Eucalyptus camaldulensis*	River Red Gum	10.0	31.4	289-X	GipP0055	Small Scattered Tree	Direct
536	*Eucalyptus melliodora*	Yellow Box	48.0	150.8	290-X	GipP0175	Small Scattered Tree	Direct
537	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	291-X	GipP0056	Small Scattered Tree	Direct
538	*Eucalyptus camaldulensis*	River Red Gum	62.0	194.8	292-X	GipP0056	Small Scattered Tree	Direct
539	*Eucalyptus* spp.	Eucalypt	38.0	119.4	293-X	GipP0175	Small Scattered Tree	Direct
545	*Eucalyptus camaldulensis*	River Red Gum	51.0	160.2	294-X	GipP0056	Small Scattered Tree	Direct
600	*Eucalyptus camaldulensis*	River Red Gum	50.0	157.1	295-X	GipP0056	Small Scattered Tree	Direct
601	*Eucalyptus camaldulensis*	River Red Gum	71.0	223.1	296-X	GipP0056	Small Scattered Tree	Direct
602	*Eucalyptus camaldulensis*	River Red Gum	49.0	153.9	297-X	GipP0056	Small Scattered Tree	Direct
603	*Eucalyptus camaldulensis*	River Red Gum	42.0	131.9	298-X	GipP0056	Small Scattered Tree	Direct
612	*Eucalyptus camaldulensis*	River Red Gum	35.0	110.0	299-X	GipP0055	Small Scattered Tree	Direct
613	*Eucalyptus camaldulensis*	River Red Gum	42.0	131.9	300-X	GipP0055	Small Scattered Tree	Direct
614	*Eucalyptus camaldulensis*	River Red Gum	61.0	191.6	301-X	GipP0055	Small Scattered Tree	Direct
675	*Eucalyptus melliodora*	Yellow Box	35.0	110.0	302-X	GipP0055	Small Scattered Tree	Direct
807	*Eucalyptus camaldulensis*	River Red Gum	71.0	223.1	303-X	GipP0068	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
810	*Eucalyptus camaldulensis*	River Red Gum	66.0	207.3	304-X	GipP0055	Small Scattered Tree	Direct
819	*Eucalyptus camaldulensis*	River Red Gum	54.0	169.6	305-X	GipP0068	Small Scattered Tree	Direct
823	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	306-X	GipP0055	Small Scattered Tree	Direct
845	*Eucalyptus camaldulensis*	River Red Gum	16.0	50.3	307-X	GipP0055	Small Scattered Tree	Direct
909	*Eucalyptus* X *studleyensis*	Studley Park Gum	25.0	78.5	308-X	GipP0055	Small Scattered Tree	Direct
910	*Eucalyptus* X *studleyensis*	Studley Park Gum	25.0	78.5	309-X	GipP0055	Small Scattered Tree	Direct
928	*Eucalyptus camaldulensis*	River Red Gum	49.0	153.9	310-X	GipP0937	Small Scattered Tree	Direct
930	*Eucalyptus camaldulensis*	River Red Gum	45.0	141.4	311-X	GipP0937	Small Scattered Tree	Direct
931	*Eucalyptus camaldulensis*	River Red Gum	58.0	182.2	312-X	GipP0937	Small Scattered Tree	Direct
932	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	313-X	GipP0126	Small Scattered Tree	Direct
933	*Eucalyptus camaldulensis*	River Red Gum	52.0	163.4	314-X	GipP0126	Small Scattered Tree	Direct
934	*Eucalyptus camaldulensis*	River Red Gum	74.0	232.5	315-X	GipP0068	Small Scattered Tree	Direct
937	*Eucalyptus camaldulensis*	River Red Gum	53.0	166.5	316-X	GipP0055	Small Scattered Tree	Direct
938	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	317-X	GipP0055	Small Scattered Tree	Direct
939	*Eucalyptus camaldulensis*	River Red Gum	55.0	172.8	318-X	GipP0055	Small Scattered Tree	Direct
940	*Eucalyptus camaldulensis*	River Red Gum	60.0	188.5	319-X	GipP0055	Small Scattered Tree	Direct
944	*Eucalyptus camaldulensis*	River Red Gum	48.0	150.8	320-X	GipP0068	Small Scattered Tree	Direct
946	*Eucalyptus ovata*	Swamp Gum	77.0	241.9	321-X	GipP0055	Small Scattered Tree	Direct
947	*Eucalyptus ovata*	Swamp Gum	26.0	81.7	322-X	GipP0055	Small Scattered Tree	Direct
948	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	323-X	GipP0055	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
950	*Eucalyptus ovata*	Swamp Gum	59.0	185.4	324-X	GipP0068	Small Scattered Tree	Direct
951	*Eucalyptus ovata*	Swamp Gum	63.0	197.9	325-X	GipP0068	Small Scattered Tree	Direct
953	*Eucalyptus camaldulensis*	River Red Gum	20.0	62.8	326-X	GipP0068	Small Scattered Tree	Direct
954	*Eucalyptus radiata*	Narrow-leaved Peppermint	71.0	223.1	327-X	GipP0068	Small Scattered Tree	Direct
955	*Eucalyptus radiata*	Narrow-leaved Peppermint	60.0	188.5	328-X	GipP0068	Small Scattered Tree	Direct
958	*Eucalyptus melliodora*	Yellow Box	50.0	157.1	329-X	GipP0126	Small Scattered Tree	Direct
959	*Eucalyptus camaldulensis*	River Red Gum	57.0	179.1	330-X	GipP0937	Small Scattered Tree	Direct
960	*Eucalyptus camaldulensis*	River Red Gum	42.0	131.9	331-X	GipP0937	Small Scattered Tree	Direct
961	*Eucalyptus camaldulensis*	River Red Gum	51.0	160.2	332-X	GipP0937	Small Scattered Tree	Direct
963	*Eucalyptus leucoxylon*	Yellow Gum			333-X	GipP0047	Small Scattered Tree	Direct
964	*Eucalyptus camaldulensis*	River Red Gum	71.0	223.1	334-X	GipP0047	Small Scattered Tree	Direct
965	*Eucalyptus camaldulensis*	River Red Gum	56.0	175.9	335-X	GipP0047	Small Scattered Tree	Direct
966	*Eucalyptus camaldulensis*	River Red Gum	65.0	204.2	336-X	GipP0047	Small Scattered Tree	Direct
967	*Eucalyptus camaldulensis*	River Red Gum	54.0	169.6	337-X	GipP0126	Small Scattered Tree	Direct
968	*Eucalyptus camaldulensis*	River Red Gum	70.0	219.9	338-X	GipP0056	Small Scattered Tree	Direct
969	*Eucalyptus camaldulensis*	River Red Gum			339-X	GipP0056	Small Scattered Tree	Direct
970	*Eucalyptus camaldulensis*	River Red Gum	45.0	141.4	340-X	VVP_0056	Small Scattered Tree	Direct
971	*Eucalyptus camaldulensis*	River Red Gum	15.0	47.1	341-X	VVP_0056	Small Scattered Tree	Direct
972	*Eucalyptus melliodora*	Yellow Box	59.0	185.4	342-X	GipP0175	Small Scattered Tree	Direct
973	*Eucalyptus camaldulensis*	River Red Gum	53.0	166.5	343-X	GipP0056	Small Scattered Tree	Direct

Tree number	Scientific name	Common name	DBH (cm)	– Circumference (cm)	HZ#	HH_EVC	Tree Type	Impact type
974	*Eucalyptus melliodora*	Yellow Box	66.0	207.3	344-X	GipP0056	Small Scattered Tree	Direct
975	*Eucalyptus polyanthemos*	Red Box	69.0	216.8	345-X	GipP0056	Small Scattered Tree	Direct
976	*Eucalyptus melliodora*	Yellow Box	64.0	201.1	346-X	GipP0056	Small Scattered Tree	Direct
977	*Eucalyptus melliodora*	Yellow Box	60.0	188.5	347-X	GipP0056	Small Scattered Tree	Direct

Appendix J – NVR report for project boundary

Native vegetation removal report

This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report **is not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: **08/02/2019**
Time of issue: **2:18 pm**

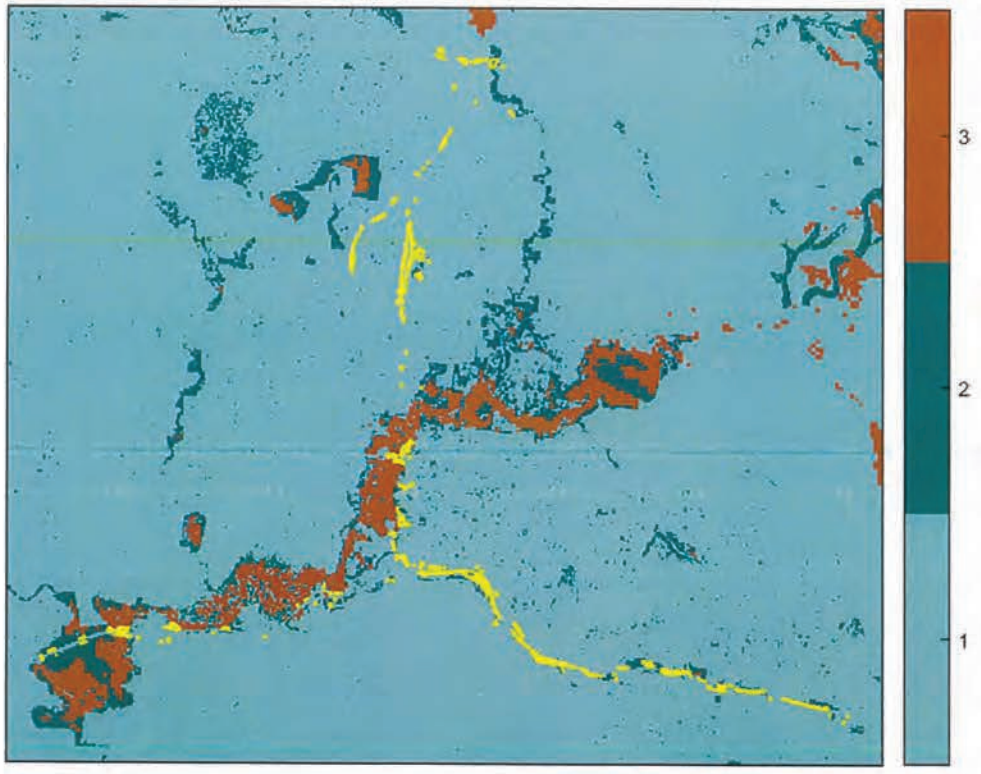
Report ID: GHD_2019_007

Project ID	3135006_NELA_EnSym_DELWP_v6

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	60.341 ha
Extent of past removal	0.000 ha
Extent of proposed removal	60.341 ha
No. Large trees proposed to be removed	179
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

1. Location map



VICTORIA State Government | Environment, Land, Water and Planning

Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	8.025 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Banyule City, Boroondara City, Manningham City, Nillumbik Shire, Whitehorse City Council
Minimum strategic biodiversity value score[2]	0.155
Large trees*	103 large trees
Species offset amount[3]	22.945 species units of habitat for Grey-headed Flying-fox, *Pteropus poliocephalus* 24.980 species units of habitat for Australian Grayling, *Prototroctes maraena* 9.490 species units of habitat for Yarra Pygmy Perch, *Nannoperca obscura* 17.269 species units of habitat for Small Golden Moths, *Diuris basaltica* 18.821 species units of habitat for Melbourne Yellow-gum, *Eucalyptus leucoxylon subsp. connata*
Large trees*	76 trees
*** The total number of large trees that the offset must protect**	179 large trees to be protected in either the general, species or combination across all habitat units protected

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

3 The species offset amount(s) required is the sum of all species habitat units in Appendix 1.

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native* vegetation (the Guidelines) for a full list of application requirements This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defendable space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DELWP Customer Service Centre 136 186

www.delwp.vic.gov.au

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
2-C	Patch	gipp0083	Endangered	0	no	0.350	1.048	1.048	0.260	1.000	0.734	4686 Australian Grayling *Prototroctes maraena*
										0.001	0.407	501473 Small Golden Moths *Diuris basaltica*
										0.001	0.407	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
3-U	Patch	vvp_0056	Endangered	0	no	0.400	0.013	0.013	0.910	0.650	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.400	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.400	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
4-S	Patch	gipp0055	Endangered	0	no	0.470	1.772	1.772	0.666	0.728	1.440	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.070	1.666	4686 Australian Grayling *Prototroctes maraena*
										0.070	1.666	4882 Yarra Pygmy Perch *Nannoperca obscura*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.359	1.266	501473 Small Golden Moths *Diuris basaltica*
										0.543	1.286	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
5-S	Patch	gipp0055	Endangered	0	no	0.420	2.898	2.898	0.258	0.667	2.029	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.222	2.435	4686 Australian Grayling *Prototroctes maraena*
										0.222	2.435	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.302	1.683	501473 Small Golden Moths *Diuris basaltica*
										0.327	1.657	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
6-S	Patch	gipp0055	Endangered	0	no	0.240	0.016	0.016	0.260		0.004	General
7-S	Patch	gipp0055	Endangered	0	no	0.240	0.039	0.039	0.260		0.009	General
8-U	Patch	vvp_0056	Endangered	0	no	0.480	0.032	0.032	0.910	0.710	0.026	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.030	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.030	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.530	0.023	501473 Small Golden Moths *Diuris basaltica*
										0.530	0.023	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
9-C	Patch	gipp0083	Endangered	0	no	0.140	0.051	0.051	0.720	0.660	0.012	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.865	0.014	4686 Australian Grayling *Prototroctes maraena*
10-C	Patch	gipp0083	Endangered	0	no	0.370	0.035	0.035	0.215		0.012	General
11-C	Patch	gipp0083	Endangered	0	no	0.370	0.302	0.302	0.210	1.000	0.223	4686 Australian Grayling *Prototroctes maraena*
12-E	Patch	gipp0047	Vulnerable	1	no	0.470	0.144	0.144	0.230		0.062	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
13-C	Patch	gipp0083	Endangered	0	no	0.350	0.000	0.000	0.230	1.000	0.000	4686 Australian Grayling *Prototroctes maraena*
14-C	Patch	gipp0083	Endangered	0	no	0.350	0.001	0.001	0.210		0.000	General
15-C	Patch	gipp0083	Endangered	2	no	0.350	0.530	0.530	0.230	1.000	0.371	4686 Australian Grayling *Prototroctes maraena*
										0.240	0.291	501473 Small Golden Moths *Diuris basaltica*
16-C	Patch	gipp0083	Endangered	1	no	0.440	1.308	1.308	0.211	0.664	0.958	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.863	1.151	4686 Australian Grayling *Prototroctes maraena*
										0.123	0.756	501473 Small Golden Moths *Diuris basaltica*
										0.040	0.748	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
17-N	Patch	hsf_0022	Least Concern	0	no	0.220	0.063	0.063	0.100		0.011	General
18-N	Patch	hsf_0022	Least Concern	1	no	0.260	0.224	0.224	0.100		0.048	General
19-C	Patch	gipp0083	Endangered	0	no	0.390	0.067	0.067	0.699	0.650	0.043	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.812	0.052	4686 Australian Grayling *Prototroctes maraena*
										0.066	0.035	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
20-C	Patch	gipp0083	Endangered	2	no	0.440	3.875	3.875	0.260	0.683	2.869	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.630	3.410	4686 Australian Grayling *Prototroctes maraena*
										0.103	2.444	501473 Small Golden Moths *Diuris basaltica*
										0.277	2.400	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
21-C	Patch	gipp0083	Endangered	0	no	0.390	0.800	0.800	0.260	0.664	0.519	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.009	0.624	4686 Australian Grayling *Prototroctes maraena*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.003	0.418	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
22-L	Patch	gipp0068	Endangered	1	no	0.190	0.098	0.098	0.178		0.016	General
23-L	Patch	gipp0068	Endangered	0	no	0.100	0.022	0.022	0.110		0.002	General
24-S	Patch	gipp0055	Endangered	0	no	0.190	0.048	0.048	0.160		0.008	General
25-L	Patch	gipp0068	Endangered	0	no	0.140	0.125	0.125	0.190		0.016	General
26-N	Patch	hsf_0022	Least Concern	3	no	0.470	0.487	0.487	0.122		0.193	General
27-L	Patch	gipp0068	Endangered	0	no	0.200	0.215	0.215	0.123		0.036	General
28-N	Patch	hsf_0022	Least Concern	0	no	0.430	0.391	0.391	0.128		0.142	General
29-L	Patch	gipp0068	Endangered	0	no	0.140	0.110	0.110	0.117		0.013	General
30-M	Patch	gipp0056	Endangered	0	no	0.280	0.173	0.173	0.489	0.715	0.083	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.025	0.063	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
31-M	Patch	gipp0056	Endangered	6	no	0.480	0.811	0.811	0.802	0.789	0.696	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.461	0.778	4686 Australian Grayling *Prototroctes maraena*
										0.461	0.778	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.286	0.590	501473 Small Golden Moths *Diuris basaltica*
										0.044	0.521	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
32-M	Patch	gipp0056	Endangered	0	no	0.400	0.002	0.002	0.850	0.500	0.001	501473 Small Golden Moths *Diuris basaltica*
										0.500	0.001	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
33-M	Patch	gipp0056	Endangered	0	no	0.400	0.016	0.016	0.850	0.740	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.584	0.010	501473 Small Golden Moths *Diuris basaltica*
										0.177	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
34-M	Patch	gipp0056	Endangered	4	no	0.220	0.831	0.831	0.260	0.750	0.320	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.068	0.365	4686 Australian Grayling *Prototroctes maraena*
										0.068	0.365	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.102	0.295	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
35-M	Patch	gipp0056	Endangered	0	no	0.250	0.875	0.875	0.427	0.737	0.380	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.435	0.330	501473 Small Golden Moths *Diuris basaltica*
36-N	Patch	hsf_0022	Least Concern	0	no	0.230	0.001	0.001	0.100		0.000	General
37-N	Patch	hsf_0022	Least Concern	0	no	0.230	0.061	0.061	0.100		0.012	General
38-N	Patch	hsf_0022	Least Concern	1	no	0.230	0.471	0.471	0.100		0.089	General
39-N	Patch	hsf_0022	Least Concern	0	no	0.380	0.476	0.476	0.104		0.150	General
40-I	Patch	hsf_0018	Least Concern	4	no	0.340	1.571	1.571	0.710	0.605	0.857	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.621	1.068	4686 Australian Grayling *Prototroctes maraena*
										0.502	0.802	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
41-T	Patch	vvp_0055	Endangered	0	no	0.290	0.325	0.325	0.791	0.729	0.163	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.013	0.189	4686 Australian Grayling *Prototroctes maraena*
										0.013	0.189	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.558	0.147	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.558	0.147	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
42-S	Patch	gipp0055	Endangered	0	no	0.340	0.604	0.604	0.920	0.752	0.360	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.707	0.411	4686 Australian Grayling *Prototroctes maraena*
										0.707	0.411	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.574	0.323	501473 Small Golden Moths *Diuris basaltica*
										0.574	0.323	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
43-J	Patch	vvp_0641	Endangered	0	no	0.350	0.006	0.006	0.920	0.690	0.004	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.500	0.003	501473 Small Golden Moths *Diuris basaltica*
										0.500	0.003	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
44-J	Patch	vvp_0641	Endangered	0	no	0.350	0.018	0.018	0.910	0.710	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.013	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.013	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.530	0.010	501473 Small Golden Moths *Diuris basaltica*
										0.530	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
45-T	Patch	vvp_0055	Endangered	0	no	0.260	0.195	0.195	0.764	0.719	0.087	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.431	0.072	501473 Small Golden Moths *Diuris basaltica*
										0.431	0.072	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
46-S	Patch	gipp0055	Endangered	0	no	0.330	0.033	0.033	0.920	0.750	0.019	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										1.000	0.021	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.021	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.690	0.018	501473 Small Golden Moths *Diuris basaltica*
										0.690	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
47-T	Patch	vvp_0055	Endangered	0	no	0.260	0.086	0.086	0.862	0.694	0.038	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.565	0.035	501473 Small Golden Moths *Diuris basaltica*
										0.565	0.035	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
48-G	Patch	gipp0641	Endangered	0	no	0.410	0.027	0.027	0.920	0.770	0.020	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.022	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.022	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.620	0.018	501473 Small Golden Moths *Diuris basaltica*
										0.620	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
49-G	Patch	gipp0641	Endangered	0	no	0.410	0.033	0.033	0.920	0.750	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.600	0.022	501473 Small Golden Moths *Diuris basaltica*
										0.600	0.022	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
50-G	Patch	gipp0641	Endangered	0	no	0.410	0.032	0.032	0.920	0.761	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.546	0.026	4686 Australian Grayling *Prototroctes maraena*
										0.546	0.026	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.611	0.021	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.611	0.021	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
51-G	Patch	gipp0641	Endangered	0	no	0.410	0.050	0.050	0.920	0.750	0.036	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.112	0.041	4686 Australian Grayling *Prototroctes maraena*
										0.112	0.041	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.601	0.033	501473 Small Golden Moths *Diuris basaltica*
										0.601	0.033	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
52-M	Patch	gipp0056	Endangered	0	no	0.300	0.048	0.048	0.960	0.770	0.025	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.629	0.023	501473 Small Golden Moths *Diuris basaltica*
53-M	Patch	gipp0056	Endangered	0	no	0.180	0.042	0.042	0.970	0.810	0.014	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.340	0.012	501473 Small Golden Moths *Diuris basaltica*
										0.601	0.012	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
54-M	Patch	gipp0056	Endangered	4	no	0.290	0.450	0.450	0.920	0.787	0.233	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.276	0.213	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
55-M	Patch	gipp0056	Endangered	0	no	0.300	0.044	0.044	0.288	0.790	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.025	0.026	4686 Australian Grayling *Prototroctes maraena*
										0.025	0.026	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.015	0.021	501473 Small Golden Moths *Diuris basaltica*
56-M	Patch	gipp0056	Endangered	0	no	0.320	0.005	0.005	0.970	0.809	0.003	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										1.000	0.003	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.003	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.022	0.003	501473 Small Golden Moths *Diuris basaltica*
57-M	Patch	gipp0056	Endangered	2	no	0.320	1.068	1.068	0.970	0.811	0.619	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.031	0.535	501473 Small Golden Moths *Diuris basaltica*
										0.418	0.553	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
58-S	Patch	gipp0055	Endangered	32	no	0.580	9.978	9.978	0.213		5.266	General
59-S	Patch	gipp0055	Endangered	0	no	0.460	0.259	0.259	0.130		0.101	General
60-S	Patch	gipp0055	Endangered	0	no	0.520	0.000	0.000	0.210		0.000	General
61-S	Patch	gipp0055	Endangered	3	no	0.520	0.739	0.739	0.168		0.337	General
62-E	Patch	gipp0047	Vulnerable	0	no	0.380	0.180	0.180	0.210	0.664	0.114	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.035	0.137	4686 Australian Grayling *Prototroctes maraena*
										0.462	0.101	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
63-C	Patch	gipp0083	Endangered	0	no	0.350	0.015	0.015	0.210	0.680	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.480	0.008	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
64-D	Patch	gipp0821	Least Concern	0	no	0.560	0.023	0.023	0.230	1.000	0.026	4686 Australian Grayling *Prototroctes maraena*
										0.141	0.020	501473 Small Golden Moths *Diuris basaltica*
65-S	Patch	gipp0055	Endangered	0	no	0.170	0.043	0.043	0.805	0.739	0.013	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.499	0.011	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.499	0.011	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
66-O	Patch	gipp0175	Endangered	0	no	0.350	0.156	0.156	0.920	0.747	0.095	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.529	0.083	501473 Small Golden Moths *Diuris basaltica*
										0.529	0.083	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
67-M	Patch	gipp0056	Endangered	0	no	0.270	0.106	0.106	0.367		0.029	General
68-S	Patch	gipp0055	Endangered	0	no	0.220	0.027	0.027	0.820	0.720	0.010	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.012	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.012	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.480	0.009	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
69-D	Patch	gipp0821	Least Concern	0	no	0.510	0.039	0.039	0.732	0.725	0.035	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.843	0.040	4686 Australian Grayling *Prototroctes maraena*
										0.843	0.040	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.507	0.030	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
70-S	Patch	gipp0055	Endangered	0	no	0.220	0.007	0.007	0.820	0.730	0.003	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.003	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.003	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.500	0.002	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
71-S	Patch	gipp0055	Endangered	0	no	0.430	0.071	0.071	0.813	0.713	0.052	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.760	0.061	4686 Australian Grayling *Prototroctes maraena*
										0.760	0.061	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.261	0.044	501473 Small Golden Moths *Diuris basaltica*
										0.261	0.044	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
72-L	Patch	gipp0068	Endangered	1	no	0.320	0.284	0.284	0.190		0.081	General
73-S	Patch	gipp0055	Endangered	0	no	0.120	0.076	0.076	0.100		0.008	General
74-M	Patch	gipp0056	Endangered	0	no	0.430	0.053	0.053	0.990	0.790	0.041	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.660	0.038	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
75-S	Patch	gipp0055	Endangered	1	no	0.380	0.071	0.071	0.242	0.710	0.046	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.054	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.054	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.476	0.040	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
76-S	Patch	gipp0055	Endangered	0	no	0.380	0.048	0.048	0.260	1.000	0.036	4686 Australian Grayling *Prototroctes maraena*
										0.326	0.036	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.270	0.025	501473 Small Golden Moths *Diuris basaltica*
										0.410	0.026	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
77-M	Patch	gipp0056	Endangered	0	no	0.500	0.099	0.099	0.910	0.780	0.088	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.634	0.081	501473 Small Golden Moths *Diuris basaltica*
										0.634	0.081	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
78-L	Patch	gipp0068	Endangered	0	no	0.100	0.024	0.024	0.190		0.002	General
79-S	Patch	gipp0055	Endangered	0	no	0.230	0.036	0.036	0.260		0.008	General
80-M	Patch	gipp0056	Endangered	0	no	0.430	0.013	0.013	0.421	0.810	0.010	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.649	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
81-M	Patch	gipp0056	Endangered	3	no	0.670	0.270	0.270	0.903	0.743	0.315	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.623	0.294	501473 Small Golden Moths *Diuris basaltica*
										0.623	0.294	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
82-S	Patch	gipp0055	Endangered	0	no	0.070	0.005	0.005	0.820	0.710	0.001	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.001	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.001	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.390	0.000	501473 Small Golden Moths *Diuris basaltica*
										0.390	0.000	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
83-D	Patch	gipp0821	Least Concern	0	no	0.510	0.390	0.390	0.820	0.711	0.340	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.833	0.398	4686 Australian Grayling *Prototroctes maraena*
										0.833	0.398	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.287	0.309	501473 Small Golden Moths *Diuris basaltica*
										0.536	0.306	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
84-S	Patch	gipp0055	Endangered	0	no	0.150	0.017	0.017	0.100		0.002	General
85-S	Patch	gipp0055	Endangered	0	no	0.200	0.243	0.243	0.142		0.042	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
86-S	Patch	gipp0055	Endangered	1	no	0.340	0.141	0.141	0.150		0.041	General
87-S	Patch	gipp0055	Endangered	1	no	0.250	0.075	0.075	0.100		0.015	General
88-S	Patch	gipp0055	Endangered	0	no	0.180	0.036	0.036	0.161		0.006	General
89-C	Patch	gipp0083	Endangered	0	no	0.460	1.796	1.796	0.683	0.704	1.408	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.609	1.652	4686 Australian Grayling *Prototroctes maraena*
										0.609	1.652	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.227	1.245	501473 Small Golden Moths *Diuris basaltica*
										0.499	1.238	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
90-B	Patch	gipp0053	Endangered	0	no	0.400	0.010	0.010	0.260		0.004	General
91-B	Patch	gipp0053	Endangered	0	no	0.400	0.086	0.086	0.349	1.000	0.069	4686 Australian Grayling *Prototroctes maraena*
92-B	Patch	gipp0053	Endangered	0	no	0.400	0.128	0.128	0.260	1.000	0.103	4686 Australian Grayling *Prototroctes maraena*
										0.053	0.073	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
93-O	Patch	gipp0175	Endangered	1	no	0.540	0.910	0.910	0.920	0.775	0.873	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.191	0.983	4686 Australian Grayling *Prototroctes maraena*
										0.191	0.983	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.588	0.781	501473 Small Golden Moths *Diuris basaltica*
										0.588	0.781	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
94-O	Patch	gipp0175	Endangered	0	no	0.540	0.121	0.121	0.920	0.720	0.112	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.421	0.093	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
95-O	Patch	gipp0175	Endangered	0	no	0.540	0.025	0.025	0.920	0.250	0.017	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
96-C	Patch	gipp0083	Endangered	3	no	0.330	2.053	2.053	0.375	0.682	1.140	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.694	1.355	4686 Australian Grayling *Prototroctes maraena*
										0.024	0.915	501473 Small Golden Moths *Diuris basaltica*
										0.074	1.043	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
97-C	Patch	gipp0083	Endangered	1	no	0.330	0.559	0.559	0.679	0.704	0.315	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.369	4686 Australian Grayling *Prototroctes maraena*
										0.108	0.275	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
98-C	Patch	gipp0083	Endangered	0	no	0.400	0.374	0.374	0.332	0.680	0.251	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.177	0.299	4686 Australian Grayling *Prototroctes maraena*
										0.070	0.207	501473 Small Golden Moths *Diuris basaltica*
										0.171	0.197	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
99-C	Patch	gipp0083	Endangered	0	no	0.390	0.057	0.057	0.260	0.620	0.036	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.045	4686 Australian Grayling *Prototroctes maraena*
										0.280	0.029	501473 Small Golden Moths *Diuris basaltica*
										0.280	0.029	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
100-E	Patch	gipp0047	Vulnerable	0	no	0.270	0.162	0.162	0.210	0.622	0.071	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.546	0.087	4686 Australian Grayling *Prototroctes maraena*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.073	0.056	501473 Small Golden Moths *Diuris basaltica*
										0.214	0.055	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
101-C	Patch	gipp0083	Endangered	0	no	0.390	0.058	0.058	0.210	0.610	0.037	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.930	0.046	4686 Australian Grayling *Prototroctes maraena*
										0.251	0.029	501473 Small Golden Moths *Diuris basaltica*
										0.251	0.029	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
102-C	Patch	gipp0083	Endangered	0	no	0.390	0.414	0.414	0.237	0.610	0.260	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.027	0.323	4686 Australian Grayling *Prototroctes maraena*
										0.007	0.205	501473 Small Golden Moths *Diuris basaltica*
										0.007	0.205	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
103-C	Patch	gipp0083	Endangered	0	no	0.390	0.210	0.210	0.260		0.077	General
104-F	Patch	gipp0937	Endangered	2	no	0.550	0.228	0.228	0.260	1.000	0.250	4686 Australian Grayling *Prototroctes maraena*
105-L	Patch	gipp0068	Endangered	0	no	0.340	0.061	0.061	0.190	0.680	0.035	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
106-M	Patch	gipp0056	Endangered	0	no	0.320	0.087	0.087	0.260	0.680	0.047	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.056	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.056	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.400	0.039	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.400	0.039	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
107-S	Patch	gipp0055	Endangered	0	no	0.220	0.017	0.017	0.418	0.716	0.006	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.008	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.008	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.489	0.006	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
108-E	Patch	gipp0047	Vulnerable	0	no	0.400	2.124	2.124	0.259	0.647	1.400	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.503	1.700	4686 Australian Grayling *Prototroctes maraena*
										0.132	1.085	501473 Small Golden Moths *Diuris basaltica*
										0.299	1.112	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
109-S	Patch	gipp0055	Endangered	0	no	0.290	0.070	0.070	0.260	0.660	0.033	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.040	4686 Australian Grayling *Prototroctes maraena*
										0.302	0.026	501473 Small Golden Moths *Diuris basaltica*
										0.302	0.026	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
110-S	Patch	gipp0055	Endangered	0	no	0.220	0.021	0.021	0.170		0.004	General
111-S	Patch	gipp0055	Endangered	0	no	0.220	0.021	0.021	0.170		0.004	General
112-E	Patch	gipp0047	Vulnerable	0	no	0.390	0.337	0.337	0.260	0.640	0.216	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.732	0.263	4686 Australian Grayling *Prototroctes maraena*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.229	0.173	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
113-E	Patch	gipp0047	Vulnerable	2	no	0.540	0.392	0.392	0.260	0.693	0.359	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.855	0.424	4686 Australian Grayling *Prototroctes maraena*
										0.368	0.311	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
114-S	Patch	gipp0055	Endangered	0	no	0.120	0.010	0.010	0.260		0.001	General
115-S	Patch	gipp0055	Endangered	1	no	0.370	0.161	0.161	0.260		0.056	General
116-S	Patch	gipp0055	Endangered	0	no	0.320	0.048	0.048	0.260	1.000	0.031	4686 Australian Grayling *Prototroctes maraena*
										0.772	0.031	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.502	0.025	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
117-S	Patch	gipp0055	Endangered	0	no	0.120	0.077	0.077	0.260		0.009	General
118-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.260	0.273	0.018	501473 Small Golden Moths *Diuris basaltica*
										0.273	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
119-M	Patch	gipp0056	Endangered	1	no	0.260	0.115	0.115	0.406	0.320	0.040	501473 Small Golden Moths *Diuris basaltica*
										0.320	0.040	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
120-S	Patch	gipp0055	Endangered	0	no	0.220	0.056	0.056	0.260		0.012	General
121-G	Patch	gipp0641	Endangered	0	no	0.350	0.029	0.029	0.920	0.743	0.017	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.395	0.017	501473 Small Golden Moths *Diuris basaltica*
										0.655	0.017	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
122-G	Patch	gipp0641	Endangered	0	no	0.350	0.040	0.040	0.920	0.757	0.025	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.307	0.028	4686 Australian Grayling *Prototroctes maraena*
										0.307	0.028	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.683	0.023	501473 Small Golden Moths *Diuris basaltica*
										0.683	0.023	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
123-M	Patch	gipp0056	Endangered	0	no	0.500	0.294	0.294	0.677	0.780	0.262	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.505	0.237	501473 Small Golden Moths *Diuris basaltica*
										0.505	0.237	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
124-M	Patch	gipp0056	Endangered	0	no	0.490	0.198	0.198	0.910	0.829	0.178	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.618	0.158	501473 Small Golden Moths *Diuris basaltica*
										0.630	0.158	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
125-M	Patch	gipp0056	Endangered	2	no	0.340	0.311	0.311	0.900	0.760	0.186	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.304	0.164	501473 Small Golden Moths *Diuris basaltica*
126-M	Patch	gipp0056	Endangered	0	no	0.270	0.132	0.132	0.260	0.545	0.055	501473 Small Golden Moths *Diuris basaltica*
										0.064	0.057	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
127-M	Patch	gipp0056	Endangered	0	no	0.300	0.037	0.037	0.970	0.790	0.020	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.022	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.022	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.580	0.018	501473 Small Golden Moths *Diuris basaltica*
128-M	Patch	gipp0056	Endangered	2	no	0.270	0.108	0.108	0.970	0.810	0.053	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
129-M	Patch	gipp0056	Endangered	0	no	0.260	0.161	0.161	0.160		0.036	General
130-D	Patch	gipp0821	Least Concern	0	no	0.460	0.449	0.449	0.260	0.675	0.346	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.380	0.413	4686 Australian Grayling *Prototroctes maraena*
										0.149	0.288	501473 Small Golden Moths *Diuris basaltica*
										0.364	0.282	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
131-S	Patch	gipp0055	Endangered	0	no	0.540	0.158	0.158	0.260	0.685	0.144	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.379	0.170	4686 Australian Grayling *Prototroctes maraena*
132-H	Patch	hsf_0047	Vulnerable	0	no	0.290	0.059	0.059	0.100		0.014	General
133-H	Patch	hsf_0047	Vulnerable	0	no	0.290	0.155	0.155	0.260		0.043	General
134-H	Patch	hsf_0047	Vulnerable	0	no	0.360	0.089	0.089	0.740	0.560	0.050	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.500	0.048	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
135-N	Patch	hsf_0022	Least Concern	0	no	0.370	0.575	0.575	0.199	0.319	0.280	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
136-A	Patch	gipp0055	Endangered	1	no	0.260	0.095	0.095	0.140		0.021	General
137-A	Patch	gipp0055	Endangered	0	no	0.180	0.005	0.005	0.170		0.001	General
138-M	Patch	gipp0056	Endangered	0	no	0.340	0.000	0.000	0.260	0.360	0.000	501473 Small Golden Moths *Diuris basaltica*
139-M	Patch	gipp0056	Endangered	0	no	0.340	0.000	0.000	0.260	0.360	0.000	501473 Small Golden Moths *Diuris basaltica*
140-K	Patch	gipp0308	Least Concern	0	no	0.590	0.059	0.059	0.260	0.710	0.060	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.413	0.049	501473 Small Golden Moths *Diuris basaltica*
141-A	Patch	gipp0055	Endangered	0	no	0.270	0.004	0.004	0.141		0.001	General
142-A	Patch	gipp0055	Endangered	0	no	0.270	0.007	0.007	0.140		0.002	General
143-A	Patch	gipp0055	Endangered	0	no	0.270	0.007	0.007	0.140		0.002	General
144-A	Patch	gipp0055	Endangered	1	no	0.270	0.070	0.070	0.150		0.016	General
145-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.210		0.013	General
146-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.230		0.013	General
147-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.230		0.013	General
148-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.220		0.013	General
149-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.220		0.013	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
150-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.220		0.013	General
151-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.065	0.220		0.012	General
152-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.065	0.220		0.012	General
153-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.059	0.220	0.559	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
154-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.230		0.013	General
155-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.068	0.220	0.696	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.486	0.020	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
156-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.068	0.220	0.692	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.468	0.020	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
157-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.220	0.690	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.510	0.021	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
158-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.066	0.220	0.340	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
159-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.065	0.220	0.340	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
160-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.061	0.218	0.340	0.016	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
161-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.062	0.220	0.340	0.017	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
162-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.060	0.100		0.010	General
163-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.060	0.100		0.010	General
164-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.146		0.012	General
165-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.108		0.012	General
166-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.900	0.700	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.360	0.019	501473 Small Golden Moths *Diuris basaltica*
										0.360	0.019	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
167-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.052	0.220	0.370	0.014	501473 Small Golden Moths *Diuris basaltica*
										0.370	0.014	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
168-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.220	0.620	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.132	0.019	501473 Small Golden Moths *Diuris basaltica*
										0.325	0.019	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
169-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.053	0.220	0.370	0.015	501473 Small Golden Moths *Diuris basaltica*
										0.370	0.015	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
170-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.058	0.220	0.370	0.016	501473 Small Golden Moths *Diuris basaltica*
										0.370	0.016	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
171-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.230	0.570	0.022	501473 Small Golden Moths *Diuris basaltica*
										0.306	0.022	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
172-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.065	0.220	0.370	0.018	501473 Small Golden Moths *Diuris basaltica*
										0.464	0.019	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
173-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.049	0.220	0.370	0.013	501473 Small Golden Moths *Diuris basaltica*
										0.527	0.015	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
174-X	Scattered Tree	gipp0022	Least Concern	1	no	0.200	0.070	0.070	0.230		0.013	General
175-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.228		0.013	General
176-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.200	0.410	0.020	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
177-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.160		0.012	General
178-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
179-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
180-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.160	0.640	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.088	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
181-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.131		0.012	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
182-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
183-X	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
184-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.070	0.210	0.610	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.990	0.028	4686 Australian Grayling *Prototroctes maraena*
185-X	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.043	0.230		0.008	General
187-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.070	0.250	0.680	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.033	0.028	4686 Australian Grayling *Prototroctes maraena*
										0.016	0.021	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
188-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.064	0.700	0.651	0.021	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.012	0.026	4686 Australian Grayling *Prototroctes maraena*
										0.335	0.017	501473 Small Golden Moths *Diuris basaltica*
										0.011	0.017	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
189-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.059	0.700	0.650	0.019	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.350	0.016	501473 Small Golden Moths *Diuris basaltica*
191-X	Scattered Tree	gipp0126	Endangered	1	no	0.200	0.070	0.070	0.730	0.700	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.028	4686 Australian Grayling *Prototroctes maraena*
										0.492	0.021	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
192-X	Scattered Tree	gipp0937	Endangered	1	no	0.200	0.070	0.070	0.260	0.661	0.023	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.127	0.028	4686 Australian Grayling *Prototroctes maraena*
										0.044	0.019	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
193-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.063	0.920	0.762	0.022	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.407	0.025	4686 Australian Grayling *Prototroctes maraena*
										0.407	0.025	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.627	0.020	501473 Small Golden Moths *Diuris basaltica*
										0.627	0.020	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
194-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.049	0.260	0.720	0.017	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.340	0.013	501473 Small Golden Moths *Diuris basaltica*
										0.340	0.013	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
195-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.052	0.920	0.800	0.019	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.021	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.021	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.600	0.017	501473 Small Golden Moths *Diuris basaltica*
196-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.047	0.190		0.008	General
197-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.160		0.012	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
198-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.449		0.015	General
199-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.460		0.015	General
200-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.250	0.720	0.024	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.299	0.019	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
201-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.460	0.785	0.025	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.580	0.022	501473 Small Golden Moths *Diuris basaltica*
										0.580	0.022	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
202-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.130		0.012	General
203-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.031	0.220		0.006	General
204-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.065	0.130		0.011	General
205-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.039	0.220		0.007	General
206-X	Scattered Tree	gipp0022	Least Concern	1	no	0.200	0.070	0.070	0.160		0.012	General
207-X	Scattered Tree	hsf_0056	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
208-X	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.070	0.070	0.260		0.013	General
209-X	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.070	0.070	0.210	0.310	0.018	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
210-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.048	0.140		0.008	General
211-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.064	0.140		0.011	General
212-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.160		0.012	General
213-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.160		0.012	General
214-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.070	0.100		0.012	General
215-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.051	0.140		0.009	General
216-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.100		0.012	General
217-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.070	0.120		0.012	General
218-X	Scattered Tree	gipp0937	Endangered	1	no	0.200	0.070	0.028	0.260	0.680	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.347	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
219-X	Scattered Tree	gipp0047	Vulnerable	1	no	0.200	0.070	0.070	0.260		0.013	General
220-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.410		0.015	General
221-X	Scattered Tree	gipp0056	Endangered	1	no	0.200	0.070	0.070	0.460		0.015	General
222-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.035	0.190		0.006	General
223-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.052	0.190		0.009	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
224-X	Scattered Tree	hsf_0022	Least Concern	1	no	0.200	0.070	0.070	0.210		0.013	General
225-X	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.070	0.070	0.210		0.013	General
226-X	Scattered Tree	hsf_0047	Vulnerable	1	no	0.200	0.070	0.070	0.210		0.013	General
227-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.059	0.139		0.010	General
228-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.059	0.138		0.010	General
229-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.070	0.168		0.012	General
230-X	Scattered Tree	gipp0068	Endangered	1	no	0.200	0.070	0.070	0.139		0.012	General
231-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.070	0.120		0.012	General
232-X	Scattered Tree	gipp0055	Endangered	1	no	0.200	0.070	0.032	0.220		0.006	General
233-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
234-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.022	0.160		0.004	General
235-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.004	0.160		0.001	General
236-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.026	0.160		0.005	General
237-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General
238-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
239-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General
240-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.031	0.260	0.270	0.008	501473 Small Golden Moths *Diuris basaltica*
										0.270	0.008	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
241-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General
242-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260	0.620	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
243-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.020	0.260	0.590	0.006	501473 Small Golden Moths *Diuris basaltica*
										0.595	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
244-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.021	0.260	0.590	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.598	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
245-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.024	0.895	0.740	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.059	0.008	501473 Small Golden Moths *Diuris basaltica*
246-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.015	0.850	0.740	0.005	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.630	0.005	501473 Small Golden Moths *Diuris basaltica*
247-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.022	0.850	0.740	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.630	0.007	501473 Small Golden Moths *Diuris basaltica*
248-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
249-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
250-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.190		0.006	General
251-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.031	0.154		0.005	General
252-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.015	0.110		0.002	General
253-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.015	0.110		0.003	General
254-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.019	0.110		0.003	General
255-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.023	0.160		0.004	General
256-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.029	0.110		0.005	General
257-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.023	0.160		0.004	General
258-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.011	0.220		0.002	General
259-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.013	0.220		0.002	General
260-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.020	0.220		0.004	General
261-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.013	0.220		0.002	General
262-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.016	0.220		0.003	General
263-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.015	0.220		0.003	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
264-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.002	0.220		0.000	General
265-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.006	0.220		0.001	General
266-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.010	0.220		0.002	General
267-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.013	0.220		0.002	General
268-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.003	0.220		0.001	General
269-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.023	0.220		0.004	General
270-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.031	0.220		0.006	General
271-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.022	0.220		0.004	General
272-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.015	0.220		0.003	General
273-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.022	0.220		0.004	General
274-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.027	0.212		0.005	General
275-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.100		0.005	General
276-X	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
277-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.000	0.700	0.650	0.000	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.350	0.000	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
278-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.024	0.650	0.709	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.867	0.010	4686 Australian Grayling *Prototroctes maraena*
										0.066	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
279-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.024	0.650	0.705	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.462	0.010	4686 Australian Grayling *Prototroctes maraena*
										0.269	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
280-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.026	0.650	0.669	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.215	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.408	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
281-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.013	0.650	0.700	0.004	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.500	0.004	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
282-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.019	0.650	0.700	0.006	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.500	0.006	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
283-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.190		0.006	General
284-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.100		0.005	General
285-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.130		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
286-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.012	0.100		0.002	General
287-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.018	0.100		0.003	General
288-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.025	0.100		0.004	General
289-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.020	0.100		0.003	General
290-X	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.023	0.920	0.270	0.006	501473 Small Golden Moths *Diuris basaltica*
										0.270	0.006	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
291-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.017	0.209	0.370	0.005	501473 Small Golden Moths *Diuris basaltica*
										0.014	0.005	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
292-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.017	0.210		0.003	General
293-X	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.016	0.920	0.270	0.004	501473 Small Golden Moths *Diuris basaltica*
										0.270	0.004	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
294-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.029	0.460		0.006	General
295-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.023	0.910	0.810	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.650	0.008	501473 Small Golden Moths *Diuris basaltica*
										0.650	0.008	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
296-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.030	0.910	0.810	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.650	0.010	501473 Small Golden Moths *Diuris basaltica*
										0.650	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
297-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.013	0.910	0.810	0.005	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.633	0.004	501473 Small Golden Moths *Diuris basaltica*
										0.633	0.004	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
298-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.018	0.910	0.810	0.006	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.631	0.006	501473 Small Golden Moths *Diuris basaltica*
										0.631	0.006	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
299-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.018	0.820	1.000	0.007	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.007	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.470	0.005	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
300-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.019	0.820	1.000	0.008	4686 Australian Grayling *Prototroctes maraena*
										1.000	0.008	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.470	0.006	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
301-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.810	0.740	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.550	0.010	501473 Small Golden Moths *Diuris basaltica*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.550	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
302-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.013	0.130		0.002	General
303-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.031	0.140		0.005	General
304-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.011	0.160		0.002	General
305-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.016	0.170		0.003	General
306-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.000	0.100		0.000	General
307-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.001	0.160		0.000	General
308-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.024	0.150		0.004	General
309-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.024	0.150		0.004	General
310-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.029	0.260	0.680	0.010	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
311-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.031	0.260	0.680	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.323	0.008	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
312-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.028	0.260	0.680	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.269	0.011	4686 Australian Grayling *Prototroctes maraena*
										0.380	0.008	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
313-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.018	0.260	0.680	0.006	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.436	0.007	4686 Australian Grayling *Prototroctes maraena*
										0.405	0.005	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
314-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.011	0.260	0.680	0.004	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.340	0.003	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
315-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.031	0.131		0.005	General
316-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.150		0.005	General
317-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.150		0.005	General
318-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.030	0.120		0.005	General
319-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.030	0.120		0.005	General
320-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.016	0.170		0.003	General
321-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.142		0.005	General
322-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
323-X	Scattered Tree	gipp0055	Endangered	0	no	0.200	0.031	0.031	0.120		0.005	General
324-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.025	0.120		0.004	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
325-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.025	0.120		0.004	General
326-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.031	0.100		0.005	General
327-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.017	0.100		0.003	General
328-X	Scattered Tree	gipp0068	Endangered	0	no	0.200	0.031	0.017	0.100		0.003	General
329-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.031	0.700	0.704	0.011	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.013	4686 Australian Grayling *Prototroctes maraena*
330-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.031	0.234		0.006	General
331-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.030	0.260		0.006	General
332-X	Scattered Tree	gipp0937	Endangered	0	no	0.200	0.031	0.011	0.260		0.002	General
333-X	Scattered Tree	gipp0047	Vulnerable	0	no	0.200	0.031	0.031	0.260		0.006	General
334-X	Scattered Tree	gipp0047	Vulnerable	0	no	0.200	0.031	0.031	0.260		0.006	General
335-X	Scattered Tree	gipp0047	Vulnerable	0	no	0.200	0.031	0.031	0.260		0.006	General
336-X	Scattered Tree	gipp0047	Vulnerable	0	no	0.200	0.031	0.031	0.260		0.006	General
337-X	Scattered Tree	gipp0126	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General
338-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.022	0.260	0.750	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.590	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
339-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.022	0.260	0.750	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.590	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
340-X	Scattered Tree	vvp_0056	Endangered	0	no	0.200	0.031	0.024	0.910	0.710	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										1.000	0.010	4686 Australian Grayling *Prototroctes maraena*
										0.476	0.010	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.415	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.415	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
341-X	Scattered Tree	vvp_0056	Endangered	0	no	0.200	0.031	0.024	0.910	0.661	0.008	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.562	0.010	4686 Australian Grayling *Prototroctes maraena*
										0.407	0.010	4882 Yarra Pygmy Perch *Nannoperca obscura*
										0.423	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.423	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
342-X	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.025	0.920	0.730	0.009	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.409	0.007	501473 Small Golden Moths *Diuris basaltica*
										0.409	0.007	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
343-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.460		0.007	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
344-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.029	0.900	0.460	0.008	501473 Small Golden Moths *Diuris basaltica*
345-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.031	0.260	0.565	0.010	501473 Small Golden Moths *Diuris basaltica*
										0.298	0.010	504484 Melbourne Yellow-gum *Eucalyptus leucoxylon subsp. connata*
346-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.021	0.260		0.004	General
347-X	Scattered Tree	gipp0056	Endangered	0	no	0.200	0.031	0.021	0.260		0.004	General
348-C	Patch	gipp0083	Endangered	1	no	0.440	1.745	1.745	0.322	0.698	1.303	11280 Grey-headed Flying-fox *Pteropus poliocephalus*
										0.558	1.536	4686 Australian Grayling *Prototroctes maraena*
										0.011	1.232	501473 Small Golden Moths *Diuris basaltica*

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Grey-headed Flying-fox	*Pteropus poliocephalus*	11280	Vulnerable	Dispersed	Top ranking map ; special site	0.0938
Grey-headed Flying-fox	*Pteropus poliocephalus*	11280	Vulnerable	Dispersed	Habitat importance map ; special site	0.0203
Australian Grayling	*Prototroctes maraena*	4686	Vulnerable	Dispersed	Habitat importance map ; special site	0.0094
Small Golden Moths	*Diuris basaltica*	501473	Endangered	Dispersed	Habitat importance map	0.0072
Yarra Pygmy Perch	*Nannoperca obscura*	4882	Vulnerable	Dispersed	Habitat importance map	0.0066
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0054
Grey Billy-buttons	*Craspedia canens*	504643	Endangered	Dispersed	Habitat importance map	0.0050
Lacey River Buttercup	*Ranunculus amplus*	505019	Rare	Dispersed	Habitat importance map	0.0045
Veined Spear-grass	*Austrostipa rudis subsp. australis*	504940	Rare	Dispersed	Habitat importance map	0.0043
Australian Mudfish	*Neochanna cleaveri*	4703	Critically endangered	Dispersed	Habitat importance map	0.0039
Veiled Fringe-sedge	*Fimbristylis velata*	501369	Rare	Dispersed	Habitat importance map	0.0027
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map ; special site	0.0026
Benambra Club-sedge	*Isolepis gaudichaudiana*	504676	Vulnerable	Dispersed	Habitat importance map	0.0025
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0024
Glossy Grass Skink	*Pseudemoia rawlinsoni*	12683	Vulnerable	Dispersed	Habitat importance map	0.0023
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map ; special site	0.0022
Fringed Helmet-orchid	*Corybas fimbriatus*	500839	Rare	Dispersed	Habitat importance map	0.0022

Wine-lipped Spider-orchid	*Caladenia oenochila*	503694	Vulnerable	Dispersed	Habitat importance map	0.0017
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0017
Round-leaf Pomaderris	*Pomaderris vacciniifolia*	502675	Endangered	Dispersed	Habitat importance map	0.0015
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0014
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0013
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0013
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0013
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0011
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0011
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0010
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0010
Sticky Wattle	*Acacia howittii*	500044	Rare	Dispersed	Habitat importance map	0.0009
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0009
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0009
Common Bent-wing Bat (eastern ssp.)	*Miniopterus schreibersii oceanensis*	61342	Vulnerable	Dispersed	Habitat importance map	0.0008
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	10226	Vulnerable	Dispersed	Habitat importance map	0.0008
Eastern Great Egret	*Ardea modesta*	10187	Vulnerable	Dispersed	Habitat importance map ; special site	0.0008
Austral Tobacco	*Nicotiana suaveolens*	502275	Rare	Dispersed	Habitat importance map	0.0008
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map ; special site	0.0008
Musk Duck	*Biziura lobata*	10217	Vulnerable	Dispersed	Habitat importance map	0.0008
Dandenong Wattle	*Acacia stictophylla*	505140	Rare	Dispersed	Habitat importance map	0.0007
Australasian Bittern	*Botaurus poiciloptilus*	10197	Endangered	Dispersed	Habitat importance map	0.0007
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0007

Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0007
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0006
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0006
Little Pink Spider-orchid	*Caladenia rosella*	503669	Endangered	Dispersed	Habitat importance map	0.0006
Keferstein's Tree Frog	*Litoria dentata*	528551	Vulnerable	Dispersed	Habitat importance map	0.0006
Little Egret	*Egretta garzetta nigripes*	10185	Endangered	Dispersed	Habitat importance map	0.0005
Intermediate Egret	*Ardea intermedia*	10186	Endangered	Dispersed	Habitat importance map	0.0005
Slender Stylewort	*Levenhookia sonderi*	501998	Rare	Dispersed	Habitat importance map	0.0005
Large-flower Crane's-bill	*Geranium sp. 1*	505342	Endangered	Dispersed	Habitat importance map	0.0004
Salt Lawrencia	*Lawrencia spicata*	501888	Rare	Dispersed	Habitat importance map	0.0004
Smooth Grevillea	*Grevillea rosmarinifolia subsp. glabella*	501536	Rare	Dispersed	Habitat importance map	0.0004
Western Golden-tip	*Goodia medicaginea*	501518	Rare	Dispersed	Habitat importance map	0.0004
Common Sandpiper	*Actitis hypoleucos*	10157	Vulnerable	Dispersed	Habitat importance map	0.0004
Forest Bitter-cress	*Cardamine papillata*	505034	Vulnerable	Dispersed	Habitat importance map	0.0003
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0002
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0002
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0002
Brown Toadlet	*Pseudophryne bibronii*	13117	Endangered	Dispersed	Habitat importance map	0.0002
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0002
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0002
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0002
Swamp Skink	*Lissolepis coventryi*	12407	Vulnerable	Dispersed	Habitat importance map	0.0002
Australian Painted Snipe	*Rostratula australis*	10170	Critically endangered	Dispersed	Habitat importance map	0.0002

Tufted Club-sedge	*Isolepis wakefieldiana*	501789	Rare	Dispersed	Habitat importance map	0.0002
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	502750	Rare	Dispersed	Habitat importance map	0.0002
Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	505337	Vulnerable	Dispersed	Habitat importance map	0.0002
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0002
One-flower Early Nancy	*Wurmbea uniflora*	503583	Rare	Dispersed	Habitat importance map	0.0001
Square-tailed Kite	*Lophoictinia isura*	10230	Vulnerable	Dispersed	Habitat importance map	0.0001
Black-tailed Godwit	*Limosa limosa*	528553	Vulnerable	Dispersed	Habitat importance map	0.0001
Swift Parrot	*Lathamus discolor*	10309	Endangered	Dispersed	Habitat importance map	0.0001
Barking Owl	*Ninox connivens connivens*	10246	Endangered	Dispersed	Habitat importance map	0.0001
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0001
Velvet Apple-berry	*Billardiera scandens s.s.*	504290	Rare	Dispersed	Habitat importance map	0.0000
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	10498	Vulnerable	Dispersed	Habitat importance map	0.0000
Crimson Spider-orchid	*Caladenia concolor*	504347	Endangered	Dispersed	Habitat importance map	0.0000
Pale Hickory-wattle	*Acacia sporadica*	505881	Vulnerable	Dispersed	Habitat importance map	0.0000
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0000
Large-headed Fireweed	*Senecio macrocarpus*	503116	Endangered	Dispersed	Habitat importance map	0.0000
Emerald-lip Greenhood	*Pterostylis smaragdyna*	503915	Rare	Dispersed	Habitat importance map	0.0000
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	11008	Endangered	Dispersed	Habitat importance map	0.0000
Poison Rice-flower	*Pimelea pauciflora*	502528	Rare	Dispersed	Habitat importance map	0.0000
Tangled Pseudanthus	*Pseudanthus orbicularis*	502760	Rare	Dispersed	Habitat importance map	0.0000
Masked Owl	*Tyto novaehollandiae novaehollandiae*	10250	Endangered	Dispersed	Habitat importance map	0.0000
Yellow Watercrown Grass	*Paspalidium flavidum*	507820	Endangered	Dispersed	Habitat importance map	0.0000

Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0000
Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0000
Swamp Fireweed	*Senecio psilocarpus*	504659	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

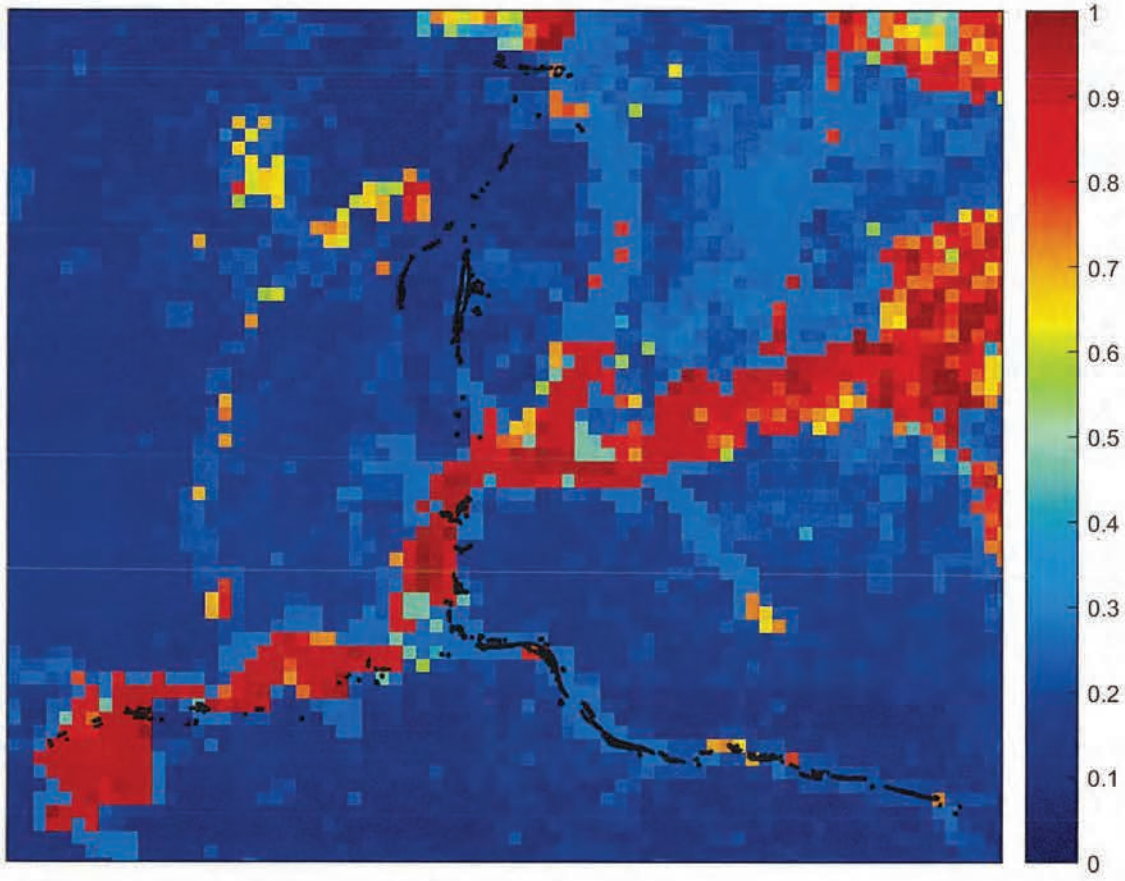
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

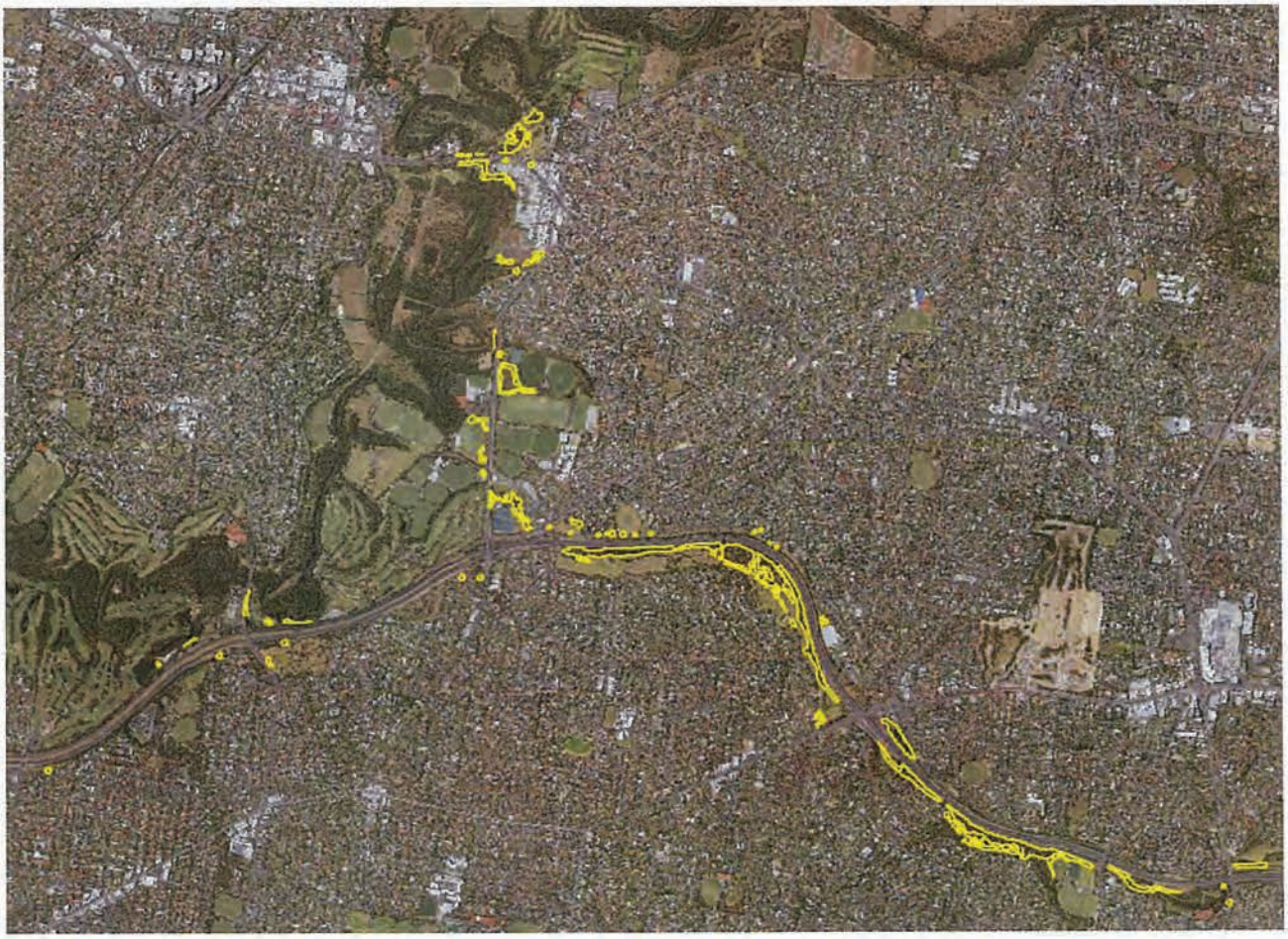
- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

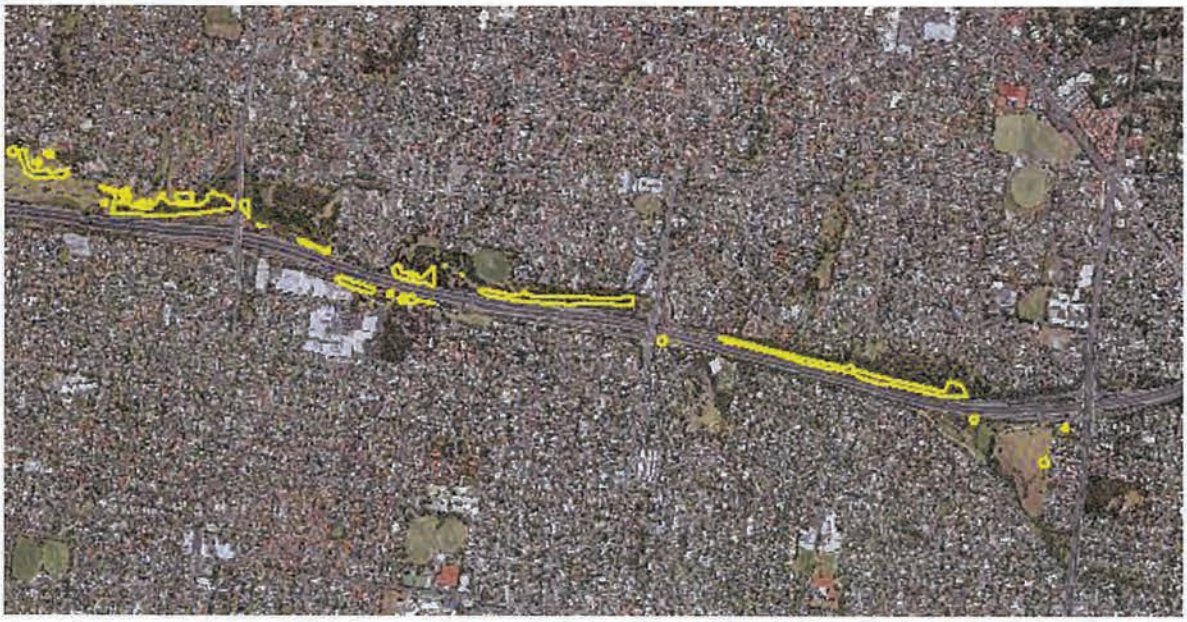
Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation

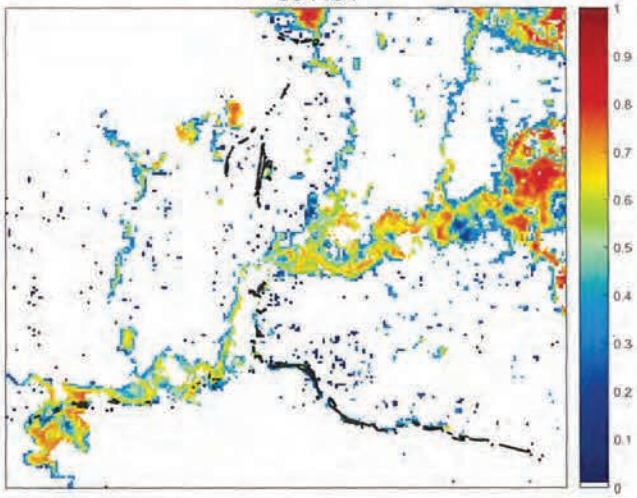




4. Map of the property in context

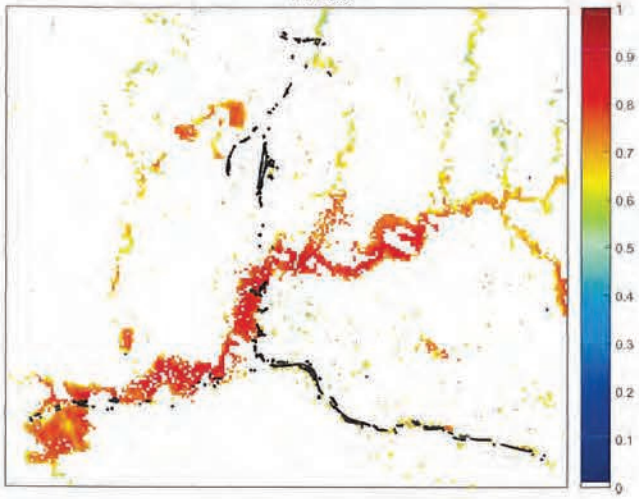
Yellow boundaries denote areas of proposed native vegetation removal.

Melbourne Yellow-gum
Eucalyptus leucoxylon subsp. connata
504484

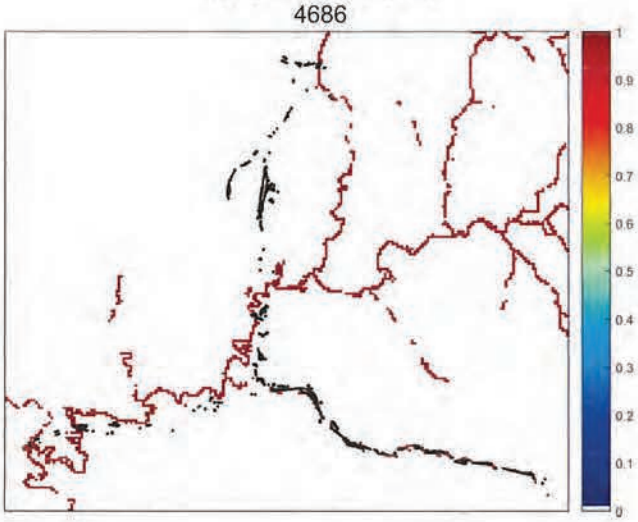


4. Habitat importance maps

Grey-headed Flying-fox
Pteropus poliocephalus
11280

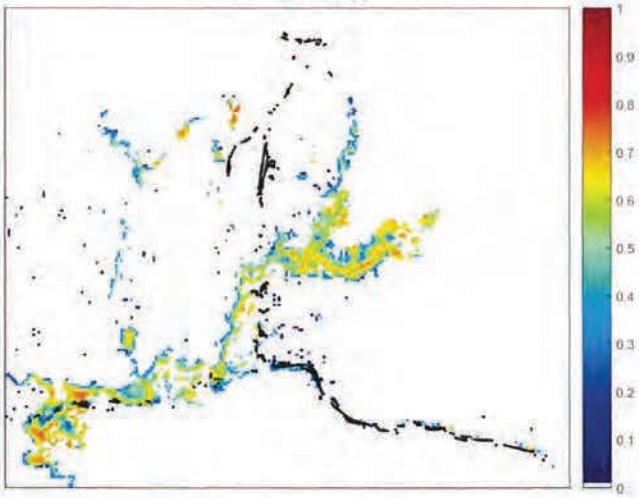


Australian Grayling
Prototroctes maraena
4686



Yarra Pygmy Perch
Nannoperca obscura
4882

Small Golden Moths
Diuris basaltica
501473



Appendix K – Salvage and Translocation Plan

North East Link Project

Salvage and Translocation Plan

April 2019

This publication is prepared to inform the public about the North East Link. This publication may be of assistance to you but the North East Link Project (a division of the Major Transport Infrastructure Authority) and its employees, contractors or consultants (including the issuer of this report) do not guarantee that the publication is without any defect, error or omission of any kind or is appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Table of contents

Table index

Figure index

Summary of this Plan

The following table summarises this Salvage and Translocation Plan.

Project title	North East Link
Taxon to be translocated	Matted Flax-lily *Dianella amoena* Arching Flax-lily *Dianella longifolia* var. *grandis*
Number of plants to be translocated	Approximately 95 plants/patches, including one large patch (15 x 2 m), of Matted Flax-lily may be subject to removal. However, it should be recognised that the final figure is likely to vary (+/-) depending on the prevailing conditions at the time of salvage. Five individuals of Arching Flax-lily were observed within the project boundary and are likely to be subject to removal.
Proposed dates of translocation	The proposed timing of translocation depends on when project planning and environmental approvals are received and on project procurement. Works are likely to start in 2020. Timing of salvage and translocation is to be determined, although the intent is to translocate plants either directly or within a year of salvage (and no later than two years after salvage). Alteration to this program may be considered if suitable conditions are prevalent or if early human intervention is likely to lead to higher salvage success rates. Translocation is proposed to be undertaken within two years of salvage; subject to both the conditions of the plants at the time of salvage, and the conditions of the recipient site(s).
Source location or propagation facility	North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include upgrade works at the Eastern Freeway. Within the project area (see Figure 1-1), Matted Flax-lily has been identified within the: • M80 Ring Road reserve • Hurstbridge line rail corridor • Commonwealth land (Simpson Barracks site). Arching Flax-lily has been identified within: • Commonwealth land (Simpson Barracks site) • Colleen Reserve • Crown land north of the Eastern Freeway between Yarra Boulevard and the Yarra River.
Recipient sites	The plan outlines the process for identifying a recipient site and presents a number of potential sites.
Summary of the Translocation	North East Link Project (NELP) is proposing to salvage and translocate approximately 95 individual plants/patches of Matted Flax-lily and five plants of Arching Flax-lily. This plan documents: • A protocol for salvage and translocation • Nomination and selection criteria to determine a recipient site(s) • Pre-clearance surveys • Post translocation management • Monitoring and reporting • Contingency planning and adaptive management

1. Introduction

1.1 Objectives

GHD Pty Ltd (GHD) and AECOM Australia Pty Ltd were engaged by the North East Link Project (NELP) to prepare a Salvage and Translocation Plan for Matted Flax-lily *Dianella amoena* and Arching Flax-lily *Dianella longifolia* var. *grandis* to support the Environment Effects Statement (EES) and Public Environment Report (PER) required to inform approvals for the North East Link project.

The objectives of this plan are to:

- Provide background on the project, Matted Flax-lily and Arching Flax-lily, and the regulatory requirements for translocation
- Identify Matted Flax-lily and Arching Flax-lily plants to be salvaged
- Outline the criteria and process for the selection of suitable recipient site(s) for the translocated plants
- Provide details on pre- and post-translocation management actions for the salvage and recipient sites
- Establish clear and effective protocols for the salvage, translocation, propagation, management and monitoring of plants that must be removed prior to project construction
- Identify roles and responsibilities for the parties involved in the translocation process
- Establish benchmarks for translocation success
- Outline future reporting requirements and provide guidelines for potential contingency and adaptive-management measures during the monitoring period
- Satisfy regulatory requirements under Australian Government and Victorian Government legislation.

1.2 Project description

North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include works along the Eastern Freeway from Springvale Road to near Hoddle Street.

The North East Link alignment and its key elements assessed in the Environment Effects Statement (EES) include:

- **M80 Ring Road to the northern portal** – from the M80 Ring Road at Plenty Road, and the Greensborough Bypass at Plenty River Drive, North East Link would extend to the northern portal near Erskine Road utilising a mixture of above, below and at surface road sections. This would include new road interchanges at the M80 Ring Road and Grimshaw Street.

- **Northern portal to southern portal** – from the northern portal the road would transition into twin tunnels that would connect to Lower Plenty Road via a new interchange, before travelling under residential areas, Banyule Flats and the Yarra River to a new interchange at Manningham Road. The tunnel would then continue to the southern portal located south of the Veneto Club.
- **Eastern Freeway** – from around Hoddle Street in the west through to Springvale Road in the east, modifications to the Eastern Freeway would include widening to accommodate future traffic volumes and new dedicated bus lanes for the Doncaster Busway.
  There would also be a new interchange at Bulleen Road to connect North East Link to the Eastern Freeway.

These areas are illustrated in Figure 1-1.

The project would also improve existing bus services from Doncaster Road to Hoddle Street through the Doncaster Busway, as well as pedestrian connections and the bicycle network, with connected walking and cycling paths from the M80 Ring Road to the Eastern Freeway.

For a detailed description of the project, refer to EES Chapter 8 – Project description.

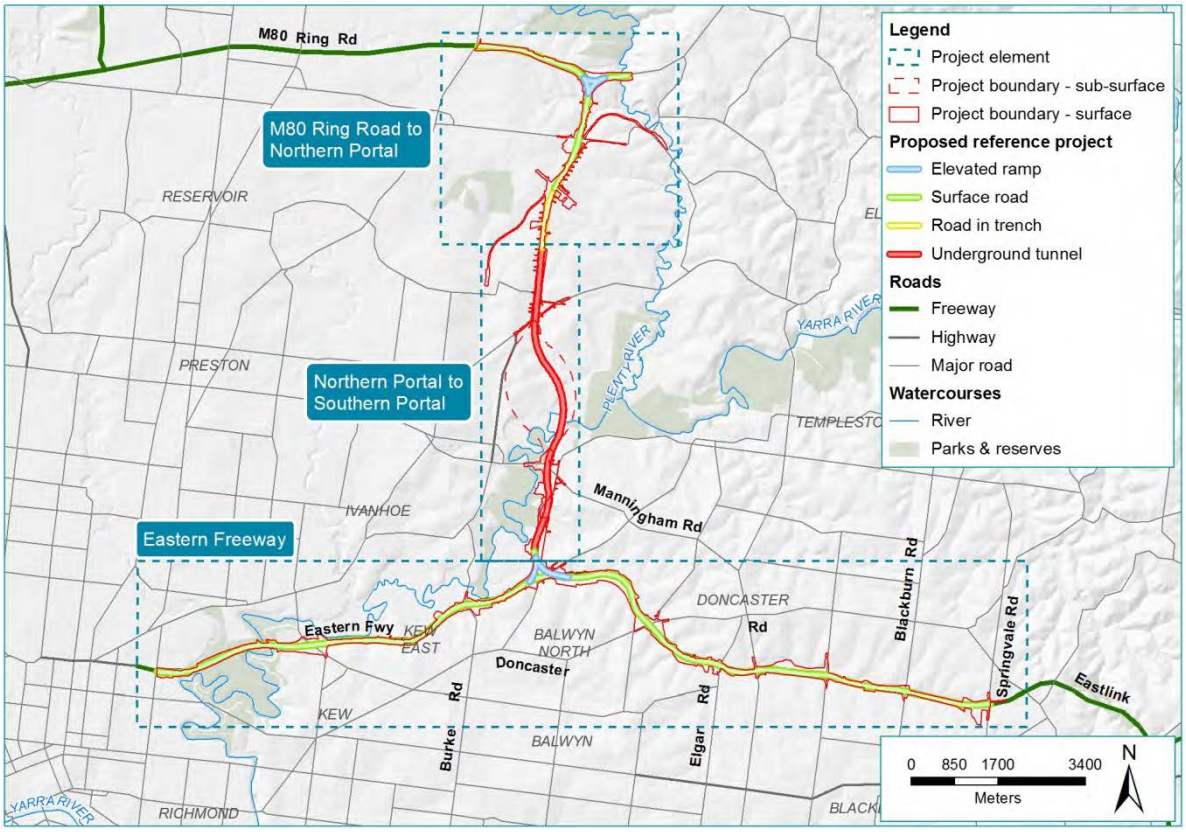


Figure 1-1 North East Link overview

1.3 Vegetation within the Project boundary

Vegetation within the project boundary is predominantly located within the Gippsland Plain bioregion, and to a lesser extent the Highlands–Southern Fall and Victorian Volcanic Plain bioregions.

The northern parts of the project generally pass through areas that have been previously disturbed. The woodland and forest areas that remain have regenerated or have been re-planted, and are generally in poor to moderate condition. The exceptions to this are the larger intact areas of woodland within Simpson Barracks and a small area of Commonwealth land immediately south of Simpson Barracks. Simpson Barracks contains a relatively large area of remnant woodland/forest (EVC 55: Plains Grassy Woodland), particularly for this part of otherwise urbanised Melbourne.

Key areas of riparian and floodplain vegetation located within the project boundary are associated with the Yarra River and its tributaries, including Koonung Creek in the south and Banyule Creek near the centre of the project area. Vegetation in these areas generally consists of Floodplain Riparian Woodland (EVC 56) or Swampy Riparian Woodland (EVC 83). These areas contain a mature or developing canopy of River Red Gum *Eucalyptus camaldulensis*, which form remnant patches or occur as isolated scattered trees. The understorey shrub layer is generally species-rich, although herbs and graminoids are largely absent due to the presence of high-threat weeds, including Wandering Trad *Tradescantia fluminensis*.

The project boundary also contains several areas of good quality remnant Plains Grassy Woodland (EVC 55) and Valley Grassy Forest (EVC 47), which are characterised by a canopy layer comprising several *Eucalyptus* species and a grassy understorey.

1.4 Matted Flax-lily background

1.4.1 Species description

The National Recovery Plan for the Matted Flax-lily *Dianella amoena* (Carter, 2010) describes Matted Flax-lily as:

> *...in the family Hemerocallidaceae (formerly included in the family Liliaceae) is a tufted, mat–forming perennial lily. Plants are rhizomatous and can form loose clumps up to 5 m wide. Rhizomes are yellow and slender, with shoots arising every 10–30 cm. Leaves are grey-green, dull crimson at the base, narrow and tapering, to 45 cm long by 12 mm wide, and broadly V-shaped, with a prominent abaxial keel along the midrib and loose clasping leaf sheaths. Blades, sheaths and midribs usually have small, irregularly spaced teeth. Leaves are deciduous in summer if plants are water-stressed (Gray & Knight 2001). The inflorescence is erect, 20–90 cm long, with a slender, arching scape that bears several bluish, star-shaped, nodding, sweetly fragrant flowers. Perianth segments are pale to deep blue-violet, recurved, elliptic, to 10 mm long by 3 mm, the outer tepals with five veins, the inner tepals with three veins. There are six stamens, to 7 mm long, with pale yellow filaments, orange strumae and pale lime-yellow anthers, while the style is whitish-translucent, to 6 mm long. Fruits are ovoid purple berries to 7 mm long, and seeds are shiny black and smooth, to 3 mm long. Flowering occurs from October to April* (description from Carr & Horsfall, 1995).

Typical images of the plant in various stages of growth and reproduction are shown in Plate 1a –d.

Plate 1a–d Matted Flax-lily in situ (Cameron Miller, AECOM)

1.4.2 Conservation status

Matted Flax-lily is listed as Endangered under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999 (*'EPBC Act') and the Victoria Department of Environment, Land, Water and Planning's (DELWP) Advisory List, and as Threatened under the Victorian Government's *Flora and Fauna Guarantee Act 1988* ('FFG Act'). In 2010, a National Recovery Plan was prepared for the species, outlining recovery objectives and actions necessary to ensure the long-term survival of the species. The Recovery Plan identified the major current threats to the species as weed invasion and competition, habitat destruction and disturbance, and population fragmentation (Carter, 2010).

1.4.3 Habitat and ecology

In Victoria, Matted Flax-lily typically occurs in grassland and grassy woodland habitats with fertile, well-drained to seasonally-wet soils ranging from sandy loams to heavy cracking clays (Carr & Horsfall, 1995; Gray & Knight, 2001).

Matted Flax-lily is typically found in association with native grasses such as Common Wheat Grass *Anthosachne scabra*, Common Tussock-grass *Poa labillardierei*, Kangaroo Grass *Themeda triandra*, Grey Tussock-grass *Poa sieberiana*, Wallaby Grass *Rytidosperma racemosa* var. *racemosa*, and Weeping Grass *Microlaena stipoides* var. *stipoides*. In grassy woodland habitat, associated tree species include Blackwood *Acacia melanoxylon* and a variety of *Eucalyptus* species, including River Red Gum *Eucalyptus camaldulensis*, Long-leaved Box *E. goniocalyx*, Red Stringybark *E. macrorhyncha* subsp. *macrorhyncha*, Yellow Box E. *melliodora*, Swamp Gum *E. ovata*, Snow Gum *E. pauciflora* subsp. *pauciflora*, and Red Box *E. polyanthemos* subsp. *vestita*. Matted Flax-lily is also found in association with various introduced grasses and herbs (Carr & Horsfall, 1995; Gray & Knight, 2001; Carter 2010).

Flowers are buzz-pollinated by the native Blue-banded Bee *Amegilla cingulata*. Fruits are readily formed but recruitment is often considered low or absent due to habitat disturbance and weed competition, with generally no seedlings produced. Instead, the species typically reproduces vegetatively through the production of rhizomes and ramets. The species can also be propagated by division (Carter, 2010; Ralph, 2003). However, given the size of some of the observed plants and their isolation from other plants within the project area, there is the potential that some of these have been produced through sexual reproduction and seed dispersal.

1.4.4 Current population and distribution

Matted Flax-lily is currently known to occur in Victoria and Tasmania. Approximately 2,500 plants are estimated to remain in the wild in Victoria, found in approximately 120 sites (Carter, 2010). Multiple populations are known from the northern suburbs of Melbourne, typically within remnant vegetation along roadsides and within rail corridors, in conservation reserves, and in translocation sites (Carter, 2010). The distribution of Matted Flax-lily at the time of writing the Recovery Plan is shown in Figure 1-2.

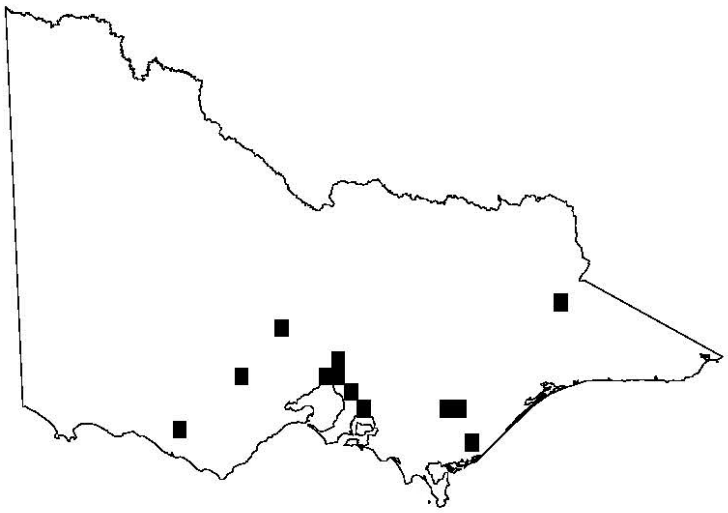


Figure 1-2 Distribution of Matted Flax-lily in 2010 (Carter, 2010)

It should be noted that the Recovery Plan is somewhat outdated, and since the expansion of Melbourne's urban growth boundary, additional records and sites have been found as demonstrated by a recent extract of Matted Flax-lily observations from NatureKit (DELWP, 2017), shown in Figure 1-3.

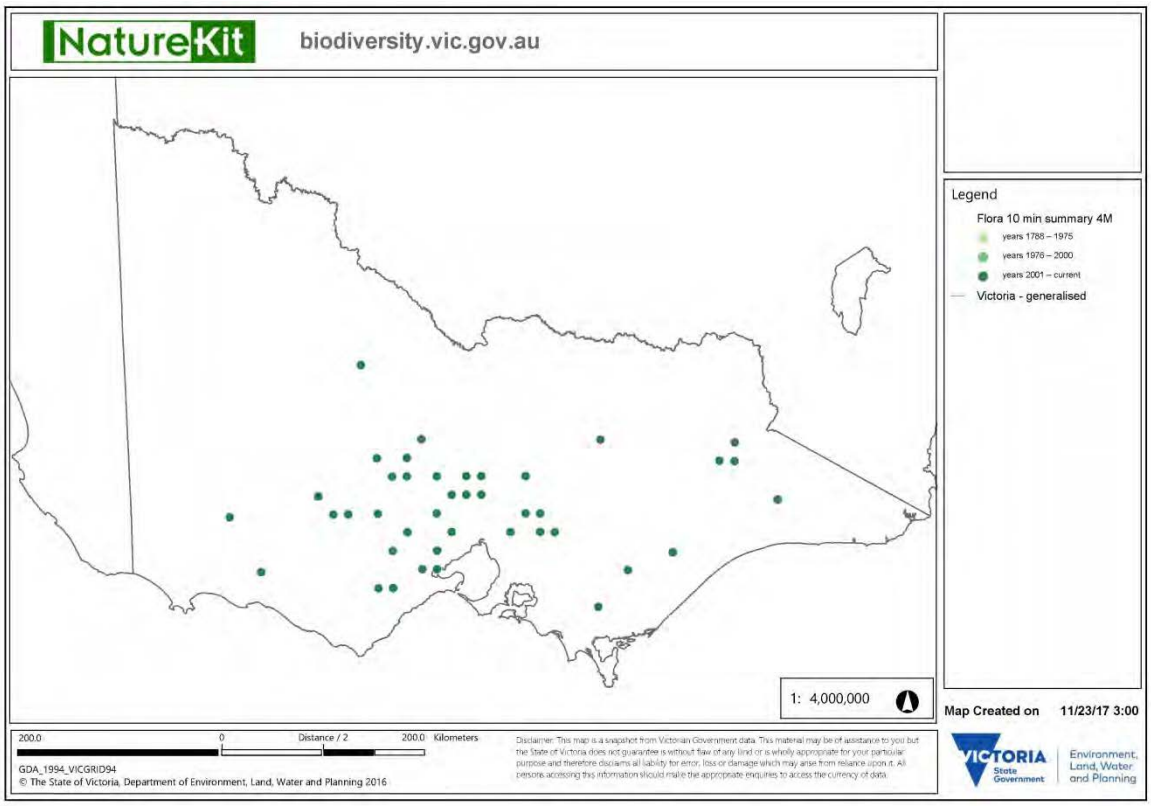


Figure 1-3 Current observations of Matted Flax-lily from 2000–2017 (DELWP, 2017)

1.4.5 Population and distribution within project area

Suitable habitats within the project area were surveyed between October and December 2017. Matted Flax-lily was identified at three sites within the project area defined for the project's EPBC referral:

- Commonwealth land (Simpson Barracks)
- M80 Ring Road reserve
- Hurstbridge rail line

Each of these sites were surveyed on two separate events by a team of ecologists. Table 1-1 summarises the Matted Flax-lily observations and Figure 1-4 shows the mapped observations for individuals/patches recorded during targeted surveys for the project. Shows previous mapped observations at Simpson Barracks.

Table 1-1 Results of the Matted Flax-lily survey for North East Link

Approximate number of individuals	Approximate area encompassed by patches (m)
Whole assessment (i.e. inside and outside of the project boundary)	
217 + one large patch (15 x 2 m)	8529
Within the project boundary	
95 (including one large patch (15 x 2 m))	3134

Paper Size A3

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Project boundary - sub-surface
- Project boundary - surface
- Matted Flax-lily
- Matted Flax-Lily Patch

NORTH EAST LINK PROJECT

North East Link Project
Environment Effects Statement (EES)

Job Number	31-35006
Revision	E
Date	04 Mar 2019

Matted Flax-lily Locations
Hurstbridge rail line

C:\31\35036\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Matted_Flax_Lily_A3L_RevE.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S..A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Paper Size A3

0 7 14 21 28

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Project boundary - sub-surface
- Project boundary - surface
- Matted Flax-lily
- Matted Flax-Lily Patch

North East Link Project
Environment Effects Statement (EES)

Matted Flax-lily Locations
Hurstbridge rail line

Job Number	31-35006
Revision	E
Date	04 Mar 2019

C:\31\35006\GIS\Maps\Working\Specialist Submission\EES\Ecology\31250005_Matted_Flax_Lily_A3L_RevE.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S_A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Paper Size A3

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Project boundary - sub-surface
- Project boundary - surface
- Matted Flax-lily
- Matted Flax-Lily Patch

NORTH EAST LINK PROJECT

North East Link Project
Environment Effects Statement (EES)

Job Number	31-35006
Revision	E
Date	04 Mar 2019

Matted Flax-lily Locations
Hurstbridge rail line

C:\31\35036\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Matted_Flax_Lily_A3L_RevE.mxd

Data source: DP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S..A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Paper Size A3

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Project boundary - sub-surface
- Project boundary - surface
- Matted Flax-lily
- Matted Flax-Lily Patch

NORTH EAST LINK PROJECT

North East Link Project
Environment Effects Statement (EES)

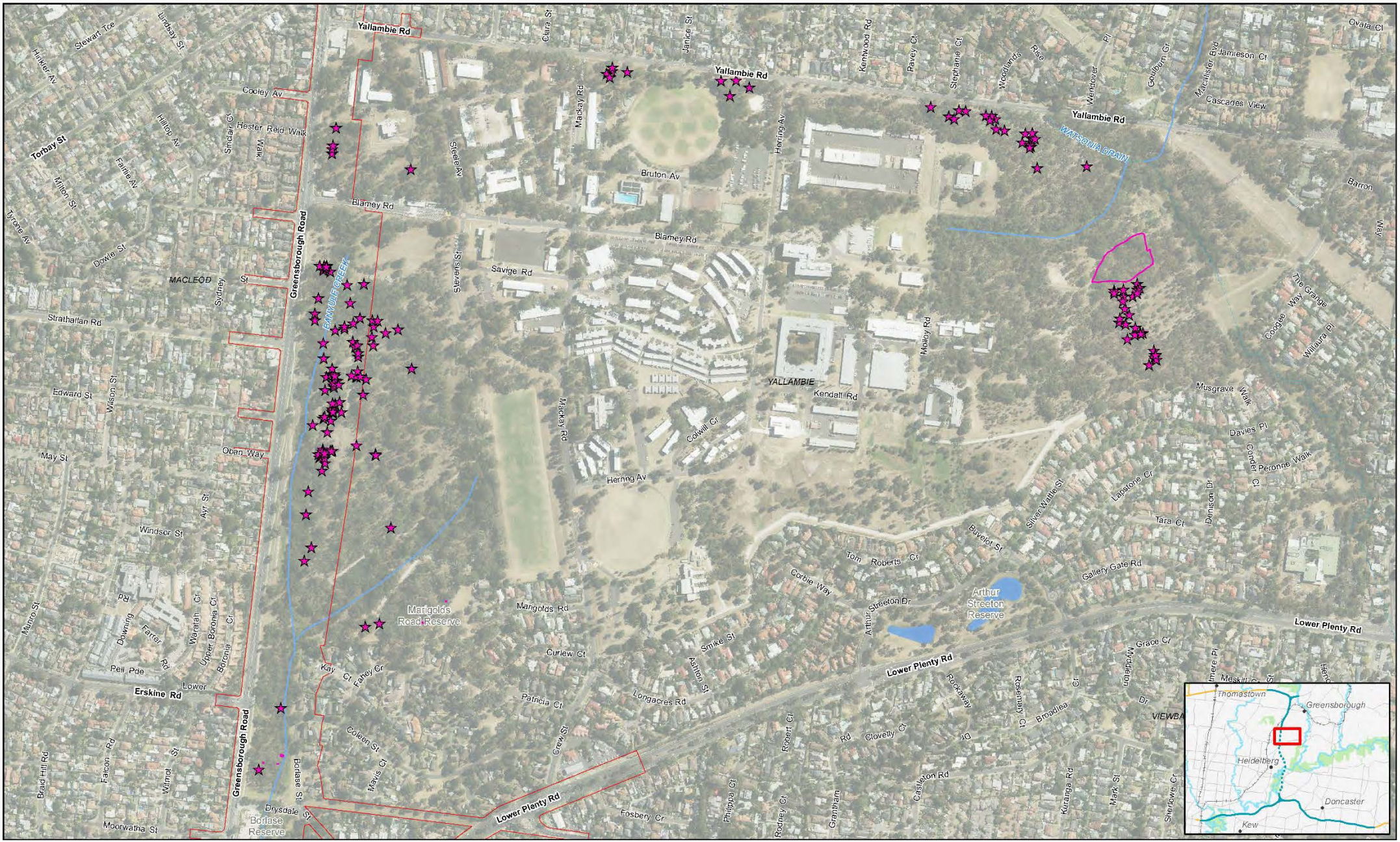
Matted Flax-lily Locations M80

Job Number	31-35006
Revision	E
Date	04 Mar 2019

C:\31\35036\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Matted_Flax_Lily_A3L_RevE.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S_A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com



Paper Size A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Project boundary - sub-surface
- Project boundary - surface
- Matted Flax-lily
- Matted Flax-Lily Patch

NORTH EAST LINK PROJECT

North East Link Project
Environment Effects Statement (EES)

Matted Flax-lily Locations Simpson Barracks

Job Number	31-35006
Revision	E
Date	04 Mar 2019

C:\31\35006\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Matted_Flax_Lily_A3L_RevE.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S.A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

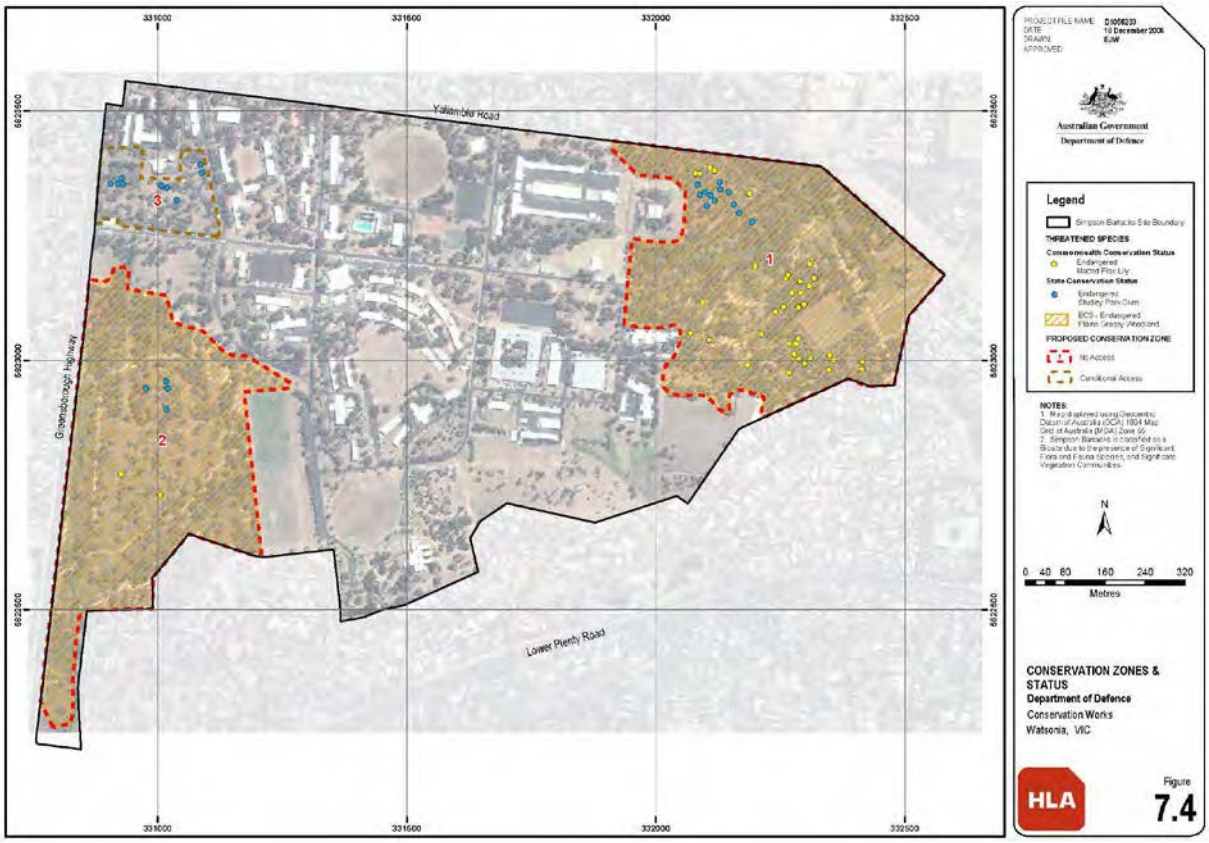


Figure 1-5 Previously mapped distribution of Matted Flax-lily within Simpson Barracks

1.5 Arching Flax-lily background

1.5.1 Species description

Arching Flax-lily is a perennial graminoid that grows to 1.3-metres tall in solitary tufts or loose patches up to 40-centimetres wide. Its leaves are glaucous, rather thick-textured and firm, measuring 12 to 25 millimetres wide at midpoint when flattened. It flowers from November to December (Flora of Victoria, 2018). The leaves are known to have a prominent central rib. Flowers have an open pyramidal panicle to 30 x 60 centimetres with long spreading side branches and strongly fragrant flowers (Bull, 2014).

Typical images of the plant are shown in Plate 2.

Plate 2 a-b Arching Flax-lily in situ (Tim Wills, GHD)

1.5.2 Conservation status

Arching Flax-lily is not listed under the EPBC Act or the FFG Act. It is considered a vulnerable taxon under the DELWP Advisory List.

1.5.3 Habitat and ecology

In Victoria, Arching Flax-lily typically occurs in well-drained skeletal soils often associated with rocky outcrops, full sun and semi-shade (Bull, 2014). Once considered widespread over the volcanic plains, many populations are now small and isolated as a result of habitat clearance, grazing and disturbance.

1.5.4 Current population and distribution

Following urban expansion, many of the remaining populations of this species are very small and fragmented in Victoria, where it is mainly concentrated in the Victorian Volcanic Plain and Victorian Riverina bioregions (refer to Figure 1-6).

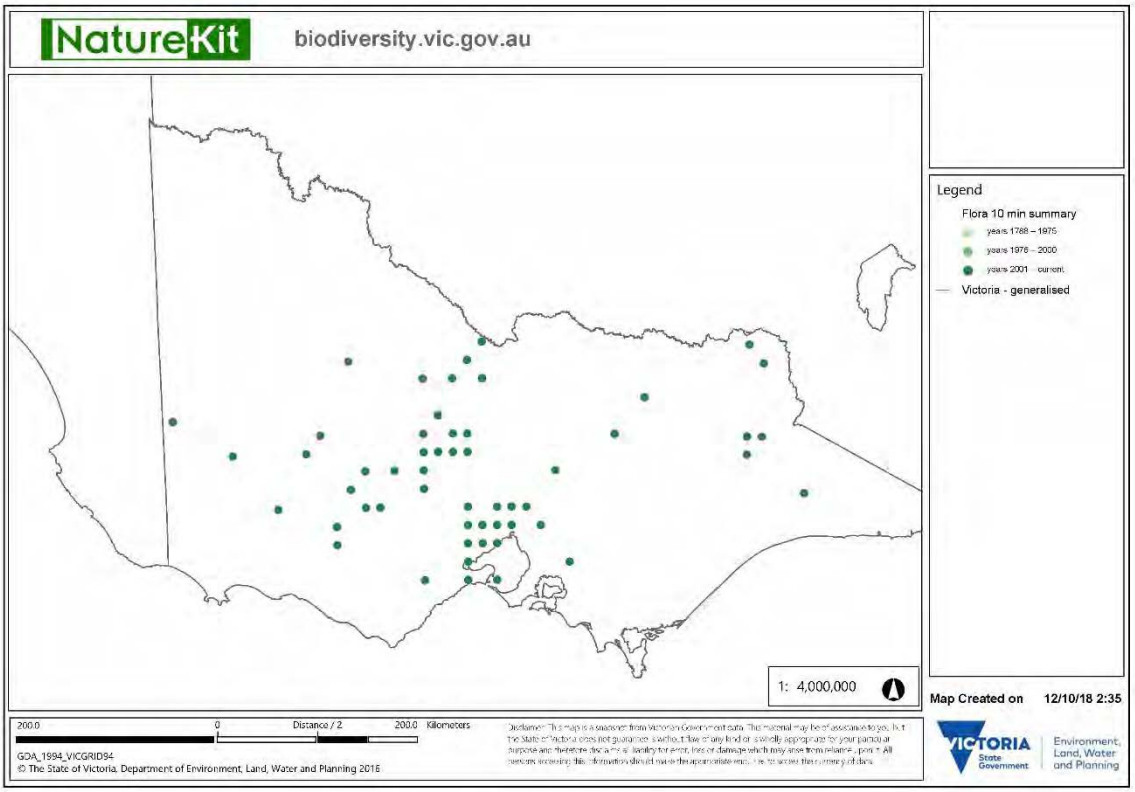


Figure 1-6 Current observations of Arching Flax-lily from 2000 – 2018 (DELWP, 2018)

1.5.5 Population and distribution within project area

Two individuals were identified during field assessments at Simpson Barracks, although one of these is located outside the project boundary. One individual was observed within the project boundary at Colleen Reserve and a further three individuals were identified within the project boundary on the north side of the Eastern Freeway, between Yarra Boulevard and the Yarra River on Crown land recognised as a Public Park and Recreational Zone. These locations are shown in Figure 1-7.

Paper Size A3

0 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

Project Boundary
- sub surface impact
- surface impact

Arching Flax-lily

NORTH EAST LINK PROJECT

North East Link Authority
North East Link Project

Job Number	31-35006
Revision	A
Date	29 Jan 2019

Arching Flax-lily Locations

C:\31\35006\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Arching_Flax_lily_distribution_A2L_RevC.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S..A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Paper Size A3

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

Project Boundary
- sub surface impact
- surface impact

Arching Flax-lily

North East Link Authority
North East Link Project

Job Number	31-35006
Revision	A
Date	29 Jan 2019

Arching Flax-lily Locations

C:\31\35036\GIS\Maps\Working\Specialist Submission\EES\Ecology\31125005_Arching_Flax_lily_distribution_A3L_RevC.mxd

Data source: CIP Imagery - DELWP - 2018 | Roads, LGA, Watercourses, Rail - Vicmap - 2018 | Project Boundary, MFL Locations - GHD AECOM, S..A - 2018. Created by: righetti

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

2. Regulatory setting and approvals

This section summarises the regulatory environment and permit requirements that relate to the translocation of Matted Flax-lily.

2.1 Environment Protection and Biodiversity Conservation Act 1999

NELP referred the North East Link project to the Commonwealth Department of the Environment and Energy (DoEE) on 17 January 2018 for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* ('EPBC Act').

On 13 April 2018 the delegate for the Minister for the Environment and Energy determined that the project is a 'controlled action' that has the potential to have a significant impact on the environment on Commonwealth land and on Matters of National Environmental Significance (MNES). The decision notice also advised that the project would be assessed through a Public Environment Report (PER).

The ecological assessment prepared for the project's EPBC referral concluded the project would likely have a significant impact on Matted Flax-lily based on its potential to fragment an existing population and remove habitat to the extent the species is likely to decline.

When considered as part of a development proposal, translocation may be proposed as a mitigation measure, particularly for Matted Flax-lily. DoEE (2016) states '*The rhizomatous nature of Matted Flax-lilies allows plants to be translocated. Translocation has occurred at a number of sites*'. Translocation plans/strategies are factored into the approval decisions under section 133 of the EPBC Act to address any residual impacts MNES (DSEWPaC, 2013). Given that translocation measures are recognised to reduce residual impacts, ultimately this can lead to a reduction in required offsets. All offsets for residual impacts to this MNES would be assessed under the EPBC Act offsets policy (DSEWPaC, 2012).

2.1.1 Application of Commonwealth outcomes-based policy

The Australian Government has developed policy and guidance on outcomes-based conditions under the EPBC Act. Outcomes-based conditions specify the environmental outcome that must be achieved by an approval holder without prescribing how that outcome should be achieved. Outcomes-based conditions allow approval holders to be innovative and achieve the best environmental outcome at the lowest cost, while increasing the public transparency of the required environmental outcomes.

With this in mind, a proposed environmental outcome that specifically relates to Matted Flax-lily has been developed, as well as measures to achieve this outcome. The proposed outcome for Matted Flax-lily detailed in this Salvage and Translocation Plan, are summarised in Table 2-1.

Table 2-1 Proposed outcome for Matted Flax-lily

Outcome
Matted Flax-lily populations directly impacted by North East Link must be translocated in accordance with a Salvage and Translocation Plan prepared to the satisfaction of the Department of Environment and Energy. There must be a net gain in the number of Matted Flax Lily plants/patches due to North East Link, measured by comparing the pre-impact and 10 year post-impact number of Matted Flax-lily plants/patches within the North East Link project boundary and approved translocation recipient sites.
Purpose of proposed outcome
As direct impacts on Matted Flax-lily would be unavoidable, the purpose of this proposed outcome is to require that Matted Flax Lily impacted by North East Link are successfully translocated so there is no net loss in their overall numbers or decline in the species due to North East Link.

2.1.2 Commonwealth offsets

Offsets are sometimes required under the EPBC Act to compensate for any residual impacts to MNES once avoidance and mitigation measures have been considered (DSEWPaC, 2012). An offset must deliver an overall conservation outcome that improves or maintains the viability of the MNES and should be tailored specifically to the attribute of the MNES that is to be affected.

Given that translocation measures for Matted Flax-lily are recognised as a successful and viable method to reduce residual impacts to negligible levels, and given that recent nearby projects comprising substantial removal of this species have not required offsets, it is proposed that offsets are not necessary for this project.

2.2 Flora and Fauna Guarantee Act 1988

Under section 48 of the FFG Act, a permit is required from the Secretary of DELWP for the translocation of flora listed under the Act. As part of the FFG Act permit application, a Salvage and Translocation Plan is to be submitted describing the justification, nature of and likely success of translocation as described in Appendix 1 and 2 of the *Procedures Statement for Translocation of Threatened Native Flora in Victoria* (Department of Environment and Primary Industries [DEPI] 2013c). This document also addresses the principles and decision-making framework that are used by DELWP when assessing a Salvage and Translocation Plan.

2.3 Permits and approvals

Before undertaking the proposed salvage and translocation of the Matted Flax-lily, NELP would:

- Seek approval from DoEE to salvage and translocate Matted Flax-lily
- Seek a general permit application for threatened species and ecological communities (section 201) from DoEE under the EPBC Act 1999
- Obtain a permit from DELWP pursuant to section 48 of the FFG Act for the translocation of listed flora

Arching Flax-lily is not a ‘protected’ plant under the FFG Act or EPBC Act and as such does not trigger permit requirements.

3. Translocation management plan

3.1 Translocation activities

This section summarises the activities that would be undertaken to translocate the Matted Flax-lily[1]. Further detail is provided in Sections 4 to 7.

3.1.1 Salvage

Construction timing depends on the timing of planning and environmental approvals and procurement, and is indicatively envisaged to start in 2020. It is proposed that salvage would occur shortly before construction commencement. Salvaged material would be propagated in a nursery with demonstrated suitable experience with native plants (and preferably with Matted Flax-lily), and translocated to the selected recipient sites provided that:

- Plants have recovered from the disturbance of the salvage process, which is most readily identified by the new vegetative growth
- A sufficient number of clones have been propagated from the salvaged plants so the required number of individuals are able to be planted to satisfy any required offset

It is proposed that, where possible, whole plants (or sufficient material to produce the clones required) would be salvaged at least six weeks before construction works started, allowing for the salvage of any additional material if required. If sufficient material is not present, more clones may need to be produced from a lesser number of individuals, as discussed in Section 4.3.

Translocation would be completed under the supervision of a suitably qualified botanist approved by DELWP and the botanist would follow the Guidelines for the Translocation of Threatened Plants in Australia (Vallee et al., 2004) as applicable. The selection of a suitably qualified botanist to undertake salvage activities would be the responsibility of the construction contractor.

3.1.2 Nursery management

A suitable nursery for propagation would be engaged before salvage works started.

Existing nurseries under consideration and with experience in Matted Flax-lily salvage and propagation include:

- ABZECO ecological consultants
- Victorian Indigenous Nursery Co-operative (VINC)
- Australian Ecosystems
- Merri Creek Management Committee (MCMC)
- Whittlesea City Council nursery

3.1.3 Recipient site management

Recipient sites would be identified in accordance with the process outlined in Section 6.

The ongoing management of each recipient site after translocation would be undertaken for 10 years following initial translocation, or until long-term performance benchmarks were met (see Section 7.1).

[1] It should be noted that Arching Flax-lily will be treated in the same way as Matted Flax-lily within this Plan. Therefore, generally, specific controls for Arching Flax-lily are not provided unless stated otherwise.

General management requirements are described in Section 5 and site-specific requirements would be developed once the recipient sites were identified.

3.2 Management responsibilities

Responsibilities of each party are summarised in Table 3-1.

Table 3-1 Translocation program responsibilities

Activity	Responsibility	Monitoring and reporting
Plant salvage and nursery management		
Pre-clearance survey	NELP	NELP
Nursery selection	NELP[2]	NELP
Plant salvage	Contractor	NELP
Nursery management until translocation completed	Contractor	NELP
Nursery management of "insurance" plants (after translocation)	Contractor until practical completion. NELP from practical completion to year 10.*	NELP
Recipient site management		
Site preparation	To be determined following selection of site(s)	NELP
Planting	To be determined following selection of site(s)	NELP
Management: Years 1 to 10	To be determined following selection of site(s)	NELP

** NELP will engage a suitably qualified contractor*

3.3 Timing and schedule

The proposed salvage of Matted Flax-lily material within the project disturbance area would be undertaken before construction of the project started and once the necessary approvals were obtained. This would likely be in 2020.

The optimal time for salvage and translocation is when Matted Flax-lily is not flowering or fruiting, daily maximum temperatures are low, soil moisture is high, and the corresponding increase in vegetative growth means the species can be easily identified in the field. Matted Flax-lily typically begins flowering in October and finishes setting seed by the end of April. Mean daily maximum temperatures in the project area are lowest during winter (June-August), which is also the season of most consistent rainfall (i.e. the highest mean number of days of rainfall per month). Conducting salvage and translocation between winter and early spring enhances the chance of success, primarily because the plants are more resilient to disturbance at this time, and because this timing allows for a longer period of beneficial growing conditions before the arrival of summer heat. Therefore, it is the preference that salvage would occur during winter or early spring before construction started, but provided that rainfall and other climatic conditions are suitable.

[2] In consultation with DoEE

Salvage and translocation may occur outside this time period if climatic conditions are conducive and/or if supplemental watering and monitoring were conducted to ensure the survival of the plants. Based on the current project timelines, salvage is expected to occur in winter 2020.

The exact timing of salvage and other translocation actions is yet to be determined. Table 3-2 summarises the timeline for translocation activities relative to the initial salvage event.

Table 3-2 Summary schedule for translocation

Task	Action	Timeframe
1	Pre-clearance surveys of salvage site, including installation of protective fencing around plants to be salvaged	Within 6 months before salvage
2	Identification of a suitable nursery	Within 3 months before salvage
3	Pre-translocation watering - undertake an appropriate watering schedule to maintain plant health and optimise translocation success	Assessment of plants to be translocated approximately 1 month before removal
4	Salvage of plants to be translocated	Prior to start of construction
5	Labelling of plants	During salvage and propagation at nursery
6	Propagation of clones (six per plant)	After transport of salvaged material to the nursery and then as needed during nursery management period
7	Nursery management	For up to 10 years following salvage, or until long-term performance criteria have been met
8	Preparation of a Management Plan for the recipient sites	Within 6 months before planting of salvaged material
9	Physical preparation of the recipient sites	Minimum of 6 months before planting of salvaged material
10	Initial translocation to recipient sites to include 4 clones of each plant (where possible) and 2 retained as a safety net in the nursery	Preference is within the 1st year of nursery management period (subject to site conditions) but no longer than 2 years Optimal time is for translocation is winter-early spring
11	Active recipient site management	For 10 years following initial translocation or until long-term performance criteria have been met
12	Monitoring period	Periodically for 10 years following salvage, or until long-term performance criteria have been met (monitoring schedule provided in Section 7)
13	Replacement plantings	As needed for 10 years following initial translocation; optimal time is winter-early spring
14	Reporting	Reports after salvage and initial translocation, and then annually for 10 years or until long-term performance criteria have been met. Reports to be delivered to DoEE and DELWP
15	Adaptive management measures	As needed during 10-year monitoring period, or until long-term performance criteria are met
16	Evaluation of long-term performance criteria	At end of 5th year following initial translocation. Further evaluation annually for years 5-10

4. Salvage and translocation

Survival rates for Matted Flax-lily that have been translocated for other developments in the local area have been high. The most relevant and recent examples are the South Morang Rail Extension Project and Melbourne Wholesale Markets. In addition, the Mernda Rail Extension Project has also been granted approval to translocate plants, although while these have been salvaged they are yet to be translocated. Provided certain safeguards are in place, the translocation procedure is generally considered low risk.

This document incorporates protocols and procedures that have been informed by the translocation plans prepared for the Mernda Rail Extension Project (AECOM, 2016) and other translocation plans prepared for recent projects in Victoria, and have therefore been proven to be effective for the species in the local area. Measures to be implemented for the management and monitoring of the translocated plants are detailed in Section 7.

4.1 Pre-clearance surveys

The detectability of Matted Flax-lily plants and/or populations is known to vary significantly within and between seasons, and numbers of plants in a defined area can fluctuate markedly. This presents some difficulty both when defining a number of individuals to be impacted, but also provides uncertainty around the final number of Matted Flax-lily that are able to be salvaged and translocated. As such, it is proposed that a pre-clearance survey is implemented before construction works started (within the three months before construction). The aim of this survey is to confirm the total number of plants to be translocated and to identify any new individuals.

The pre-clearance survey would utilise the following methodology:

1. All patches identified by previous surveys would be located by differential GPS, and any deviations from previously recorded locations and/or additional patches identified during the salvage recorded using the GPS unit
2. Each patch or plant would be marked with a red flag by a qualified botanist. The flag nominates the individual is considered suitable for salvage
3. Appropriate protective fencing would be installed around each patch to protect the plants from damage before translocation
4. A qualified botanist would survey the area post-salvage to ensure all plants identified for translocated have been salvaged
5. A tally of plants would be recorded and mapped
6. The final removal number would be updated, and provided to DoEE and DELWP

4.2 Proposed end-uses of salvaged plants

The Matted Flax-lilies salvaged from within the project disturbance area will be divided, propagated and managed to reproduce vegetatively (that is, clone) to establish a nursery population of a sufficient number of plants to allow for a variety of end-uses, including as back-up material for each salvaged patch in case of plant mortality within the recipient sites. Establishing a nursery population would also provide an appropriate amount of time to prepare the recipient site(s) (such as weed control, fencing and vermin control) to maximise the probability of the clones surviving after replanting.

It is the intent that six clones are created from each plant, although this number may vary depending on the quality of the salvaged material. Where sufficient material cannot be obtained to generate six clones (for example small ramets/plants < 10 X 10 centimetres), a whole plant may be initially removed with the view to clone this plant in the nursery at a later date. Alternatively, where more than six clones can be created, this would be undertaken to increase the number of clones available for translocation and insurance.

The proposed end-uses of the propagated material include:

- Four clones would be grown at the nursery until the following winter-spring planting season, or until they become sufficiently established in the nursery, at which point they would be translocated to the recipient sites (proving suitable climatic conditions prevail).
- Two clones would be retained at the nursery for five to ten years. This material would be used for insurance to provide replacement plants in the case of losses of plants at the recipient site. If, at the end of the five-year period, not all these plants had been used for replacement planting, they would be provided to Parks Victoria and/or other local agencies or organisations for revegetation projects in the region.

The goals of these proposed end-uses are:

1. To ensure the proposed performance benchmarks are met at the recipient site (see Section 7.1).
2. Once those performance benchmarks have been met, to provide additional plants for other projects to expand the population and distribution of the Matted Flax-lily within Victoria.

4.3 Salvage protocol

A qualified botanist would oversee the salvage of all plants identified by the pre-clearance surveys as being suitable for translocation. All vegetative material of viable Matted Flax-lily plants within the proposed project disturbance area would be removed and salvaged utilising the following procedure:

1. Plants would be watered the day before the removal, or for several days if conditions are dry, to loosen the soil and to ensure the plants are not water-stressed during salvage and transport.
2. All patches previously marked with a red flag during the pre-clearance survey would be removed and recorded on a monitoring sheet. It is proposed that only enough material (attached ramets and rhizomes) is collected to generate the six clones. Any excess plant material can be left *in situ.*
3. For each patch removed, the extent (length and width) would be measured, recorded and a photo taken along with an estimation of the height of ramets.
4. Material would be dug from the ground by hand using suitable equipment that has been cleaned of dirt and debris before each day's removal work.
5. Plants/divisions should be excavated as intact clumps, so that sufficient soil is maintained around the root system to keep roots from exposure and desiccating. This would be achieved by wrapping the clump of roots in a wet hessian or similar material until plants are potted-up at the nursery.

6. Patches would be separated into divisions of a size that fits the transport container (polystyrene box or similar sealed container) to allow for ease of handling and transport. Care would be taken to ensure that sufficient root material was included with each division and that ramets were not separated from their attached rhizome/root base, to the extent practicable. Ideally, small plate-sized material would be left intact (approximately 14-centimetre diameter pots). If smaller pieces of rhizomes or ramets accidentally become separated from the larger divisions, these may be gathered and taken to the nursery, as Matted Flax-lily can be propagated from relatively small pieces of vegetative material.
7. Plant material other than Matted Flax-lily would be removed from the salvaged material prior to transport to the nursery.
8. All vegetative material removed would be labelled by patch and division identifiers, using small aluminium 'dog-tag' labels attached with wire, and recorded on a tracking form according to the system described in Section 4.4 (below), to monitor the number of divisions created and to facilitate identification and tracking upon arrival at the nursery.
9. Depending on soil moisture levels, the excavated divisions may need to be hand-watered so the soil is moist before transport.
10. Once all plants were lifted from the ground and placed into transport containers, they would be promptly transported to the nursery.

Consideration would be given to the preservation of material for the purpose of genetic testing, subject to further consultation with DoEE and DELWP.

4.4 Labelling

The correct labelling of all salvaged material needs to be undertaken so that plants can be identified and tracked throughout the entire removal, propagation, translocation and monitoring process.

Plants would be labelled with small metal labels at the salvage site during the removal and division process, using a numeric system that identified the patch and field division number. For example, the divisions from Patch 01 would be labelled 01-01, 01-02, 01-03 and so on.

At the nursery, the plants would be further divided to a size appropriate to the propagation containers – 14 to 24-centimetre diameter pots (6 to 10 inch pots) or other suitable propagation containers. The metal dog-tag would be replaced with a staked metal nursery label, and the side of the pots also labelled with a permanent marker. The nursery label would include the patch number and, in place of the two-digit field division number, use a three-digit nursery clone number (01-001, 01-002) to simplify tallying of the total number of divisions taken from the parent plant.

4.5 Propagation and nursery management

All plants to be grown at the nursery would be potted in a medium specifically designed for propagating native plants. Where achievable, six clones would be created to allow for four to be planted at the recipient site after one year, and two to be retained in the nursery as potential replacement plants in the case of mortality at recipient sites.

After the clones were potted, they must be managed correctly to maximise survival and good health within the nursery environment. Appropriate management would depend on conditions and the length of stay in the nursery. Watering, fertilisation, and disease and pest control would need to be undertaken to maximise survival and sufficient growth over the nursery management period. Disease and pest control in the nursery would be important so that no diseases or pests were introduced to the recipient site during delayed translocation. Correct hygiene procedures should be practiced at all times within the nursery. Any plants suspected of being infected by a pathogen or disease should be treated according to nursery guidelines or destroyed and disposed of appropriately to avoid spread of the pathogen/disease. Plants suspected of carrying a pathogen/disease or having pests would not be introduced to the recipient site. Weeding of pots would also be undertaken periodically and before translocation.

Generally, Matted Flax-lilies do well within a nursery environment and may spread to fill their container. If plants become pot-bound, further division and correct labelling would be undertaken.

Nursery populations would be monitored by a qualified botanist every six months in the first two years, and annually thereafter during the life of the program. Results of the nursery monitoring would be included in the translocation program's annual report (see Section 7.5).

Before planting into the recipient site, plants need to be 'hardened-off' (exposed to conditions similar to those at the recipient site) gradually so they are not stressed by a sudden change in watering regime, sun and wind exposure, or temperature. Before the plants are translocated into the recipient site(s), the health and readiness of the plants for translocation must be inspected and approved by the project botanist.

4.6 Planting procedure

The translocation to the recipient site would occur once plants were established within the nursery and conditions at the site (such as climate, soil moisture and weed control) are favourable. The ideal time to conduct translocation is during winter or early spring, when temperatures are cool and rainfall is more consistent. Planting would be overseen by a qualified botanist approved by DELWP. Planting of the plants/clones at the recipient site would be accomplished by adopting the following practices:

1. Holes would be pre-dug systematically and filled with water the day before translocation occurs; the holes would be dug roughly twice as wide and slightly deeper than the pot in which the material is grown in. The holes should be laid out in a loose grid formation, with plants spaced 3-5 metres apart, to assist in later monitoring of the plants. Holes should be placed so as to avoid impacts to existing native vegetation at the site, to the extent practicable.

   Holes should also be placed so they are not too close to any perimeter fence, any large trees or other vegetation that would excessively shade the translocated plants or compete with them for water or nutrients. The spoils from the hole should be broken down into small clumps and mixed with a small amount of weed-free planting medium to serve as backfill during planting.

2. The pre-dug planting holes would be re-filled with water just before the translocation to moisten and soften the surrounding soil and facilitate quick root growth. Any high-threat weeds not already removed from the area immediately around the hole should also be removed at this time.

3. The potted plants would be well watered before translocation.

4. After being transported from the nursery, the plants would be laid out systematically at pre-identified recipient holes. The plants would be arranged so that divisions planted next to each other are from different parent plants to facilitate cross-pollination and enhance genetic diversity within the recipient site.

5. Care should be taken when removing the material from the pot to avoid damage to the plant and to keep the planting medium intact around the root system. If the plant is root-bound, the outer layer of roots may be loosened by hand or with pruning shears, taking care to not cause excessive damage to the roots.

6. The translocated material should be placed in the centre of the planting hole at a sufficient depth so the top of the root ball sits slightly lower than the surrounding soil surface, to create a slight basin to capture water.

7. The backfill material would be placed around the root ball and tamped down slightly so it is packed around the root ball and no large air pockets remain. Care should be taken to minimise disturbance of the root ball and avoid over-compacting the soil during backfilling. To avoid crown rot, the backfill soil should not cover the crown of the plant.

8. The area around the plant would be covered with a 7–10-centimetre layer of certified weed-free mulch consisting of organic material (such as wood chips or pea straw). Mulch should not cover the crowns of the plants. If considered appropriate and necessary, weed matting would also be considered to supress the establishment of weeds.

9. The plant would be watered-in immediately after placement in the hole. Watering should continue until the soil in the planting depression is saturated, taking care not to displace the mulch when watering.

10. The plant would be labelled according to the nursery number, using a small metal label attached to a metal stake embedded in the ground, and the location of the plant recorded using a differential GPS.

11. Immediately following translocation, the basal diameter and height of each clump and the number of ramets per clump would be measured to establish a baseline for monitoring the success of translocation. Reference photos would also be taken of the recipient site after the translocation episode is complete, to serve a visual baseline for subsequent monitoring, and the photo point location recorded using GPS.

5. Translocation recipient site selection

Before translocation, an appropriate recipient site must be identified. This would occur once this Plan was approved by DELWP and in consultation with DELWP.

In considering whether a site is a suitable translocation recipient site, a key consideration is the presence, historical or otherwise, of Matted Flax-lily at that site. A site that has remained undisturbed following recent extinction of the species, or where the species is present in low numbers in otherwise suitable habitat and is not currently protected through relevant planning controls is considered to be the best option.

Securing such an area for active ecological management in perpetuity would provide a strong ecological benefit for the species. Whilst the presence of an existing, large and self-sustaining population at a potential recipient site may indicate the habitat would be suitable for translocated plants, there is a risk the addition of more plants to the site may adversely affect the current population, and so this should be avoided. However, translocation to sites with existing self-sustaining populations and/or sites which are already under active conservation management can be undertaken in circumstances that would benefit the species and the community or ecosystem at the site, and where no other more suitable sites are available.

A number of criteria would be considered when identifying potential recipient sites for the Matted Flax-lilies to be translocated. Selection factors for consideration are documented in Figure 5-1.

Once the recipient site was identified, this Plan will be updated to reflect the selected site, the specific arrangements for the translocation, and the ongoing management of plants at the site.

Currently, NELP is investigating potential recipient sites within the City of Whittlesea, City of Banyule, City of Darebin and/or in the eastern section of Simpson Barracks, including:

- Southern Redgum Reserve, Enterprise Drive, Bundoora
- 185 Bridge Inn Road, Wollert
- Mernda Village Conservation Reserve (East of Brahe Drive), Mernda
- Harry Pottage Reserve, Macleod
- Habitat Link (Gresswell Forest Nature Conservation Reserve), Macleod
- Cherry Street Reserve, Macleod
- Forensic Drive, Macleod
- Simpson Barracks

Further information on these sites is presented below.

5.1 Southern Redgum Reserve, Enterprise Drive, Bundoora

This site is located within the Victorian Volcanic Plain and is managed by the City of Whittlesea for conservation purposes. It is a small reserve on flat ground, with the M80 Ring Road to the south and industrial buildings surrounding. The canopy comprises an open woodland of River Red Gum *Eucalyptus camaldulensis*. There was low recruitment, with a couple of saplings present. The sparse mid-storey comprised primarily planted shrubs 1–2-metres high, including Sticky Wattle *Acacia howittii*, Kurwan *Bursaria spinosa* and *Cassinia* sp. The understorey was dominated by weeds, including Kikuyu *Cenchrus clandestinus*, Couch *Cynodon dactylon*, Cocksfoot *Dactylis glomerata*, Panic Veldt-grass *Erharta erecta* and Annual Veldt-grass *Erharta longifolia*. Native ground-storey species were sparse, including Berry Saltbush *Atriplex semibaccata*, Nodding Saltbush *Einadia nutans*, Wallaby Grass *Rytidosperma* spp. and Cotton Fireweed *Senecio quadridentatus*. The northern edge of the site was dominated by Wallaby Grass and had an overall lower ground-storey cover (high cover of bare ground and moss/lichen) than the rest of the reserve, which was dominated by weeds. Logs were present throughout the reserve and litter cover was around 40 per cent, as shown in Plate 2.

A kangaroo was present on the reserve and is likely a permanent resident. The reserve has undergone obvious management, with planted shrubs and sprayed weeds, including a few individuals of Montpellier Broom *Genista monspessulana*. Two soil samples were taken as outlined in Table 5-1.

Suitability as a translocation site

There are no current or historic records of Matted Flax-lily or Arching Flax-lily on the site according to the Victorian Biodiversity Atlas (VBA)[3]. The site is also on the Victorian Volcanic Plain rather than the preferred Gippsland Plain bioregion, where most of the individuals for translocation originate. The soil and vegetation is suitable, though the understorey requires further management to reduce the cover of weeds. This site is therefore considered a potentially suitable Matted Flax-lily and Arching Flax-lily recipient site.

Table 5-1 Soil samples, Southern Redgum Reserve

Pit 1	Pit 2
Horizon A1: 0-24 centimetres deep, colour brown-grey, texture a clay loam	Horizon A1: 0-28 centimetres deep, colour brown-grey, texture a clay loam Horizon A2: 28-30 centimetres deep, colour light brown tinged yellow, texture a silty clay loam

[3] https://vba.dse.vic.gov.au/vba/#/ (accessed 29/01/2019)


Plate 3 West side of Enterprise Drive reserve, and east side of Enterprise Drive reserve

5.2 185 Bridge Inn Rd, Mernda

This site is located within the Victorian Volcanic Plain and managed by the City of Whittlesea. The reserve is bordered by Darebin Creek at the base of a slope along the west and north edges of the site. The western third of the site is on a small hill; the north-east corner contains a shallow depression and the rest of the site occurs on a flat plain. The north end of the site showed some erosion and exposed rock. Scattered River Red Gum canopy trees were present on the site as well as dense patches of recruitment cohorts on the eastern edge and centre of the site. The understorey was dominated by introduced Sweet Vernal-grass *Anthoxanthum odoratum*, Cocksfoot, Toowoomba Canary-grass *Phalaris aquatica* and Ribwort *Plantago lanceolata*. Smaller sections of the reserve were dominated by Wallaby Grass, primarily under the Eucalyptus regeneration or in disturbed/mown areas. Scattered Berry Saltbush and Nodding Saltbush were also present, as shown in Plates 3A–C).

A number of listed weeds were present in and around the site. Along the southern and western edges of the reserve Broom *Genista* sp., African Boxthorn *Lycium ferocissimum* and Gorse *Ulex europaeus* were present. Scattered Spanish Artichoke *Cynara cardunculus* subsp. *flavescens* was also present within the site. Kangaroos and rabbits were present onsite. There was also evidence of mowing around the paddock edges. An old well located on the hill has Aboriginal cultural significance. Three soil samples were taken, which are outlined in Table 5-2.

Suitability as a translocation site

There are no current or historical records of Matted Flax-lily or Arching Flax-lily on site according to the VBA. The site occurs on the Victorian Volcanic Plain rather than the preferred Gippsland Plain bioregion and the site is dominated by introduced vegetation. However, the site is comprised of suitable soil. Ultimately, while the location is considered suitable, the site requires a significant amount of management and is not recommended as a translocation site for Matted Flax-lily and Arching Flax-lily.

Table 5-2 Soil samples, 185 Bridge Inn Rd

Pit 1 Horizon A1: 0-15 centimetres deep, colour brown-grey, texture a clay loam	**Pit 2** Horizon A1: 0-20 centimetres deep, colour brown-grey becoming browner at depth, texture a clay loam (high root content near the surface; rock fragments at depth)
Pit 3 Horizon A1: 0-10 centimetres deep, colour brown-grey, texture clay loam (flakes and clumps of clay)	



Plate 4 A. Western portion of Bridge Inn Road reserve B. North end of Bridge Inn Road reserve and C. *E. camaldulensis* regeneration along the eastern edge of Bridge Inn Road reserve

5.3 Mernda Village Conservation Reserve (East of Brahe Drive), Mernda

This site is located within the Victorian Volcanic Plain and managed by the City of Whittlesea. The majority of the site is a flat or slightly undulating floodplain. The site is going through a dry period, with cracked ground and low vegetation cover, with evidence of dead understorey vegetation. Scattered River Red Gum forms an open woodland. Planted River Red Gum saplings at 2–4-metres high are evenly distributed through the site and are of generally poor health. The understorey is primarily dominated by introduced species, including Annual Veldt-grass, White Fumitory *Fumaria capreolata*, Cleavers *Galium aparine*, Rye-grass *Lolium* sp. and Hogweed *Polygonum aviculare*. The area is dominated by bare ground, with low amounts of litter and cryptogamic crust. A couple of patches, each around 50-metres long by 20-metres wide, were dominated by dense Wallaby-grass. Large logs are scattered across the site.

A small section in the north-west has been revegetated with some native shrubs and grasses, including *Acacia* spp.*, Grevillea* spp. and Kangaroo Grass *Themeda triandra*, though the understorey remains dominated by introduced grasses. Mernda Drain runs along the eastern edge of the site and has evidence of revegetation. The slope down to the drain is rocky. The canopy was dominated by River Red Gum, with one or two individuals of Swamp Gum *Eucalyptus ovata*. The sparse mid-storey consisted of planted shrubs, including *A. howittii,* Lightwood *Acacia implexa, Black Wattle A. mearnsii,* Hedge Wattle *A. paradoxa* and Kurwan. The groundstorey was dominated by introduced species, including Oat *Avena* spp., Rye-grass, Ribwort and Sharp Buttercup *Ranunculus muricatus*. Native ground-storey species included Sheep's Burr *Acaena echinata*, Rush *Juncus* spp. and Cotton Fireweed.

The reserve had minor evidence of kangaroos and rabbits. Management of the site appeared to include revegetation efforts and mowing of the large patches of Wallaby Grass.

Suitability as a translocation site

There are no current or historical records of Matted Flax-lily or Arching Flax-lily on site according to the VBA. The site is also on the Victorian Volcanic Plain rather than the preferred Gippsland Plain bioregion. However there is some suitable vegetation on site, with the area around Mernda Drain considered the most suitable translocation site. The understorey vegetation requires management to reduce the cover of weeds, but the area around Mernda Drain is considered a potentially suitable site for Matted Flax-lily and Arching Flax-lily translocation.

Plate 5 A. Floodplain along the western edge of Mernda Village Conservation Reserve B. Area dominated by Wallaby Grass and C. Area adjacent to Mernda Drain

5.4 Harry Pottage Reserve, Macleod

Harry Pottage Reserve is within the Gippsland Plain bioregion and managed by Banyule City Council. The reserve has two distinct halves: the east side is an old landfill site that has been turned into a public park and playground, the west side contains a patch of remnant native vegetation.

The east side consists primarily of typical introduced ground-storey species, including Couch, Annual Meadow-grass *Poa annua* and Clover *Trifolium* spp. Garden-beds have been formed with east and west facing aspects and mulched with a thick layer of wood-chippings shown in Plate 5A. These have been planted with native trees and shrubs. A single soil sample was taken within the introduced grasses outside the garden-beds, listed in Table 5-3.

Suitability as a translocation site – East

There is a record from 2002 of Matted Flax-lily on the site according to the VBA; there are no current or historical records of Arching Flax-lily. However, while the site is within the Gippsland Plain bioregion, the same region in which most of the individuals for translocation occur, the heavily disturbed nature of this area makes it unsuitable as a translocation site.

Table 5-3 Soil sample, Harry Pottage Reserve (east)

Pit 1 Horizon A1: 0-8 centimetres deep, colour brown-dark grey, texture a clay loam (rock and root fragments)	

The west side consisted of a patch of remnant native vegetation. The canopy comprised scattered River Red Gum, with a sub-canopy layer of River Red Gum, Silver Wattle *Acacia dealbata* and Lightwood. The mid-storey included Golden Wattle *Acacia pycnantha*, *Cassinia* sp., River Red Gum and Burgan *Kunzea ericoides*. The understorey was dominated by native grasses, including Wattle Mat-rush *Lomandra filiformis*, Weeping Grass *Microlaena stipoides* var. *stipoides*, Wallaby Grass, and Kangaroo Grass, shown in Plate 5B.

A low weed cover included Veldt-grass *Ehrharta* sp., Yorkshire Fog *Holcus lanatus*, Onion Grass *Romulea rosea* and Montpellier Broom. Matted Flax-lily is already present at the site in relatively robust numbers, shown in Plate 5C.

Suitability as a translocation site - West

Matted Flax-lily was identified as occurring on site during the field assessment. There are no current or historical records of Arching Flax-lily according to the VBA. The site occurs in the Gippsland Plain bioregion and contains suitable vegetation of good quality. If the population of Matted Flax-lily on site is small, translocation to this site may positively contribute to expanding the current gene pool. However, if the population is already well established and self-sustaining, adding additional individuals may have a negative impact.

The site is considered suitable for translocation of Arching Flax-lily and potentially suitable for Matted Flax-lily.



Plate 6 A. East half of Harry Pottage Reserve. B. West half of Harry Pottage Reserve and C. A cluster of Matted Flax-lily in the west half

5.5 Habitat Link (Gresswell Forest Nature Conservation Reserve), Macleod

Habitat Link in within the Gippsland Plain bioregion and managed by Darebin City Council. This site forms a link between the Gresswell Forest and Gresswell Hill Conservation reserves. The east side of the site is an open Eucalypt woodland dominated by River Red Gum with a mid-story of Silver Wattle, Lightwood, *Cassinia* sp. and Cherry Ballart *Exocarpos cupressiformis.* The ground layer is a mosaic of weedy and native grasses including: Kikuyu**,** Cocksfoot, Plantain and Wallaby Grass. Native graminoids included Spear Grass *Austrostipa* sp., Weeping Grass *Microlaena stipoides* var. *stipoides,* and Wallaby Grass. The east side is down a slope and fringes some good quality vegetation near the lower fence, as shown in Plate 6A-B.

The west end of the site is more open and disturbed. There is some loose gravel through the site and areas of bare ground. Sparse River Red Gum formed the overstorey and *Cassinia* sp. was present in the midstorey. Kikuyu, Couch, Ribwort and Wallaby Grass dominated the ground layer. This area seems very exposed and is located near the top of a slope, as shown in Plate 6C.

Habitat Link has undergone significant disturbance during the development of the surrounding housing estate. The site is adjacent to housing, paths and roads. There is also a large kangaroo population in Gresswell Forest which links up with the site. Darebin City Council has not undertaken much conservation work at this site but is keen to improve this site to form a better link between Gresswell Forest and Gresswell Hill.

Suitability as a translocation site

There are no current or historical records of Matted Flax-lily or Arching Flax-lily on site according to the VBA, however there are records of Matted Flax-lily in the adjoining Gresswell Forest. Although the site is in the preferred Gippsland Plain bioregion, the west side of the site is not considered suitable as a translocation site for Matted Flax-lily and Arching Flax-lily due to being heavily disturbed and mostly cleared of native vegetation. The east side of the site is considered potentially suitable, as it contains a greater abundance of native vegetation.

Plate 7 A. Possible locations (green polygons) for translocation in the Habitat Link. B. Site 1 at the east end of Habitat Link. C. Site 2 at the west end of the Habitat Link

5.6 Cherry Street Reserve, Macleod

Cherry Street Reserve is within the Gippsland Plain bioregion and managed by Darebin City Council. This site contains areas of fenced off native vegetation surrounded by more weedy areas (mown) and well used pedestrian pathways. There is a *Eucalyptus camaldulensis* overstorey, dominated by smaller recruiting individuals, with a dense midstorey of *Acacia* ssp. and *Cassinia* sp. In the better quality areas, the ground layer was dominated by Kangaroo Grass, Wallaby Grass and Weeping Grass. Other groundstorey species included Spear Grass, Small-leaved Clematis *Clematis microphylla,* Black-anther Flax-lily *Dianella revoluta,* Nodding Saltbush, Wattle Mat-rush, Cotton Fireweed and a variety of lilies (Luke Sandham, Darebin Council pers comm).

Large patches of introduced grasses, including Kikuyu, Brome *Bromus* sp. and Plantain are present through the site adjacent to the fenced native vegetation. The sites identified by Darebin City Council are in transition zones between good quality areas of native vegetation and patches of introduced grasses, shown in Plate 8.

Cherry Street Reserve is Darebin City Council's most important bushland reserve. There is significant investment in weed control and thinning out eucalypt regeneration, which shades out the understorey. The site is adjacent to suburban housing and contains walking paths. The bottom proposed site had bitumen throughout the soil surface in the open part of the site, which would not be suitable for translocation. There has been some soil movement across the site.

A soil sample was taken at each of the proposed translocation locations in Cherry Street Reserve, as outlined in Table 5-4.

Suitability as a translocation site

There are no current or historical records of Matted Flax-lily or Arching Flax-lily on site according to the VBA. However, the site occurs in the Gippsland Plain bioregion and the soil is suitable. The locations within Cherry Street reserve chosen as potential translocation sites vary in their suitability, primarily due to variation in the amount of native vegetation present. The majority of locations occur in areas predominantly cleared of native vegetation and dominated by introduced grasses. The locations considered suitable for translocation of Matted Flax-lily and Arching Flax-lily are: the northern-most, triangular-shaped location and the southern-most location. The other locations are not considered suitable as they would require extensive management.

Table 5-4 Soil samples, Cherry Street Reserve

Pit 1 Horizon A1: 0-12 centimetres deep, colour light brown, texture a clay loam (lumps of clay) Horizon A2, 12-16 centimetres deep, colour yellow-brown, texture a light clay	**Pit 4** Horizon O1, 0-1 centimetres deep, colour pale grey, exposed soil Horizon A1, 1-17 centimetres deep, colour brown, texture a silty clay loam (clay fragments)
Pit 2 Horizon A1, 0-15 centimetres deep, colour grey-brown, texture a clay loam Horizon A2, 15-20 centimetres deep Horizon A3, 20-26 centimetres deep Horizon A4, 26-30 centimetres deep, colour pale grey, texture a clay loam sand (fine and powdery)	**Pit 5** Horizon A1, 0-18 centimetres deep, colour brown, texture a clay loam
Pit 3 Horizon O1, 0-7 centimetres deep, organic matter Horizon A1, 7-20 centimetres deep, colour grey-brown, texture a sandy clay loam Horizon A2, 20-23 centimetres deep, colour darker orange-brown, texture a higher clay content	

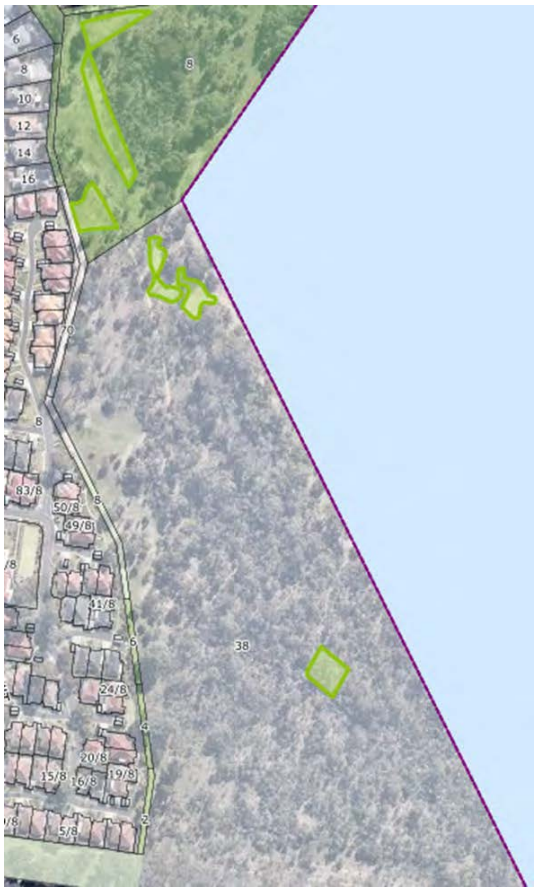


Plate 8 A. Proposed locations for translocation (green polygons). B. Transition zone between native and introduced vegetation. C. Fenced off native grassy woodland in the north-west of the reserve. D. Southern most translocation site, open area contains bitumen

5.7 Forensic Drive, Macleod

Forensic Drive is within the Gippsland Plain bioregion and managed by Darebin City Council. The site comprised of native vegetation well fenced off from weedy roadside curbs. The canopy is dominated by Lightwood and Black Wattle *Acacia mearnsii*, as well as River Red Gum. There are patches of dense regeneration of the canopy species. The midstorey consisted of multiple *Acacia* spp. and *Cassinia* sp. The understorey is dominated by Weeping Grass, as well as Spear Grass, Wattle Mat-rush, Wallaby Grass and Kangaroo Grass, as shown in Plate 9.

There has been heavy management of Chilean Needle Grass *Nassella neesiana* around the edges of the site, leaving bare patches. These patches are where Darebin City Council would like to translocate Matted Flax-lily. The site has been intentionally lit by arsons a couple of times.

A couple of soil samples taken at the site are listed in Table 5-5.

Suitability as a translocation site

There is a record from 2002 of Matted Flax-lily on the site according to the VBA; there are no current or historical records of Arching Flax-lily. The site is within the preferred Gippsland Plain bioregion and contains suitable soil and vegetation. Although the risk of disturbance is potentially higher due to the small size of the site, the site is considered suitable for Matted Flax-lily and Arching Flax-lily translocation.

Table 5-5 Soil samples, Forensic Drive

Pit 1	**Pit 2**
Horizon A1: 0-23 centimetres deep, brown colour, texture a clayey sand (clay lumps) Horizon A2: 23-32 centimetres deep, gold brown colour, texture a clayey sand	Horizon A1: 0-20 centimetres deep, chocolate brown colour, texture a clay loam, sandy

Plate 9 A. Proposed area for translocation (green polygon). B. Native vegetation at Forensic Drive reserve

5.8 Simpson Barracks

Detailed information on the environmental values of Simpson Barracks is provided in EES Technical report – Ecology. However, one area not covered within that report is a detailed assessment of the soils of the Matted Flax-lily loss site or within a proposed recipient area to the east of the site. Sampling was completed as detailed in Table 5-6 to provide assessment of the soils of the Matted Flax-lily loss site and that within a proposed recipient area to the east of the site. The results show that the soil within the west (impact site) and east (potential recipient site) are of a similar nature and therefore the eastern portion of Simpsons Barracks is suitable as a recipient site.

Table 5-6 Soil assessment results, Simpson Barracks

Impact area soil results	Recipient area soil results
Pit 1 Horizon A2: 1-25 centimetres deep, colour brown, texture a clay loam Horizon A3: 25-35 centimetres deep, colour light brown , texture a sandy clay loam with iron nodules	**Pit 4** Horizon A2: 1-7 centimetres deep, colour brown, texture a clay loam Horizon A3: 7-40+ centimetres deep, colour light brown / yellow, texture a clay loam sandy (coarse, gravelly)
Pit 2 Horizon O1: 0-2 centimetres deep Horizon A1: 2-7 centimetres deep, colour brown, texture a loam Horizon A2: 7-30 centimetres deep, colour brown, texture a clay loam Horizon A3: 30-45+ centimetres deep, texture a clay loam sandy	**Pit 5** Horizon A2: 1-10 centimetres deep, colour brown, texture a clay loam Horizon A3: 10-35+ centimetres deep, colour light brown / yellow, texture a clay loam sandy (small gravel)
Pit 3 Horizon A2: 1-20 centimetres deep, colour brown, texture a clay loam (sandy) Horizon A3: 20-30+ centimetres deep, colour light brown, texture a clay loam sandy with iron nodules, gravelly	**Pit 6** Horizon A2: 1-8 centimetres deep, colour brown, texture a clay loam Horizon A3: 8-35+ centimetres deep, colour light brown-yellow, texture a sandy clay (with gravel)

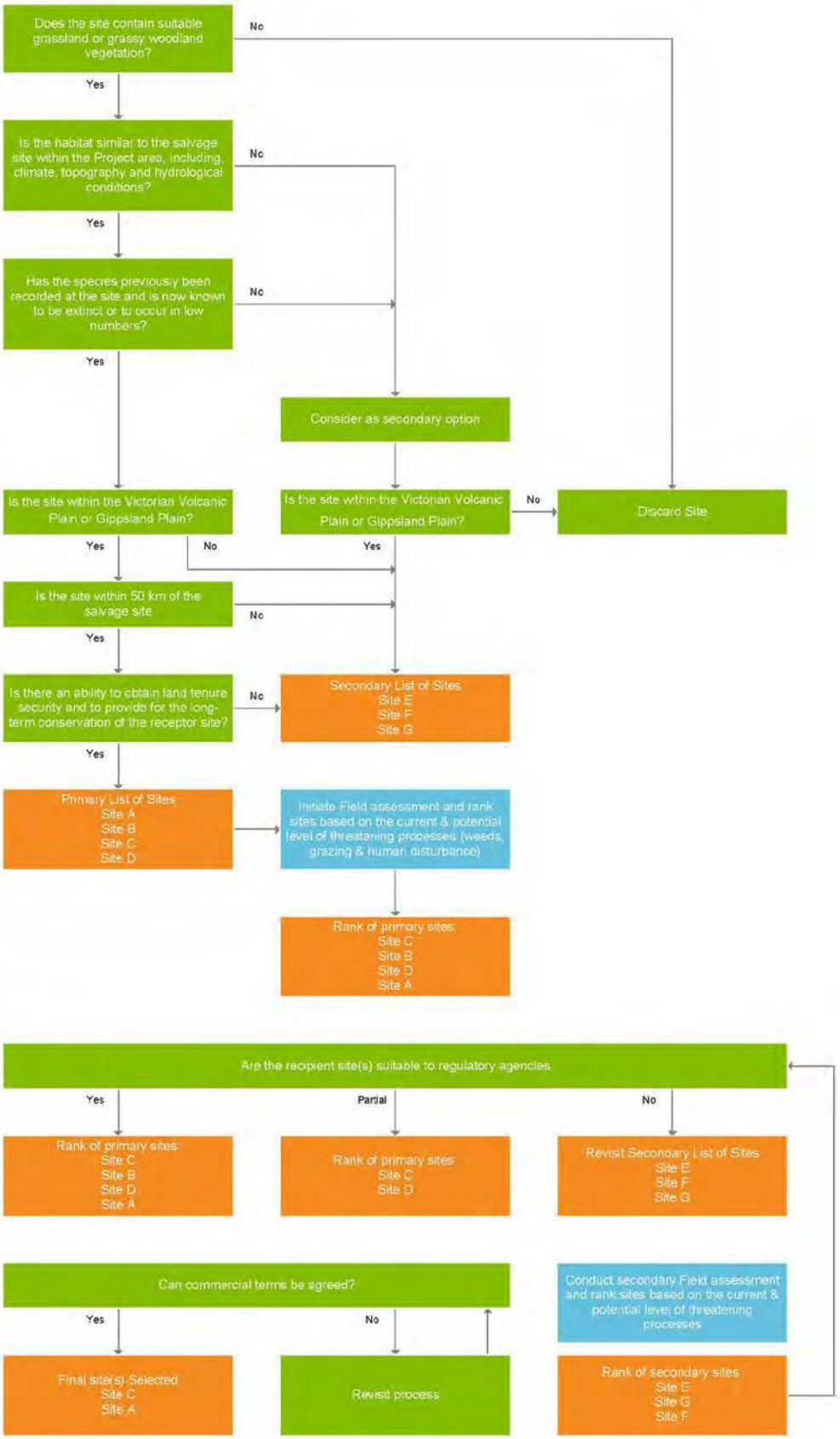


Figure 5-1 Recipient site selection flowchart

6. Recipient site management

Before and following translocation, management and maintenance activities at the recipient site would be required to control threatening processes, and improve the health, growth and survivorship of the translocated plants.

This section provides broad management activities required across the selected recipient sites to achieve a successful translocation program. To ensure the longevity of recipient sites, the sites would require a holistic management approach to improve the ecological value of the entire site rather than focusing just on the health of translocated plants. In some cases, this would involve enhancing and restoring parts of the recipient site not directly related to the translocated plants.

Management responsibilities and site security information is presented in Section 3.

6.1 Watering

Watering of translocated plants at the recipient site would be undertaken to ensure that plants established quickly and survived through dry periods during the establishment phase (considered here to include the first summer endured by the planted material). Supplementary watering can be critical to the survival of plants during the first year, and particularly the first summer after translocation, when they are still establishing their root systems and are more prone to drought-stress. The frequency and volume of watering required during this period is dependent on a number of factors, including the time of year that translocation occurs, rainfall, temperature, soil type and topography. After the plants have lived through the first summer, supplemental watering would unlikely be required unless the plants showed signs of water-stress.

A suggested watering schedule is outlined in Table 6-1. The schedule may be modified based on the time of planting as well as monitoring of weather conditions, soil moisture, and the condition of the translocated plants at the recipient site. The quantity of water used for each watering episode would be sufficient to promote survival of the translocated plants, as informed by monitoring of soil moisture and the condition of the plants at the recipient site.

Table 6-1 Watering requirements for translocated plants

Months after planting	Period between significant rainfall events[1] that will trigger watering	Watering schedule
0–3	1 week	Weekly[2]
3–9	2 weeks	Weekly
9–21	1–2 months	Monthly
21–36	1–2 months	Only if plants display signs of stress

[1]A 'significant rainfall event' will be defined as ≥20 mm of rainfall within a 24-hour period; rainfall and watering records will be included the project monitoring reports.
[2]More frequent monitoring may be required in the first months if planting occurs outside of the preferred winter to early spring.
Source: Adapted from EP (2010)

6.2 Weed control

Control of high-threat weeds within and adjacent to the location(s) of transplanted Matted Flax-lilies would be undertaken before translocation. This includes woody, grassy and herbaceous weeds.

After an initial weed control effort before translocation, an ongoing weed control program would occur biannually at times of the year when weeds were germinating and actively growing (autumn and spring). Spring weed control timing is critical so that high-threat weeds can be targeted before setting seed. The weed control methods would include undertaking spot-spraying using broad-leaf and grass selective herbicide. Woody weeds would be removed using the cut-paint method and germinates treated with a broad-leaf selective herbicide. The alternate use of selective herbicides reduces the likelihood of off-target damage, increases the ability of applicators to target broad-leaf weeds amongst indigenous grasses, and assists exotic grass control amongst indigenous herbs.

Noxious weeds would be maintained at <1% cover within five metres of any planted material within the first five years of management. To achieve this, carefully targeted spot-spraying with selective herbicides must only be undertaken at distances greater than 50 centimetres away from translocated plants. Mulching and hand weeding would be required to remove weeds within 50 centimetres of translocated plants.

Herbicide application must only be undertaken during conditions considered suitable by an experienced operator, and all operators must be familiar with the range of exotic and indigenous species present on site. Before application, the contractor would be informed of the locations of the translocated plants, and instructed in the identification of Matted Flax-lily and other sensitive native species occurring at the recipient site. This would ensure that plants are not affected by off-target application or overspray.

Nursery stock would be inspected before planting to avoid introducing weeds to the recipient site, and additional weed control undertaken at the recipient site before and after the replanting of the salvaged material. Monitoring of weed levels at the recipient site would be performed according to the monitoring schedule outlined in Section 7.3, with weed control actions as needed according to the monitoring results and associated observations of environmental conditions.

6.3 Pest animal control

If rabbits and/or hares were present within fenced recipient areas, or posed a threat to isolated plants, a combination of harbour removal, warren destruction and baiting would need to be undertaken.

Baiting would ideally be undertaken in late summer to mid-autumn when populations are naturally low, and repeated each year as required. Baiting can also be undertaken during winter and spring, although this may not be as effective if there is high availability of natural feed (potentially reducing the desirability of baits). Given translocation sites are within close proximity to neighbouring properties, roadsides and pedestrian paths, appropriate warning signage must be erected at access points and along fence lines prior to laying baits. Sites would need to be revisited four days after baiting to remove uneaten baits and again 12 days after laying baits to remove any dead carcasses. Uneaten baits and carcasses must be buried to a depth of at least 500 millimetres in cleared areas outside recipient sites.

Surveys for rabbits and active warrens at recipient sites would be undertaken at least twice yearly, and any warrens located fumigated and destroyed. Following each warren treatment, affected areas would be re-sown with indigenous grasses and follow-up weed control undertaken as required.

6.4 Biomass control

An integrated biomass control program would be implemented with the aim of reducing competition for light, nutrients and moisture from grassy weeds. In the later stages of the management plan, biomass control would reduce competition (thatching) from native grasses and promote understorey species diversity. A mixture of low impact techniques would reduce biomass and may include low intensity burning, slashing, spraying and hand removal. Techniques would vary between recipient site(s) due to management protocols required by the respective site managers.

Any proposed burns would be carried out during autumn (cool burn) with the aim of reducing competition from annual grassy weeds and to encourage germination of native understorey herbs and graminoids.

Cut grass would be removed from recipient sites where this has the potential to smother translocated plants (a hand mower with a catcher may be used if appropriate for parts of each site). For lower quantities of biomass, a brush cutter would be used as this would likely disperse grass in the process of slashing.

Care would be taken to protect translocated Matted Flax-lilies and other newly established plants during slashing. Before a plot was slashed, each Matted Flax-lily would have a fluorescent flag placed near its base or several flags placed around the edge of the colony for plants consisting of numerous ramets. High quantity areas of biomass within translocated plants would be removed by hand to prevent damage or cause significant disturbance to the Matted Flax-lilies.

Spring slashing would occur before exotic grasses and herbs setting seed to prevent seed spread.

6.5 Fencing

The design and construction of fencing would ensure the exclusion of herbivores known to occur in the vicinity and which pose a potential threat to the translocated plants at each recipient site. Decisions on fencing type would be made following the identification of recipient site(s), as existing fencing may vary and the nature of the herbivore threats may differ.

Fences would be inspected on a regular basis after translocation, including during the project monitoring events conducted, and maintained as necessary. The translocated plants would also be monitored for evidence of grazing, and additional measures, such as use of cages or tree guards for individual plants, may be implemented as necessary. Additional pest fauna controls, such as bait traps for snails or similar pests, would also be implemented if the need was indicated by monitoring.

On occasion, herbivore control would be too difficult to achieve and individual plants may be caged. This would be considered as an option if other herbivore control was not effective.

6.6 Enhancement planting

Recipient sites would be selectively revegetated with local indigenous plants particular to the relevant EVC. Plants chosen would predominately be from understorey lifeforms and consist of herbs, groundcovers, daisies, lilies and graminoids to assist with weed suppression and potentially attracting pollinators. Understorey plants suitable for enhancement planting are listed in Table 6-2.

Areas that have been removed of woody, herbaceous and grassy weeds would require revegetation with indigenous grasses to provide competition against colonising weeds. Areas containing existing understory grasses would require supplementing with herbs, groundcovers, daisies and lilies to improve species diversity.

Enhancement planting would be scheduled to occur in Year two and beyond to allow targeted weed control and to provide optimum opportunity for translocated Matted Flax-lilies to establish.

Table 6-2 Understory species suitable for enhancement planting

Common name	Scientific name
Shrubs	
Sweet Bursaria	*Bursaria spinosa*
Hedge Wattle	*Acacia paradoxa*
Groundcovers	
Berry Saltbush	*Atriplex semibaccata*
Kidney Weed	*Dichondra repens*
Purple Coral-pea	*Hardenbergia violacea*
Running Postman	*Kennedia prostrata*
Berry Saltbush	*Atriplex semibaccata*
Daisies	
Clustered Everlasting	*Chrysocephalum semipapposum*
Wiry Buttons	*Leptorhynchos tenuifolius*
Lilies	
Chocolate Lily	*Arthropodium strictum*
Grasses	
Common Wallaby-grass	*Rytidosperma caespitosa*
Brown-back Wallaby Grass	*Rytidosperma duttoniana*
Clustered Wallaby-grass	*Rytidosperma racemosa*
Australian Wheat Grass	*Anthosachne scabra*
Wattle Mat-rush	*Lomandra filiformis*
Spiny-headed Mat-rush	*Lomandra longifolia*
Weeping Grass	*Microlaena stipoides*
Velvet Tussock-grass	*Poa morrisii*
Large Tussock-grass (volcanic plains form)	*Poa labillardieri*

7. Monitoring and reporting

Monitoring of the translocated plants as well as the conditions at each recipient site would be required to identify key threatening processes, determine whether additional management actions are necessary, track the health, growth and survivorship of the translocated plants, and demonstrate whether performance benchmarks and regulatory requirements were being met.

Monitoring would be performed by a qualified botanist familiar with Matted Flax-lily biology and ecology. As detailed in Section 7.3, monitoring at the recipient site(s) would include the documentation of threatening processes, such as water stress, pest animals and signs of grazing, weed infestation and other site disturbances. In addition, the condition, growth rates, reproduction, and survivorship of the translocated material would be monitored.

7.1 Performance benchmarks

The translocation process does stress salvaged plants, and without active management, most plants would be unlikely to survive. Successful translocation of Matted Flax-lily has occurred within Victoria, with the first two years following re-planting seen as the most critical period for plant establishment. Once planted material has survived for a period of five years, it is considered established at that location and is otherwise part of the broader ecosystem in which it has been planted. However, each salvage and translocation operation needs to be carefully planned, managed, and monitored so that plants successfully become established at the recipient site within the agreed-upon timeframe.

The overall goals of the proposed Matted Flax-lily translocation program are to ensure that genetic diversity of the species is conserved and that the population affected by the project is re-established into suitable habitat and managed for the survival and reproduction of this species. Individual performance criteria have been created to assess the translocation program's progress towards meeting those goals. The following performance criteria are derived from Vallee ***et al.*** (2004) with adaptation to suit the circumstances of the current project and species to be translocated. The criteria are divided according to the phase of the proposed translocation program:

Propagation and nursery management:

1. The required number of transplants were available for the proposed translocation
2. Correct labelling and documentation was maintained throughout the propagation and nursery management period
3. Techniques for successful propagation of Matted Flax-lily developed through past translocation projects in Victoria were tested and/or advanced
4. A genetically representative collection was maintained

Habitat and threat management:

1. Good-quality habitat was restored or maintained within the recipient site
2. Management and maintenance activities were carried out at suitable intervals and to the required standard
3. Threatening processes, including weed invasion, were eliminated or effectively controlled

Translocation criteria (1 to 10 years):

For the translocation of each species:

1. At least 85 percent of transplanted clones survived, including representatives from the range of genetic individuals salvaged
2. The translocated populations displayed similar growth, development and vigour as naturally occurring populations
3. Transplants survived to a reproductive stage (producing flowers and fruit)
4. If plants didn't survive to reproductive stage, then the plants were replaced
5. Regeneration occurred in the translocated individuals (since the recruitment of Matted Flax-lily through seed is thought to be rare, the production of ramets at a rate similar to naturally occurring populations is considered sufficient to meet this criterion)
6. The number of individuals within the population was stable, or had increased by natural (including vegetative) recruitment
7. Adequate levels of genetic diversity were maintained

The number of surviving plants at the end of the 10-year monitoring program that are needed to meet the long-term success criteria would depend on the number of clones propagated and planted out. Condition and success of the clones would continue to be monitored up to 10 years with the aim of achieving 85 per cent survival of clones by the fifth year. If performance targets were met within five years, it is envisaged that a significantly reduced monitoring program could be developed for the remaining five years[4]. Should 85 percent survival not be achieved at the end of five years, contingency planning would be initiated (refer Section 7.2).

7.2 Contingency and adaptive management

A sufficient number of clones would be propagated and retained in the nursery to replace any losses of the translocated plants at the recipient sites to ensure 100 percent genetic survivorship of salvaged material. This is critical to the success of the approach. Based on previous translocation programs, Matted Flax-lily can be successfully propagated in a nursery setting and a large number of clones can often be produced from a single parent plant.

The primary criteria for triggering replanting would be plant mortality at the recipient sites, based on the judgement of the project botanist. Plants in poor health and/or which are not sufficiently growing either in width or number of ramets should first be watered before being considered for replacement.

The health and survivorship of the translocated plants would be monitored according to the protocol described in Section 5.3, and if the translocated population appears to be declining and/or performance benchmarks were not being met, the root cause of the decline would be assessed, and further adaptive management measures developed in consultation with DELWP. If the root cause is determined to be an aspect of the management of the recipient sites (such as insufficient watering or weed control), then modifications to site management would be evaluated and implemented as needed. In addition, if survivorship criteria were not being met, the number of clones in the nursery can be increased by creating further divisions of established nursery stock so that sufficient clones were available to replace losses. If contingency measures were implemented (at the end of the five-year monitoring period), the monitoring period would be extended until the 10- year period. Performance measures and contingency measures are presented in Table 7-1.

[4] This program would place a greater focus on the monitoring and management of threats to maintain the population rather than intensely monitoring population dynamics, recruitment and alike.

Table 7-1 Performance management and contingency planning

Year for completion of Activity	Standard to be achieved	Contingency
Pre-planting	• 100% salvage of pre-clearance plants • Where achievable six clones to be created to replace salvaged plants	• If the six clones cannot initially be established, additional clones to be produced • Two clones maintained in nursery conditions
End of 1st year	• >85% survivorship	• Do nothing and continue to monitor
	• <85% survivorship	• Replant up to 85% survivorship of 4 clones
End of 2nd year	• >85% survivorship	• Do nothing and continue to monitor
	• <85% survivorship	• Replant up to 85% survivorship of 4 clones
End of 3rd year	• >85% survivorship	• Do nothing and continue to monitor
	• <85% survivorship	• Replant up to 85% survivorship of 4 clones
End of 4th year	• >85% survivorship	• Do nothing and continue to monitor
	• <85% survivorship	• Replant up to 85% survivorship of 4 clones
End of 5th year	• Achieved a performance target of at least 85% of clones surviving? • If this is the case the salvage and translocation plan is declared a success.	• No contingency management required • Amend monitoring program years 5-10 • Actively manage sites to 'maintain' population through threat management.
Years 5-10	• If the performance target has not been met at the end of a 5-year period continue with replanting strategy for a further five years.	• Review the existing strategy and explore options to improve success rates • Replant with 'insurance clones' as required to achieve performance target and monitor until performance target achieved

Note: This table will be modified and updated to reflect the starting point at the time of salvage. This will allow % targets to be converted to actual targets.

7.3 Monitoring schedule

Generally, monitoring would need to occur more frequently immediately following replanting to confirm that new transplants were establishing themselves at each site. Monitoring can be undertaken less frequently once the plants become established. Therefore, monitoring would be conducted weekly for the first month after replanting, monthly during the second through fifth month, and then quarterly through the remainder of the two-year period. Monitoring would be conducted on a six-monthly basis up to five years. At the end of the five-year period a review is proposed to tailor the management and monitoring program for the remaining five years.
A reduced monitoring program would be implemented for Years 5 -10. This schedule may be revised, with approval of DoEE and DELWP, depending on establishment rates and achievement of performance benchmarks. A final site assessment would be conducted at the end of the tenth year after the initial translocation event to confirm that performance benchmarks have been met. The reporting schedule for providing the results of the monitoring to DoEE and DELWP is discussed below in Section 7.5.

7.4 Monitoring protocol

Monitoring at the recipient site would be undertaken or overseen by a qualified botanist approved by DELWP. Monitoring would also be undertaken in consultation with land managers (e.g. Council biodiversity officer). Monitoring would include the following components:

1. A population count of all translocated Matted Flax-lilies at the site.
2. An assessment of the growth and condition of the plants for four 25 m^2 quadrats set up in established locations that are easily locatable and repeatable. Quadrat monitoring would be conducted each summer, when the plants are most actively growing. Information to be collected would focus on plant health and cover, but also consider other information such as plant reproduction, weed abundance and diversity, grazing impacts and other issues.
3. Photo point monitoring at established locations showing representative views of the translocated population. Photos would be taken each quarter.
4. A general site assessment and threats analysis for the entire recipient site.

A monitoring form would be completed for each monitoring event to record the results of the monitoring, including:

- Location and population of individual plants
- Plant cover and growth (basal diameter and height of each patch, number of ramets per patch)
- Presence of flowers and/or fruits and height of inflorescence or infructescence
- Evidence of herbivory or pathogens
- Presence and cover of weed species
- Other potential or occurring threats or management issues
- Maintenance or corrective actions completed or recommended

7.5 Reporting

NELP would submit an initial report summarising the results of the salvage and nursery propagation to DoEE and DELWP within three months after salvage. A report would also be provided after the initial translocation and again after the first three months of monitoring. A summary report would be prepared each year for 10 years.

The reports would discuss the survivorship and growth of the plants and include information on conditions at the recipient site and the nursery and an assessment of the status of the translocation program relative to the established performance benchmarks. The report would also discuss occurring or potential threats or management issues and any maintenance or corrective actions taken or proposed. The reports would include rainfall and watering data, the monitoring forms for each monitoring event and the quarterly photos taken from each established photo point.

A final report would be provided after the tenth year and include an analysis of whether the translocation program had achieved the long-term performance benchmarks, or whether further management and monitoring was required, and a summary of lessons learned and recommendations for future translocation programs.

8. References

Bull, M 2014, *Flora of Melbourne: a guide to the indigenous plants of the greater Melbourne Area* (fourth edition*)*, Hyland House Publishing Pty Ltd

Carr, GW & Horsfall, PF 1995, Studies in the Phormiaceae (liliaceae) 1: New Species and combinations in Dianella Lam. Ex. Juss, in Muelleria 8; (3):365-378

Carter, O 2010, National Recovery Plan for the Matted Flax-lily *Dianella amoena*, Department of Sustainability and Environment, Victoria

DELWP 2017, Victorian Department of Environment, Land, Water and Planning, NatureKit viewer sourced at: <http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>

DEPI 2013a, Victorian Department of Environment and Primary Industries, Biodiversity Conservation Strategy for Melbourne's Growth Corridors, Melbourne, May 2013, available at <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/melbourne-strategic-assessment/conservation-strategies#A2.2a>

DEPI 2013b, Victorian Department of Environment and Primary Industries, *Permitted clearing of native vegetation – biodiversity assessment guidelines*, Melbourne, September 2013

DEPI 2013c, Victorian Department of Environment and Primary Industries, *Procedures Statement for Translocation of Threatened Native Flora in Victoria,* Melbourne, June 2013

DoEE 2016. Australian Department of the Environment and Energy, *Dianella amoena* — Matted Flax-lily, <http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64886> (2016)

DoE 2012, Australian Department of the Environment, Offsets Assessment Guide spreadsheet, <http://www.environment.gov.au/epbc/publications/ epbc-act-environmental-offsets-policy>, October 2012

DSEWPaC. 2013. Australian Department of Sustainability, Environment, Water, Population and Communities, *Environment Protection and Biodiversity Conservation Act 1999 Policy Statement: Translocation of Listed Threatened Species – Assessment under Chapter 4 of the EPBC Act,* <https://www.environment.gov.au/resource/epbc-act-policy-statement-translocation-listed-threatened-species-assessment-under-chapter>

DSEWPaC 2012, Department of Sustainability, Environment, Water, Population and Communities Environment Protection and Biodiversity Act 1999 Environmental Offsets Policy, <http://www.environment.gov.au/system/files/resources/ 12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf>, October 2012

Flora of Victoria 2018, < https://vicflora.rbg.vic.gov.au/flora/taxon/f1086f96-0684-4534-b78d-04b26a2925a9> (accessed 10/12/2018)

HLA 2007, *Biodiversity Assessments and Strategies for Simpson Barracks*, prepared by HLA Environsciences

Ralph, M 2003, *Growing Australian Native Plants from Seed,* second edition, Bushland Horticulture. Fitzroy

Tasmanian Department of Primary Industries and Water 2008, *Threatened Flora of Tasmania: Dianella amoena,*<http://www.dpiw.tas.gov.au/inter.nsf/Attachments/LJEM-74ZUT6/$FILE/Dianella%20amoena.pdf>

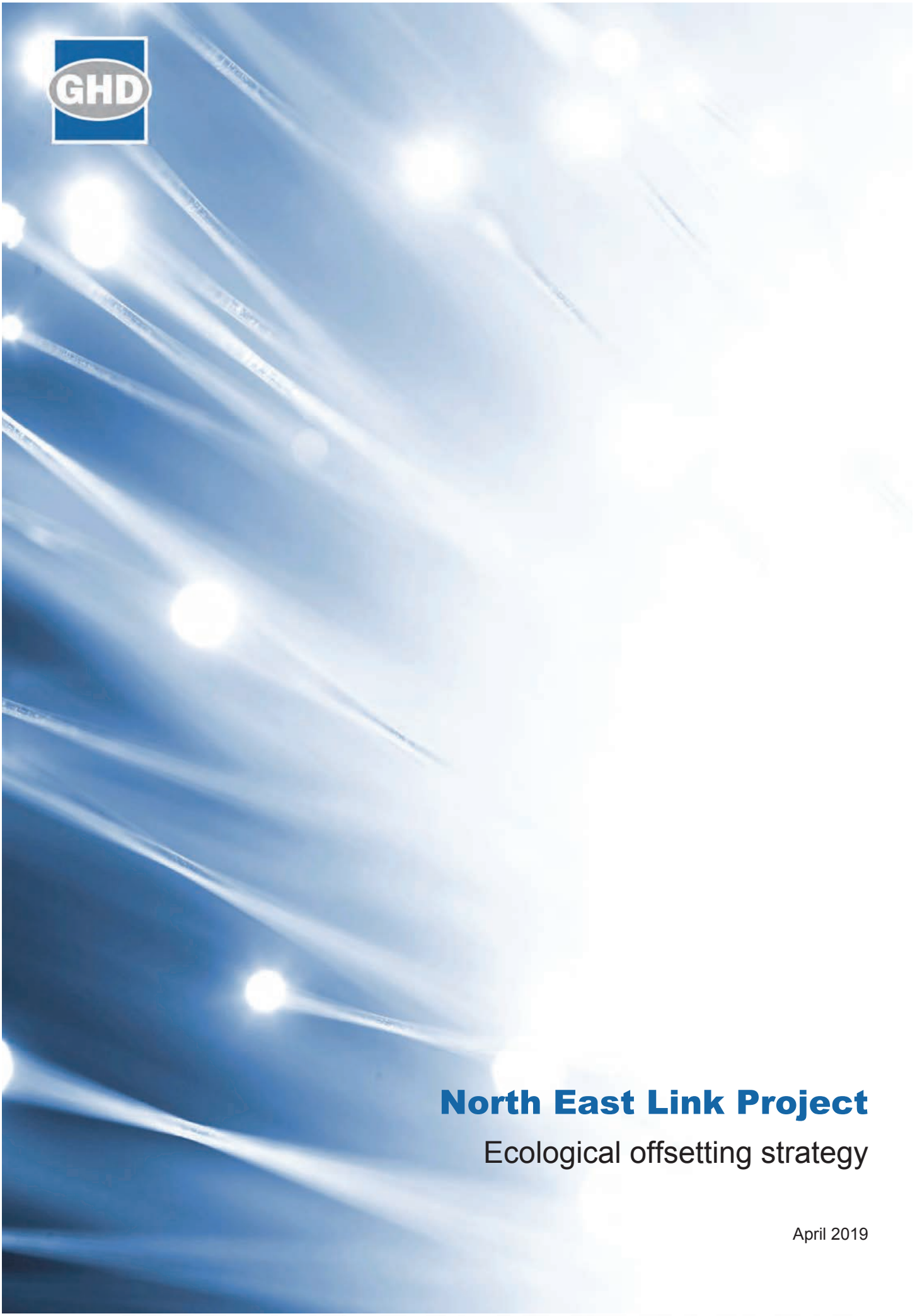
Vallee, L, Hogbin, T, Monks, L, Makinson, B, Matthes, M & Rossetto, M 2004, *Guidelines for the translocation of threatened plants in Australia,* second edition, Australian Network for Plant Conservation, Canberra

GHD

180 Lonsdale Street
Melbourne Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com

www.ghd.com

Appendix L – Ecological offsetting strategy



North East Link Project

Ecological offsetting strategy

April 2019

This publication is prepared to inform the public about the North East Link. This publication may be of assistance to you but the North East Link Project (a division of the Major Transport Infrastructure Authority) and its employees, contractors or consultants (including the issuer of this report) do not guarantee that the publication is without any defect, error or omission of any kind or is appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Table of contents

Table index

Figure index

1. Introduction

1.1 Background

North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway and include works along the Eastern Freeway from near Hoddle Street to Springvale Road.

Assessments of the impacts to biodiversity values in areas that may be impacted by North East Link have been undertaken through ecological impact assessments to inform the development of an Environment Effects Statement (EES) and Public Environment Report (PER). These biodiversity values are recognised by the Australian Government and the Victorian Government in legislation, frameworks and policies designed to facilitate their conservation.

The ecological impact assessments have identified that the project has the potential to impact patches of native vegetation (some containing large old trees) and scattered native trees, which are both protected by Victorian legislation. In addition, *Dianella amoena* (Matted Flax-lily), would also be affected, which is protected by Australian Government and Victorian Government legislation.

Offsets can be required under both Australian Government legislation (ie the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*) administered by the Australian Department of Environment and Energy (DoEE) and Victorian Government legislation (ie the *Planning and Environment Act 1987)* administered by the Victorian Department of Environment, Land, Water and Planning (DELWP) as well as local governments.

This document presents the proposed strategy for identifying offsetting requirements for North East Link and how the requirements would be achieved. This document is continuing to be developed in consultation with relevant stakeholders.

1.2 Purpose of this strategy

This document sets out the offsetting strategy for North East Link. This strategy aims to:

- Detail the offsets required by Australian Government legislation and how these offsets would be achieved, if necessary
- Detail offsets required by Victorian Government legislation and how these offsets would be achieved, including demonstrating how the 'no net loss' objective of the *Guidelines for the removal, destruction or lopping of natural vegetation* 'the Guidelines' (DELWP, 2017) would be achieved for native vegetation affected by North East Link by:
  - Describing the general habitat units and species habitat units required for the native vegetation removed or assumed lost for the North East Link reference project.
  - Outlining the options for achieving the general species habitat units (GHUs) and species habitat units (SHUs) requirements for North East Link and how these would be secured to make a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation being removed or assumed lost.

2. Achieving offsets

2.1 Commonwealth offsets

Offsets may be required under the Australian Government's EPBC Act to compensate for any residual impacts to Matters of National Environmental Significant (MNES) once avoidance and mitigation measures have been considered (DSEWPaC, 2012). Where residual impacts are considered to be significant, an offset may be required.

An offset must deliver an overall conservation outcome that improves or maintains the viability of the MNES and should be tailored specifically to the attribute of the MNES that is to be affected. An offsets package is defined in the EPBC Offsets Policy (DSEWPaC, 2012) as a suite of actions that a proponent undertakes in order to compensate for the residual significant impact of a project. An offsets package can comprise a combination of direct offsets and other compensatory measures.

Direct offsets are actions that deliver a measurable conservation gain for an impacted protected matter. Conservation gains may be achieved by:

- Improving existing habitat for the protected matter
- Creating new habitat for the protected matter
- Reducing threats to the protected matter
- Increasing values of a heritage place
- Averting the loss of a protected matter or its habitat that are under threat.

Other compensatory measures are actions that do not directly offset the impacts on the protected matter but are anticipated to lead to benefits for the impacted protected matter.

Under the EPBC Offsets Policy, a minimum of 90 per cent of the offset requirements for any given impact must be met through direct offsets.

The EPBC Offsets Policy is guided by overarching principles to be applied when determining the suitability of and assessment of offsets. Suitable offsets must:

1. Deliver an overall conservation outcome that improves or maintains the viability of the protected matter
2. Be built around direct offsets but may include other compensatory measures
3. Be in proportion to the level of statutory protection that applies to the protected matter
4. Be of a size and scale proportionate to the residual impacts on the protected matter
5. Effectively account for and manage the risks of the offset failing
6. Be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable
8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

In assessing the suitability of an offset, government decision-making will be:

1. Informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty
2. Conducted in a consistent and transparent manner.

2.2 State offsets

2.2.1 Three-step approach to 'no net loss'

Native vegetation provides habitat for plants and animals and delivers a range of ecosystem services that make land more productive and contribute to human wellbeing. In Victoria, a permit is required to remove, destroy or lop native vegetation. As part of this permit, vegetation is required to be assessed and offset according to the *Guidelines for the removal, destruction or lopping of natural vegetation* 'the guidelines' (DELWP, 2017). One of the objectives of the guidelines is to achieve 'no net loss' of native vegetation and biodiversity. Offsetting is a mechanism for achieving 'no net loss' by compensating for lost vegetation by protecting existing native vegetation or planting native vegetation.

The Guidelines outline a three-step approach to achieve 'no net loss' to prioritise avoiding and minimising vegetation removal before offsetting. During detailed design of North East Link, areas of native vegetation would be avoided where possible by refining the area required for design and construction to minimise the overall vegetation removal. Where it could not be avoided, offsets would be required.

2.2.2 Approach to delivering offsets

DELWP identifies two pathways to securing an offset. These include:

- **First party offsets** – permit holders can offset to the same site as the site being cleared, which is referred to as a first-party offset.
- **Third party offsets** – where a landholder who has a suitable offset on their property which they are willing to protect, manage and trade their offset credits with a permit holder, which is referred to as a third-party offset.

Offset brokers can assist permit holders to find a third-party offset, as well as assist landholders wanting to generate revenue from protecting environmental values on their property by matching them with a suitable permit holder.

2.2.3 Security arrangements

Offset sites must be secured to ensure the ongoing protection of the vegetation offset area. In Victoria, an agreement under one of the following Acts can be established to secure an offset:

- Section 173 of the *Planning and Environment Act 1987* – An agreement under the Planning and Environment Act 1987 would need to be established with the relevant responsible Authority
- Section 3A of the *Victorian Conservation Trust Act 1972* – a security agreement under this Act can be arranged through Trust for Nature (TFN).
- Section 69 of the *Conservation, Forests and Lands Act 1987* – DELWP is responsible for security agreements under this Act.

Offset sites are usually actively managed on an annual basis to control threats to the biodiversity values they support. Management can include activities such as removing high-threat weeds and controlling pest animals. Under Victoria's offset policy, offsets are to be managed for a 10-year period in accordance with an approved Vegetation Management Plan. After this time, landowners are not expected to continue active management, but are required to maintain biodiversity values to their condition reached at the end of the 10-year period.

2.2.4 Offset site eligibility

Sites must comply with several criteria to be eligible as an offset. These criteria must be applied before gain is calculated. Offset site eligibility requires consideration of:

- Current and future land use at the offset site
- Existing offsets or agreements encumbering the offset site
- Threats to native vegetation condition
- Minimum security and management commitments.

3. Proposed vegetation removal

3.1 Commonwealth matters

As part of the North East Link EES, an ecological impact assessment was undertaken to identify MNES with the potential to be impacted by the project. The project is expected to potentially impact approximately 95 plants/patches of Matted Flax-lily that are currently spread across three sites, including within Simpson Barracks, along the Greensborough rail line and close to the M80 Ring Road and Greensborough Bypass interchange.

These patches of Matted Flax-lily would be translocated in accordance with the project's Salvage and Translocation Plan. The process would involve plant subdivision (cloning) of those plants requiring removal and managing them in a nursery before translocating them to suitable recipient sites that would support the success of the species.

At present it is unclear if offsetting would be required in addition to the salvage and translocation of the affected plants. This would be determined in consultation with the Australian Government's Department of Environment and Energy (DoEE) as part of the Public Environment Report (PER) assessment process. Further information on the project's approach to Australian Government-required offsets is provided in Section 4.1.

3.2 State matters

The ecological impact assessment also identified native vegetation and State-protected species with the potential to be impacted by the project. This assessment included extensive surveys of vegetation located within and around the project boundary (the boundary the construction activities and final project infrastructure would be located within).

To allow for flexibility and innovative design solutions to be developed during the detailed design phase, all native vegetation located within the project boundary has been conservatively assumed to be removed. The native vegetation assumed to be removed is mapped in Figure 10 of Technical report Q – Ecology, and summarised in Table 1. This loss is determined under the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP, 2017a). These losses include trees that are just outside of the project boundary, but have at least 10 per cent of the tree protection zone within the project boundary. It does not include vegetation losses not considered under the guidelines (eg exempt planted vegetation, non-native vegetation).

Table 1 Summary of total native vegetation loss within the project boundary

Native vegetation type	Total native vegetation loss
Patches of native vegetation	52.109 hectares
Large trees within patches	92 large trees
Scattered trees	115 small trees and 55 large trees
Large scattered trees that have a moderate to high likelihood of suffering premature mortality or decline in condition, owing to groundwater drawdown associated with construction of the northern tunnel portal	32

4. Offset requirements

4.1 Commonwealth offsets

Based on the species and communities being affected by North East Link, the only potential offset requirements relate to any residual impacts to Matted Flax-lily. The specific offset requirements for Matted Flax-lily are not prescribed in policy and are being discussed with DoEE. However, as part of the PER, the whole of environment must be considered.

There would be direct and indirect losses of vegetation within Simpson Barracks that is mapped as Ecological Vegetation Class (EVC) 55: Plains Grassy Woodland. The North East Link Project (NELP) is committed to offsetting the loss of all native vegetation, including vegetation which occurs on Commonwealth land. Given this, the vegetation loss documented in Table 1 of Section 3.2 and the offsetting process documented in Section 4.2 below has been developed to appropriately account for the loss of vegetation on Commonwealth land.

4.2 State offsets

The expected vegetation removal described in Section 3 was analysed through DELWP's EnSym Native Vegetation Regulations (NVR) tool to determine the offset requirements for the project[1]. The NVR tool assesses whether the removal of vegetation (including trees) has the potential to affect significant habitat of threatened species, and uses mapped habitat to identify offset requirements to compensate for vegetation loss due to the project. The results of the analysis were provided in a *Native vegetation removal report* and are summarised below.

It should be noted the proposed loss of vegetation in Table 1 is a conservative assessment, based on assuming 100 per cent vegetation loss within the project boundary. The proposed loss presented in this table is lower than that provided in the *Native vegetation removal report* because it does not include the area assigned to scattered trees.

There is opportunity to reduce the amount of vegetation removed during the detailed design of North East Link. In addition, Environmental Performance Requirement (EPR FF2) require the loss of native vegetation be minimised.

The available approaches to achieve State offset requirements are outlined in Section 2.

4.2.1 General habitat units

The *Native vegetation removal report* received from DELWP on 8 February 2019 indicated the following requirements for general habitat:

- General offset amount: 8.025 general habitat units
- Offset attributes:
  - Large trees: 103 large trees
  - Vicinity: Port Philip and Westernport Catchment Management Authority (CMA) or the municipalities of Banyule, Boroondara, Manningham, Nillumbik and Whitehorse
  - Minimum strategic biodiversity value score: 0.155.

It should be noted that these results are not final and may change.

[1] Including all native vegetation irrespective of land tenure.

4.2.2 Species habitat units

The *Native vegetation removal report* indicated the following requirements for species specific habitat:

- Species offset amount:
  - 22.945 species units of habitat for Grey-headed Flying-fox
  - 24.980 species units of habitat for Australian Grayling
  - 9.490 species units of habitat for Yarra Pygmy Perch
  - 17.269 species units of habitat for Small Golden Moths
  - 18.821 species units of habitat for Melbourne Yellow-gum
- Large trees: 76 trees.

It should be noted that these results are not final and may change.

4.2.3 Offset availability

NELP initially consulted with DELWP during July 2018 to explore offset requirements and availability. General units are available for purchase on Victoria's Native Vegetation Credit Register (NVCR). NELP is currently consulting with DELWP and accredited offset brokers regarding offset requirements and the availability of offsets

4.2.4 Sourcing offset sites

If species offsets are not fully available via the offset market and accredited brokers, NELP proposes to identify sites that have not been previously assessed and/or registered for offsets through ongoing discussions with DELWP and accredited offset brokers. A preliminary list of potential candidate sites will be established through this process. Potential sites would be screened to determine their suitability for further assessment, this will include assessment of:

- Site area
- Distance from original site
- Connectivity to other patches of vegetation
- Existing planning zone(s) in place on the site
- Ease of acquisition of offset
- Value for money (based on estimated cost)
- Quality and composition of vegetation (if known).

The sites would then be ranked according to the results of this initial assessment and prioritised for further assessment. While the ranking process would prioritise sites that meet general and species offset requirements, consideration would also be given to areas of potential rehabilitation that can also provide for future gains and assist in long-tern ecological conservation.

NELP would seek in-principle support from DELWP of the short-listed candidate sites before proceeding with additional field investigations (if required) and undertaking final offset calculations. For a candidate site that is confirmed to meet the requirements of a first party offset, potential security and governance arrangements would be reviewed and a draft management plan prepared.

The details of one of more candidate sites would be submitted to DELWP with recommendations for the approved site. Following DELWP approval, the Offset Management Plan for the approved site(s) would be finalised and implemented.

4.2.5 Alternative offset requirements

DELWP recognises there are times when achieving offsets is either very difficult or near impossible as offsets are not available. As such, guidance is provided when 'alternative arrangements' may be necessary. The following section summarises the guidance provided in the *Assessors Handbook: Applications to remove, destroy or lop native vegetation* (DELWP, 2017b).

General offsets

The strategic biodiversity value score attribute for general offsets can be reduced by a maximum of 10 per cent (that is, to no less than 70 per cent of the strategic biodiversity value score of the native vegetation to be removed) if the offset secured includes protection of any (or all) of the following:

- 10 per cent more general habitat units than are required
- At least two large trees for every large tree to be removed.

Species offsets

If a suitable species offsets cannot be identified an applicant may:

- Consider further steps to avoid or minimise impacts to reduce offset requirements
- Consider activities or alternative management actions that will generate additional gain for the species at an offset site
- Contact landowners or land managers of sites that may be able to be used to generate species habitat units that meet the offset requirements.

If the above actions do not address the inability to secure a species offset, the applicant can propose an alternative offset for the species habitat. The alternative offset must generate direct habitat improvements for the species that provide equivalent compensation for the removal of its habitat.

Alternative arrangements for species offsets are considered for approval on a case-by-case basis by DELWP and must be to the satisfaction of the Secretary of DELWP. It should be noted that if offsets are available, the cost of the offset is not a valid reason for proposing alternative offset arrangements.

4.2.6 Offset reconciliation

Some projects, particularly large ones, identify all native vegetation that may potentially be removed when the project is delivered. Offset requirements included in approval conditions are calculated for this 'worst case' scenario. During North East Link's construction, the actual amount of native vegetation removed would likely be less than originally approved and offset, due to the constructor being able to minimise vegetation loss.

Under these circumstances DELWP provides for the opportunity to reconcile offset requirements to ensure incentives remain for on-site minimisation efforts after approval is granted and offsets are secured (DELWP, 2017b).

Offsets can be reconciled at the end of a project so that any excess credits can be unallocated and banked or sold on. An accredited native vegetation assessor must provide suitable evidence to DELWP and the responsible authority showing the difference in approved and actual native vegetation removal (DELWP, 2017b). NELP anticipates undertaking such an assessment at the end of construction of North East Link.

Under these circumstances, the following requirements apply (DELWP, 2017b):

- The project has been approved and native vegetation credits have been allocated to it
- The extent of native vegetation removed during construction is reduced, and it is decided there are benefits of reconciling the offset requirements
- The accredited native vegetation assessor confirms the actual extent of native vegetation that was removed and maps this in a GIS shapefile (meeting DELWP data requirements)
- The applicant compares the approved NVR report with the NVR report for the actual removal and confirms whether they want to proceed with the reconciliation
- The applicant approaches the approval authority and requests an amendment to the offset conditions included in the original approval, and the new offset requirements are included in the new NVR report
- If agreed, responsible authority amends the offset condition and/or issues a new approval
- The applicant provides evidence of new offset condition to DELWP's Native Vegetation Credit Register requesting excess credits be unallocated
- Native Vegetation Credit Register un-allocates excess credits from the project and registers them as available credits owned by the applicant
- The applicant has available credits registered to their name which can be allocated to a future project or sold on the credit market.

5. Proposed approach to offsetting

Given the significant scale of the project and its reference design stage, there is a level of uncertainty associated with the amount of native vegetation that would need to be removed with the project, and the most appropriate pathway to secure any required offsets.

Despite this uncertainty, it is possible to outline the proposed options available to NELP to identify and secure offsets. NELP has developed a flowchart that documents the available options. This flowchart is presented in Figure 1.

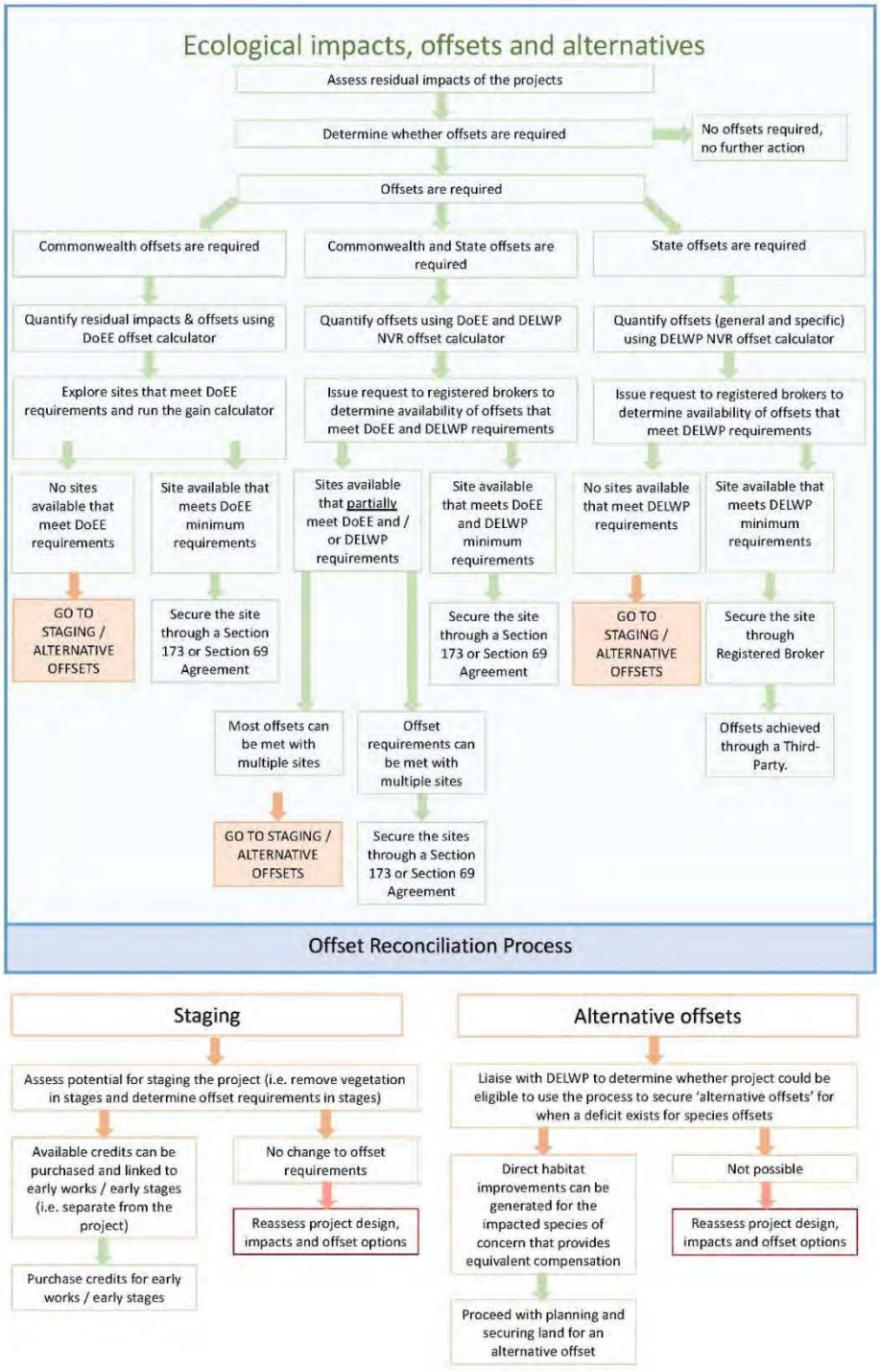


Figure 1 Pathway to securing project offsets

5.1 Indicative timing for offsetting

The anticipated timeframe for delivery of the offset strategy is shown in Table 2.

Table 2 Timeframe for delivery

Date	Activity
Early 2019	Identification of the final offset requirements and availability of offsets on the open market (third-party offsets)
Early 2019	Determine any residual impacts to MNES and calculate offsets (if required)
2019-2020	Where first party offsets (Vic) or direct offsets (C'wlth) are sought, an analysis of potential sites will be required. This shall explore potential habitat for MNES, general offsets and species offsets.
2019-2020	Site assessments of potential offset site(s) as required.
2019-2020	Assess potential sites against offset requirements and for compliance with DoEE policy (if required)
2019-2020	Prepare recommendations for the Candidate Site(s) or agreed approach
2019-2020	Reporting to DELWP and DoEE and seek approval of the Candidate Site(s) or agreed approach
2019-2020	Negotiation with land owner of candidate Site or approved credit provider
Following construction completion	Offset reconciliation and formal reporting to DoEE and DELWP
Following construction completion	On-selling of any excess offsets.

6. References

DELWP 2017a, *Guidelines for the removal, destruction or lopping of native vegetation*, Department of Environment, Land, Water and Planning, Victorian Government.

DELPW 2017b, *Assessors handbook: Applications to remove, destroy or lop native vegetation*, Department of Environment, Land, Water and Planning, Victorian Government.

DSEWPaC 2012, *Environment Protection and Biodiversity Act 1999 Environmental Offsets Policy*, Department of Sustainability, Environment, Water, People and Communities, Australian Government, Canberra.

GHD

180 Lonsdale Street
Melbourne Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com

www.ghd.com

Appendix M – Peer review report

NORTH EAST LINK

PEER REVIEW OF ECOLOGY TECHNICAL REPORT

Prepared for North East Link Project (NELP)
c/- Clayton Utz

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management
Suite 5, 61–63 Camberwell Road, Hawthorn VIC 3123
P.O. Box 337, Camberwell VIC 3124
Ph. (03) 9815 2111
Fax. (03) 9815 2685

March 2019

Report No. 18140 (5.5)

CONTENTS

1. INTRODUCTION

I have been engaged on behalf of the North East Link Project (NELP) to provide an independent peer review of the Ecology Technical Report prepared by GHD for the North East Link Project (**Project**) Environment Effects Statement (**Technical Report**).

The purpose of this review is to assist in ensuring that the Technical Report is prepared to a satisfactory standard, and that there is appropriate consideration of key issues relevant to Ecology in the EES. The peer review considered whether the Technical Report adequately addresses the relevant requirements of the EES Scoping Requirements and the "public works" declaration made by the Minister for Planning in respect of the Project, and is suitable to represent the ecological impacts of the Project. Arboricultural aspects of the project's impacts have not been reviewed.

In carrying out this peer review, I have:

- assessed the process, methodology and assessment undertaken in preparation of the Technical Report, including assessment criteria applied and assumptions relied upon;
- identified any additional matters which should be considered in order to address the EES Scoping Requirements, 'public works' Order or to otherwise adequately assess the likely impacts of the Project; and
- assessed the adequacy of proposed Environmental Performance Requirements to manage potential adverse impacts arising from the Project relevant to ecology.

My qualifications and experience to undertake this peer review are set out on Attachment 1. In undertaking this review, I have been assisted by the following persons:

- Justin Sullivan (Senior Ecologist) – botany, native vegetation regulations, EPBC Act, FFG Act, and
- Curtis Doughty (Senior Zoologist) – zoology, fauna habitats, EPBC Act, FFG Act.

Details of their qualifications and experience are provided in Attachment 2.

2. METHOD AND APPROACH

In undertaking this peer review I have reviewed various drafts of the Technical Report as it was being developed and provided comments on issues to be addressed or areas requiring amplification or clarification. This included a review of the initial scope and methodology for the preparation of the Technical Report, and review of the existing conditions, impact assessment sections and environmental performance requirements in the Technical Report.

Site inspections were also undertaken at the commencement of the review of the first full draft Technical Report provided by NELP.

The first was a group site visit of the project footprint lead by the ecological consultant team from GHD on 21st September 2018. Persons present during the group site visit included the ecological consultant team from GHD and senior ecologists, Justin Sullivan and Curtis Doughty, and Director and Principal Consultant, Brett Lane, from BL&A.

The purpose of this group site visit was to appreciate the key areas of biodiversity affected by the project and gain an understanding of the assessment approach undertaken by the project's consultants. Areas of the project visited during the group site visit included:

- Commonwealth land area south of Simpson Barracks
- Banyule Flats
- Bolin Bolin Billabong
- Koonung Creek and other key locations along the Eastern Freeway
- Yarra Bend (Eastern Freeway river crossing)

This visit also provided an opportunity to speak with the ecology consultants and ask questions that had arisen from the review of the draft Technical Report. This visit confirmed the need for a more detailed site inspection to be undertaken by BL&A.

A detailed inspection was then undertaken by BL&A throughout all relevant and accessible sections of the project boundary. The main focus for this inspection was to review the approach to the mapping and classification of native vegetation within the project boundary (including patches of native vegetation and scattered trees) as well as its suitability of threatened flora species, and to review in the field the assessed fauna habitats and their suitability for threatened fauna species.

The site inspection was conducted over three days on the 2nd – 4th October 2018. During this time, two senior staff from BL&A, Justin Sullivan (Senior Ecologist) and Curtis Doughty (Senior Zoologist) (see Attachment 2) visited all key areas of native vegetation mapped within the project boundary subject to surface impacts. I visited most of these sites in the initial site inspection on 21 September 2018. The City of Whittlesea's offset site (south of Enterprise Drive in Bundoora), was also visited despite being defined as a No-go Zone for the project. Areas of the project boundary visited as part of this site inspection included:

- City of Whittlesea's offset site (south of Enterprise Drive in Bundoora)
- Greensborough Bypass/M80 Interchange
- Simpson Barracks
- Key locations along Greensborough Road, including:
    - AK Lines Reserve

  - Watsonia Train Station
  - Winsor Reserve
  - Land south of the Simpson Barracks
- Banksia Park and Yarra Valley Parklands
- Yarra Flats
- Trees along Bulleen Road
- Trinity College wetlands
- Sports field south of the Veneto Club
- Booroondoora Tennis Centre
- Key locations along the Eastern Freeway, including:
  - Musca Street Reserve
  - Willsmere Park
  - Chandler Highway and Princess Street interchange
  - Maugie Street and Trennerry Crescent
  - Yarra Bend
  - Koonung Creek (accessed largely from the Koonung Creek trail)

During the site inspection, the native vegetation assessments in the above areas documented in the draft Technical Report were reviewed, with particular consideration given to the following:

- Accuracy of the mapped extent of patches of native vegetation;
- Classification of Ecological Vegetation Classes (EVC's);
- Accuracy of identification of scattered trees and large trees in patches;
- The approach and interpretation of the planted vegetation exemption contained in the table to Clause 52.17-7;
- Suitability for and presence of threatened flora species; and
- Suitability for and presence of threatened fauna species.

3. PEER REVIEW

This peer review is provided under the following headings:

- Assessment methods;
- Existing conditions;
- Impact Assessment;
- Environmental performance requirements;
- Addressing the Public Works Declaration;
- Addressing the EES Scoping Requirements; and
- Recommendations.

3.1. Assessment methods

An initial review of the methods for the ecological impact assessment was undertaken before the most recent spring survey had been completed.

This review involved the following steps:

- A review of the desktop review process including the sources of existing information used and the evaluation of the likelihood of occurrence of species of concern.
- A review of the field methods in the ecological assessment for their effectiveness (with reference to existing survey guidelines, such as EPBC Act Policy Statements, referred to as required, and the Precinct Structure Planning Biodiversity Kit methods [DSE 2010]) and species coverage; and
- Identification of gaps, if any, in species coverage and the adequacy of the survey methods.

These are discussed in more detail below.

3.1.1. Desktop review

The range of desktop sources used by GHD for the assessment is considered comprehensive and complete. Appendices B (Table 48 - threatened flora), C (Table 49 - threatened fauna) and D (Table 50 - migratory species) short-list species for further consideration. I concur with the conclusions drawn in relation to the likelihood of occurrence of threatened species.

I previously identified the Australian Painted Snipe as deserving more consideration as it has been recorded in the region and may occur in future, albeit infrequently. The final Technical Report gives appropriate consideration to this species.

It is noted that the likelihood of occurrence conclusions for the Brown and Southern Toadlets were based ultimately on field studies undertaken during the autumn calling season for these species, indicating that their potential occurrence was considered in planning the field surveys.

In conclusion, the desktop review that enabled identification of target species and communities for field work provided a sound basis for scoping field surveys.

3.1.2. Field surveys

Field surveys involved work on site to document the following ecological aspects of the project area:

- Flora and vegetation;
- Targeted flora and vegetation surveys;
- Fauna
- Targeted fauna surveys
- Aquatic ecological surveys
- Targeted fish surveys
- Wetlands
- Groundwater Dependent Ecosystems

Initially identified issues are discussed below, together with how they have been resolved in the Technical Report. Additional commentary is provided on the fact that targeted surveys for DELWP advisory-listed species were not undertaken.

Mapping of native vegetation

Methods used for mapping native vegetation followed the appropriate guidelines for Cl. 52.17 applications (DELWP 2017 *Guidelines for the removal, destruction or lopping of native vegetation*, DELWP, Melbourne), with the four key categories of native vegetation being assessed namely: patch vegetation, large trees in patches, scattered trees and DELWP-mapped state wetland layer.

Scattered trees and planted vegetation

During the field-based review (2nd – 4th October 2018), it became apparent that the approach adopted to classifying and mapping planted vegetation did not consistently or correctly reflect the guidance in the exemption contained in the table to Clause 52.17-7.

The effect of this exemption is that vegetation, including indigenous species, planted for amenity/road screening is exempt from the need for a planning permit under Clause 52.17 and is therefore not required to be offset in accordance with the Guidelines. Whereas native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity, is not exempt from this permit requirement unless the removal, destruction or lopping is in accordance with written permission of the agency (or its successor) that provided the funding.

Native vegetation is likely to serve a land protection purpose or enhance biodiversity if it fits the local vegetation type (EVC), provides a mix of layers (i.e. trees, shrubs and graminoids) and is done with a clear conservation/biodiversity enhancement and/or land protection objective. In such cases, the exemption would not apply and the vegetation would be considered native vegetation and a permit and offset obtained for its removal, destruction or lopping.

In an early version of the Technical Report, there were many areas throughout the project boundary where amenity plantings had been designated as scattered trees (i.e. as one class of native vegetation requiring a permit for removal). This was identified as the leading issue in the Technical Report in documenting existing conditions.

A short report was prepared and provided to NELP dated 15th November 2018, to clearly outline the issue (see Attachment 3). This resulted in the project consultants setting out a clear and accurately detailed approach to dealing with planted vegetation, and

undertaking a revised scattered tree assessment which was consistently applied throughout the project. An accurate scattered tree assessment is now provided in the Technical Report.

Information on the native vegetation assessment presented in the Technical Report, including details of habitat hectare assessment results (Table 27), Large Trees in patches (Appendix H) and Scattered Trees (Appendix I) are accurate and well presented.

The results of the native vegetation assessment are also presented in an extensive and detailed map set (Figures 11-1 to 11-25) in the Technical Report. Feedback provided in response to the first version of this map set included:

- Updates to the native vegetation assessment to reflect the correct approach to planted vegetation
- The addition of labels for roads, key parks/reserves and No-Go Zones
- Trimming native vegetation mapping to the project boundary

The native vegetation map set provided in the Technical Report provides an accurate and clear representation of the extent of native vegetation (as defined in the Guidelines) within the project boundary.

Targeted threatened species and community surveys

The assessment of threatened species undertaken for the project has utilised information obtained from all relevant sources. The analysis of the likelihood of occurrence of threatened flora and fauna species has been undertaken appropriately and is tabulated in detail in Appendix B (Table 48) and Appendix C (Table 49) of the Technical Report. The assessment of threatened species has considered all flora and fauna listed under any of the following:

- The Commonwealth *Environment Protection and Biodiversity Conservation* Act *1999* (EPBC Act);
- Victoria's *Flora and Fauna Guarantee Act* 1988 (FFG Act);
- DELWPs Advisory List of rare and threatened plants in Victoria;
- DELWPs Advisory List of Threatened Vertebrate Fauna; and
- DELWPs Advisory List of Threatened Invertebrate Fauna in Victoria.

The analysis was used to determine which species have a moderate to high likelihood of occurrence. These species were shortlisted on the basis of this analysis and potential impacts from the project have been discussed. This analysis is a standard approach to short-listing threatened species for further consideration and is based on a combination of the dates and number of records in a wider search region around the project area and whether habitat known to be preferred by the species is present in the affected area. This aspect of the report is comprehensive and accurate.

Targeted surveys were undertaken for threatened flora and fauna assessed as having a moderate to high likelihood of occurrence in the project boundary, with the exception of:

- Flora listed on the DELWP Advisory lists as rare (these species have no legislative driver for undertaking a targeted survey);

- Fauna species that are known to utilise parts of the project area and for which the results of the targeted survey would not alter the conclusion on the potential impacts to the species (ie Grey-headed Flying-Fox and Swift Parrot); and
- Cryptic fauna species including Australian Painted Snipe, Australasian Bittern and Latham's Snipe (these species were restricted to habitat assessments).

We reviewed the methods against the following guidelines:

- EPBC Act threatened species survey guidelines – published by the then Commonwealth Department of the Environment Water Heritage and the Arts in April 2010 (DSEWPAC 2011);
- The Victorian Biodiversity Precinct Structure Planning Kit, prepared by the then state Department of Sustainability and Environment in 2010 (DSE 2010); and
- Relevant species-specific survey guidelines - the Commonwealth's Growling Grass Frog EPBC Act Policy Statement (DEWHA, 2008).

Targeted surveys undertaken followed appropriate methods as per the relevant Commonwealth and state guidance.

Flora surveys

The field surveys methods (based on DSE 2010), effort and timing were considered appropriate for the Matted Flax-lily and Clover Glycine (2-3 days prior to and during the flowering season of both species in three localities involving two botanists). The difficulties in determining the number of Matted Flax-lily plants are well known and the survey method adopted was considered appropriate.

Surveys for other threatened flora species were undertaken incidentally as part of the native vegetation surveys (i.e. habitat hectare assessments). As these visited all areas of native vegetation and involved an inventory of ground cover and understorey species, it is likely that significant populations of these species would have been detected were they present. As part of this peer review, it was recommended that the following additional surveys be undertaken:

- Silurian Striped Greenhood (May – August);
- Green-striped Greenhood (July – September);
- River Swamp Wallaby-grass (Trinity Grammar, Warringal Parklands and Banyule Flats, December 2018 – as recommended by GHD);
- Short Water-starwort (Trinity Grammar, December 2018 – as recommended by GHD);

These were undertaken in subsequent months (i.e. seasonally appropriate timing) and this is now documented in the Technical Report.

As part of the targeted surveys undertaken for threatened flora, Matted Flax-lilies were recorded in the project boundary, including a sizeable population in the Simpson Barracks. The Matted Flax-lily population mapped in the project boundary was reviewed during the peer review field assessment. The identity and extent of the Matted Flax-lily population was found to be accurate, however an additional three Matted Flax-lily plants were recorded in the area north of Blamey Road. This data was provided to NELP and these additional plants have since been included in the relevant report text and mapping provided in the Technical Report (see Figure 9).

The combination of review of existing information, assessment of likelihood of occurrence, habitat assessment in the project area and targeted field surveys in accordance with accepted survey standards means that the Technical Report has assembled all available information and appropriately evaluated it for the presence of these species and has come to defendable conclusions about the status of each in and near the project area.

Fauna surveys

Targeted fauna surveys focussed on three frog species, two nocturnal bird species and one reptile species:

- Brown Toadlet;
- Southern Toadlet;
- Growling Grass Frog;
- Powerful Owl
- Barking Owl and
- Glossy Grass Skink.

Frog surveys involved two nights of survey using methods consistent with DSE (2010), which are in turn partly underpinned by DEWHA (2008). A minimum of two nights of survey was conducted at each site. Owl surveys were undertaken using widely accepted practices, including visiting each site for at least two nights. The Glossy Grass Skink was surveyed at three locations during daylight in late spring. Two additional locations considered to have potential for the species were not initially visited as permission could not be obtained. The importance of surveying these areas was emphasised in my review. In subsequent months, sites were accessed and surveys were undertaken. Sites where only one survey was undertaken were found not to be suitable so no second survey was required, a conclusion with which we concur. The final survey effort and the results (negative) are fully documented in the Technical Report.

Aquatic ecological surveys

Aquatic ecological surveys involved:

- Rapid Bioassessment (EPA 2003) of selected locations along the Plenty River, Banyule Creek, Merri Creek and Koonung Creek to determine the current response of the aquatic ecosystem to water quality issues;
- Instream vegetation assessment along the Koonung Creek to ascertain aquatic ecological function;
- An assessment of the extent of inundation of Banyule Creek during a period of low flow to ascertain the extent of its dependence on groundwater inflows; and
- An assessment of Bolin Bolin and Banyule Swamp for their condition using the EPA's (2010) Victorian lakes environmental condition assessment method.

These methods are considered appropriate to ascertain the current condition and level of degradation of aquatic ecosystems potentially affected by the project as a basis for determining the likely trajectory in ecological condition with the advent of the project. They rely on standardised methods that are accepted by regulators in Victoria.

Targeted Fish Surveys

Fish surveys targeted four species: Australian Grayling, Macquarie Perch, Australian Mudfish and Dwarf Galaxias. These surveys also provided information on non-target fish species useful in assessing the quality of aquatic ecosystems.

Methods used for the first three species at each site involved one night of work with two Fyke nets, dip netting and backpack electrofishing for between 600 and 1,000 pulse seconds along 100 to 200 metres of waterway. One site on the Plenty River and eight sites on the Koonung Creek were surveyed in this manner. Dwarf Galaxias were surveyed at one potential site, the Simpson Barracks (It is noted that this fish species occurs in the Yarra catchment as introduced populations, one of which may persist at this site).

The survey methods for Australian Grayling are consistent with the survey guidelines described in DSEWPAC (2011). These same guidelines provide no advice on surveying for the Australian Mudfish but given its cryptic nature, electrofishing is likely to be effective in detecting it.

Fyke nets are considered effective at detecting Macquarie Perch juveniles, thereby confirming a breeding population (DSEWPAC 2011).

The survey methods for Dwarf Galaxias are partly consistent with the EPBC Act survey guidelines, (DSEWPAC 2011). These guidelines recommend the use of light-baited collapsible traps, a technique that was not used in the current survey. The practical reasons this particular method was not used (i.e. site-specific constraints) have been described in the report and are acceptable.

Based on the foregoing review, the methods used for detecting the targeted threatened fish species are considered appropriate.

Wetlands and groundwater-dependent ecosystems

The sources of information on the location and extent of wetlands utilised in the Technical Report were considered reliable and accurate. Although boundary mapping on the DELWP wetland layer has been imprecise in the past, ground truthing was undertaken and the extent of wetlands was checked during the field assessment and the DELWP wetland layer was found to be accurate in this area.

Information sources relied upon to identify groundwater dependent ecosystems were:

- The Bureau of Meteorology's (BOM) National Atlas of Groundwater Dependent Ecosystems (BOM 2018a); and
- BOM and Port Phillip and Westernport Catchment Management Authority (2018)

The Technical Report discuss more refined ways of detecting groundwater dependent ecosystems based on Landsat satellite imagery but reject these due to the urban context altering watering regimes at sites, leading to possible erroneous designations. I concur with this conclusion and consider the adopted approach to documenting groundwater dependent ecosystems valid.

DELWP Advisory-listed rare and threatened species

These advisory lists are periodically updated by DELWP to reflect the latest research and findings on the distribution and population trends of plants (DEPI 2014), vertebrates (DSE 2013) and invertebrates (DSE 2009) in Victoria. The extent to which the EES for North East Link needs to address impacts is prescribed in the EES Scoping Requirements (June 2018).

In section 3.7 (p.10) of these requirements the relevant legislation to be addressed is listed. The pertinent legislation in relation to biodiversity in this list is:

- Planning and Environment Act 1987 (P&E Act), including the *Guidelines for the removal destruction and lopping of native vegetation* incorporated into the relevant municipal planning schemes
- *Flora and Fauna Guarantee Act 1988* (FFG Act)
- *Wildlife Act 1975*

Understanding impacts on Advisory listed rare and threatened species that are not listed under the FFG Act is not required explicitly in legislation that must be addressed by the EES. However, under the P&E Act, NELP has been required to follow the approach and requirements of *Guidelines for the removal, destruction and lopping of native vegetation*. This approach has involved a 'Detailed' Assessment Pathway for the project. Based on the 'EnSym Report' appended to the Technical Report, general and species offsets are required.

Five species offsets are required for Grey-headed Flying Fox, Australian Grayling (a fish), Yarra Pygmy Perch, Melbourne Yellow Gum and Small Golden Moths (an Orchid). All these species are listed on the foregoing legislation, as well as in the DELWP Advisory Lists. It is understood that discussions have commenced with DELWP in relation to which of these species offsets are actually required given habitat conditions and likelihood of impacts within the project boundary; this process is provide for under the Guidelines where habitat is not suitable for the species modelled to occur in an impact area.

No other rare or threatened species listed only on the Advisory Lists has been nominated on the Native Vegetation Removal Report as requiring offsets. This is because the extent of habitat affected for these species does not exceed the general offset threshold; that is, the proportion of the DELWP-modelled habitat in the state removed by the proposal does not exceed 0.005%.

The question has arisen as to whether targeted surveys for Advisory List species (in addition to EPBC Act and FFG Act listed species) should be undertaken. Given how Cl. 52.17 and the incorporated Guidelines work, based on DELWP state-wide spatial modelling of rare and threatened species' habitat, targeted surveys for Advisory List species are not required for any development in Victoria that removes native vegetation. In this respect, NELP will nonetheless address the impacts of native vegetation removal, including on Advisory List species consistent with the Guidelines.

The Technical Report lists those Advisory List species found in the wider region and provides a 'likelihood of occurrence' for them in the project boundary. During all targeted surveys (at appropriate times of year) for the assessment most of these were not found. The exceptions were Arching Flax-lily and Studley Park Gum, the occurrence of which has been documented in the Technical Report.

The Technical Report also discusses the status of a further 15 Advisory List flora species, that were not recorded in the study area, despite suitable habitat being present and surveyed, with an explanation of the field survey results and likelihood of occurrence, including: Silurian Striped Greenhood, Wine-lipped Spider-orchid, Melbourne Yellow Gum, Austral Crane's-bill, Veined Spear-grass, Common Apple-berry, Winged Water-starwort, Fringed Helmet-orchid, Bear's-ear, Green Scentbark, Yarra Gum, Veiled Fringe-rush, Pale-flowered Crane's-bill, Rosemary Grevillea, and Slender Stylewort. There is further discussion of another five Advisory List **rare** flora species, with a wider range making it

unlikely that, if they were present, impacts would be of concern, including Austral Tobacco, Red-tipped Greenhood, Emerald-lip Greenhood, Bulging Fireweed and Annual Fireweed.

The Technical Report discusses listed fauna species. Detailed discussion is provided of EPBC Act and FFG Act species, as well as the following species listed only on the Advisory List: Australasian Shoveler, Hardhead, Musk Duck, Glossy Grass Skink and Southern Toadlet. Targeted survey was undertaken for the last of these, along with the FFG Act listed Brown Toadlet, in accordance with the species-specific guidance in the EES Scoping Requirements (see above).

None of these flora and fauna species was nominated in the EnSym report as potentially occurring extensively enough in the project area to exceed the general offset threshold. Impacts on them, should they occur, are therefore unlikely to be of concern for decision-making.

3.2. Existing Conditions

Mapping of the extent of patches of native vegetation within the project boundary was found to be largely accurate throughout. Minor comments on the extent of some patches were made following the field-based review in October 2018. One example included the mapping of native vegetation around the Trinity Grammar wetland, east of Bulleen Road. Initially, the entire wetland (including the area of open water) had been mapped as native vegetation. This is not in line with the definition of an area of native vegetation in accordance with the Guidelines. As such, comment was provided that only the area of vegetation surrounding the permanent water storage wetland should be considered as native vegetation. This has now been addressed in the Technical Report.

In response to our scattered tree assessment report (Attachment 3), the approach to the planted vegetation exemption has been reviewed and the scattered tree assessment revised in the Technical Report. This assessment has applied an accurate and consistent approach that describes remnant native vegetation potentially affected by the project that requires application of the guidelines. Scattered trees for which a permit under Cl. 52.17 of the relevant planning schemes would be required have now been accurately and comprehensively identified and documented in the Technical Report.

As part of the targeted surveys undertaken for threatened flora, Matted Flax-lilies were recorded in the project boundary, including a sizeable population in the Simpson Barracks. The Matted Flax-lily population mapped in the project boundary was reviewed during the peer review field assessment. The identity and extent of the Matted Flax-lily population was found to be accurate, however an additional three Matted Flax-lily plants were recorded in the area north of Blamey Road. This data was provided to NELP and these additional plants have since been included in the relevant report text and mapping in the Technical Report.

3.2.1. Summary

The Technical Report appropriately, accurately and comprehensively describes the native vegetation potentially affected by the project in the manner required for application of the *Guidelines for the removal, destruction and lopping of native vegetation*. A proper assessment of the native vegetation affected by the project can therefore be made.

The combination of review of existing information, assessment of likelihood of occurrence, habitat assessment in the project area and targeted field surveys in accordance with accepted survey standards means that the Technical Report has assembled all available

information and appropriately evaluated it for the presence of these species and has come to defendable conclusions about the status of each in and near the project area. The information therefore adequately addresses the scoping requirements related to investigating the affected area for listed threatened species and communities.

3.3. Impact Assessment

3.3.1. Native vegetation

At this stage, all native vegetation within the project boundary has been assumed to be removed. This is noted as being a conservative approach, and it is understood that efforts will be made to further minimise impacts where possible during construction. An appropriate Environmental Performance Requirement is provided to ensure this is taken into consideration during the detailed design and construction of the project (EPR FF2).

A detailed 'avoid and minimise statement' is provided in the Technical Report, which discusses the restrictions involved with the location of the project, namely the reason for the encroachment of the works into Simpson Barracks, one the most sensitive areas of biodiversity associated with the project.

At present, native vegetation losses for the project include:

- 52.109 hectares of patch native vegetation, including 92 large trees in patches;
- 202 scattered trees including 87 large trees and 115 small trees (of the 87 large trees, 55 were in the project boundary and 32 were deemed to be at moderate to high risk of impact from groundwater drawdown);

The native vegetation impact assessment (summarised above) provides an accurate account of all native vegetation likely to be removed for the project. It is noted that the estimated impacts on trees outside the project boundary has been undertaken based on the assumption that any large tree (as defined in the EVC benchmark) is potentially at risk. The conclusion that those at moderate and high risk should be assumed to be lost and therefore offset is reasonable. It is possible that the impact on larger 'small' trees (i.e. less than the EVC benchmark large tree threshold) from groundwater drawdown has been underestimated but there appears to be no way of accurately assessing this given the lack of empirical evidence from the affected areas relating root depth to tree size (diameter at breast height). The approach adopted is based on reasonable assumptions and an explicit, transparent method.

The project will aim to minimise impacts on native vegetation through the adoption of EPR FF2 'Minimise and offset native vegetation removal'

Offsets will be provided to compensate the loss of this native vegetation as per the requirements of the Guidelines. A draft offset strategy is provided in Appendix L of the Technical Report. This offset strategy acknowledges the steps that must be taken to secure offsets, particularly the likely requirement to pro-actively identify certain threatened species offsets. It also addresses all possible scenarios for offset availability. It also includes an offset reconciliation process, to be undertaken in consultation with DELWP once construction has been completed. The timetable for establishment of required offsets is well within the timetable for completion of the project and it requires the maximum required offsets (based on removal of all vegetation within the project boundary) to be sourced before construction is completed. This provides a high level of assurance that the offsets will be identified and secured and for regular and timely consultation with DELWP in finalising the offsets.

The assessment of impacts and risks to native vegetation in the Technical Report (Section 12) is founded on the detailed ecological investigations that the consultants have undertaken, together with findings from other physical environmental investigations such as surface- and groundwater studies. These links are clearly explained in Section 12 of the report and are considered by the consultants in a systematic and therefore comprehensive manner.

3.3.2. Threatened species and communities

Based on the assessment of the status of threatened species in the project area being thorough and accurate, it is concluded that the risks to threatened species have been adequately identified in the report and provide a sound basis for assessing the project under all relevant biodiversity legislation and guidelines, in accordance with the scoping requirements. All relevant impact pathways have been identified in the detailed risk assessment in Section 12 of the Technical Report.

3.4. Environmental Performance Requirements

To achieve effective mitigation of project impacts on the environment, the EES describes 'Environmental Performance Requirements (EPRs) for which practical responses and plans will have to be developed during detailed design, construction and operation phases of the project. These are not intended to prescribe mitigation measures, except to the extent that something *must* be done (e.g. native vegetation offsets).

In reviewing the EPRs, the following guiding principles were adopted:

- Are EPRs linked to and address all identified risks and impacts needing management beyond compliance with environmental laws?
- Are the EPRs clear in terms of
    - Timing
    - Responsibility for implementation
    - Where or when it applies? Ie: outlining location or circumstances
- Is compliance with all relevant legislation, policy and guidelines covered in the EPRs, where necessary (noting that the EPRs do not need restate the obligation to comply with environmental laws)?
- Are the proposed design, EPRs and example management and mitigation measures:
    - demonstrably grounded in applicable policy, legislation, guidelines and best practice?
    - defined as outputs rather than being prescriptive in how the measures will be implemented?
    - practical to implement?
- Does the report describe how the EPRs will address the potential for adverse impacts?

Each of the foregoing aspects of the EPR's is discussed below. This review focusses on the nine flora and fauna related EPRs, namely EPR FF1 to EPR FF9. Before the evaluation, each EPR is briefly discussed and any gaps discussed.

FF1 – Minimise Impacts on Flora and Fauna: This EPR is standard for construction projects that require the removal of trees to ensure the proper capture and relocation of affected

tree-dependent fauna that cannot avoid the works. In response to my recommendation that a contingency procedure be included that provided a contingency response for the unanticipated detection of threatened species in the project area during construction, this EPR has been updated. It now ensures that all circumstances are covered where minimisation of impacts on flora and fauna are required.

FF2 – Minimise and offset native vegetation removal: This EPR is consistent with the 'avoid and minimise' principle in the Cl. 52.17 incorporated Guidelines and will ensure the project is executed in a manner consistent with state native vegetation policy settings. The EES Scoping Requirements require an offset strategy to be prepared that clearly identifies how the impacts on native vegetation are to be offset. An offset strategy has been provided in Appendix L of the Technical Report.

FF3 – Avoid introduction or spread of weeds and pathogens: This requirement is standard on most project construction works sites and is appropriate to ensure compliance with the *Catchment and Land Protection Act 1994* and to protect remnant indigenous ecosystems from degradation due to invasive species and pathogens.

FF4 – Protect aquatic habitat – Again, this is a standard requirement of construction projects near waterways and wetlands and it will ensure that the project has minimal impacts on the Yarra River and its tributaries during both the construction and operation stages through construction environmental management, and drainage system design and operation.

FF5 – Obtain *Flora and Fauna Guarantee Act 1988* permits – This is a legal requirement for the removal of protected flora (including that within any affected listed communities) on public land.

FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan – Given the project's impacts on groundwater and the predicted impacts on some areas of remnant ecosystem in and near the project, this is a necessary requirement (acknowledged in EPRs GW1 and GW2) that has been implemented in similar projects in the past (e.g. Eastlink – Mullum Mullum Tunnel). It would be relevant and appropriate to include specific groundwater modelling and monitoring outputs to inform the risk assessment for large trees currently considered to be affected by groundwater changes during and after construction. Once risks and impacts are refined a revised offset target should be generated for the affected trees.

FF7 - Implement a salvage and translocation plan for Matted Flax-lily – This EPR will ensure project impacts on this matter of national environmental significance will be minimised. The Plan that has been prepared (Appendix K of the Technical Report) is not specific about the recipient site but provides a clear and logical process for selecting one that will ensure the best outcome. In reviewing the Translocation Plan, the long-term protection of the recipient site for conservation purposes needs to be addressed. The mechanism for this will vary depending on the status of the land (e.g. state public land, Commonwealth Land, private freehold) and the preferences of the particular land owner and a number of options are available but the chosen option does not need to be specified at this stage.

FF8 – Minimise intense noise and vibration impacts on the Australian Grayling (a fish) – This EPR is appropriate. It is consistent, for example, with a similar requirement for the Port Phillip Bay Channel Deepening Project last decade, specifically for works in the Lower Yarra River.

FF9 – Protect fauna habitat values in existing waterbodies that are modified for drainage purposes - The measures proposed to minimise impacts on wetland habitats for waterbirds during construction through sensitive timing and duration of works and rapid refilling of drained wetlands are appropriate given the threatened status of some waterbird species.

Following is an evaluation of the EPRs.

Do EPR's address all risks to flora, fauna and native vegetation?

EPRs relevant to flora and fauna risks are presented in Section 13 of the Technical Report (designated with the term 'EPR FF' then a number from one to nine)

They address all identified risks from Section 12 of the report. The remaining EPRs (i.e. those without the designation FF) are also very relevant. I have not reviewed these in detail. I have reviewed if they comprehensively cover potential and known impact pathways necessary for identifying, understanding and mitigating the ecological impacts of the project. They do this thoroughly.

Are the EPRs clear in timing, responsibility, circumstances and location?

Each of the nine flora and fauna EPRs is clear in terms of the phase of the project in which it must apply, namely construction or operation.

In terms of responsibilities for implementation, I have reviewed a draft of the EES chapter "Environmental Management Framework". This framework specifies responsibilities for implementing project environmental controls. It indicates that the EPRs will be part of all project contracts with responses and implementation to become the responsibility of the relevant contractor. An Independent Environmental Auditor will be established to report back to the NELP as project owner. Successful tenderers would be required to prepare documentation including a complete Environmental Strategy, CEMP, Worksite Environmental Management Plans (WEMPs) and, where relevant, an Operations Environmental Management Plan (OEMP) to meet the requirements of the EPRs. These will describe in detail how contractors will meet the EPRs and approval conditions.

This is a modern, best practice approach and will ensure that the EPR's are embedded into the project's governance and environmental management systems.

Importantly, although not every flora and fauna EPR refers to a specific environmental management document, compliance with all EPRs will be a requirement of the proposed Incorporated Document for the project as part of the Planning Scheme Amendment. Accordingly, although specific locations where flora and fauna related EPRs apply are not always provided (they are in EPR FF2, EPR FF8 and EPR FF9) 'Worksite Environmental Management Plans' (WEMPs) will specify where the more general measures will apply. Therefore, the fact that some flora and fauna EPRs are general and apply to the whole project is not a limitation as the management system for responding to them will clearly identify the circumstances and where response and implementation is required.

Do the EPRs comply with all relevant legislation?

The nine flora and fauna EPRs ensure specific measures are taken to reduce ecological impacts and risks as required by the objectives of the EPBC Act, FFG Act and the *Guidelines for the removal, destruction and lopping of native vegetation.* To the extent that licenses and permits are required (e.g. for fauna salvage under the *Wildlife Act 1975*), these are explicitly mentioned.

Are the EPRs legally compliant, best practice and practical, and are outcomes defined?

The legal aspect of the EPRs is discussed in the preceding sub-section.

The EPRs, in combination with the arrangements described in the EES Chapter on the Environmental Management Framework, provide a best practice response to the ecological impacts and risks arising from the project.

Does the report describe how the EPRs will address the potential for adverse impacts?

In section 12 of the Technical Report, ecological risks are identified and the relevant EPRs for addressing these are described.

3.5. Addressing the Public Works Declaration

In February 2018, the Minister for Planning made a public works declaration under the *Environment Effects Act 1978*. Part of this declaration related to biodiversity and it reads:

"(i) The EES is to document investigations of potential environmental effects of the Public Works, including the feasibility of design alternatives and relevant environmental mitigation and management measures, in particular for:

a. potential effects on biodiversity, including through loss, degradation or fragmentation of habitat or through other causes (e.g. shading, light, noise and vibration), as well as related ecological effects…"

This requires the proponent to assess impacts on biodiversity from both direct and indirect impacts of the project.

The Technical Report includes all necessary information to address this requirement. In particular, it includes a conservative estimate of the extent of native vegetation and associated fauna habitat removal and fragmentation arising directly from the project, having regard to EPR FF2. Indirect impacts have been assessed through a thoroughly screened range of relevant and potential impact pathways and associated risks.

3.6. Addressing the EES Scoping Requirements

The EES Scoping Requirements provide the following evaluation objective for ecology:

- *"To avoid or minimise adverse effects on vegetation (including remnant, planted and regenerated), listed rare and threatened species and ecological communities, habitat for listed threatened species, listed migratory species and other protected flora and fauna, and address offset requirements for residual environmental effects, consistent with relevant state policies."*

As described in the foregoing sections of this peer review report, work has been undertaken as follows:

- A comprehensive review of available existing information evaluated to target site investigations on biodiversity priorities, including native vegetation, aquatic and terrestrial habitats, threatened flora and fauna and ecological communities protected by relevant legislation (EPBC Act and FFG Act) and planning provisions (the Guidelines);
- Surveys of targeted species and communities;
- Appropriate native vegetation and tree assessments in line with the *Guidelines for the removal, destruction and lopping of native vegetation*;

- Avoidance of impacts on extensive areas of remnant ecosystem in the most ecologically important part of the project area (i.e. the Yarra floodplain) through tunnelling;
- To identify and, where possible, to quantify impacts to native vegetation, aquatic and terrestrial habitats, threatened flora and fauna and ecological communities;
- Establish EPRs that ensure appropriate avoidance minimisation and mitigation of impacts are taken account of in detailed design, construction and operation of the project in response to the requirements of the Guidelines.

In these ways, the Technical Report (when considered with the Environmental Management Framework for the project) appropriately and adequately addresses the foregoing EES Scoping Requirements evaluation objective as well as the information requirements set out below this objective.

3.7. Recommendations

All recommendations made during the peer review process have been taken up by the consultants preparing the Technical Report.

Where there were minor departures from these recommendations, they were valid and based on sound information (e.g. only undertaking one Growling Grass Frog survey of sites that were found not to be suitable for the species after the first survey).

4. CONCLUSION

I am satisfied that the Technical Report comprehensively identifies and accurately describes the native vegetation, and threatened species and communities of the project area, and that the impacts of the project have been thoroughly and comprehensively assessed and identified.

In this respect the Technical Report provides the necessary technical information for an assessment to be made of the impacts of the project on biodiversity under the *Planning and Environment Act 1987* (specifically Cl. 12.01 and 52.17 of the applicable planning schemes), the *Environment Effects Act 1978* and the *Flora and Fauna Guarantee Act 1988*.

The Environmental Performance Requirements for the project cover all potential impacts and mitigation strategies.

I am satisfied that the Technical Report adequately addresses the EES Scoping Requirements, the Public Works Declaration and is consistent with best practice in Victoria in relation to identifying, mitigating and offsetting biodiversity impacts for projects of this type.

5. REFERENCES

DEWHA (2008) *Significant impact guidelines for the vulnerable Growling Grass Frog.* EPBC Act Policy Statement 3.14, Department of Environment Water Heritage and the Arts, Canberra.

DSE (2010) *Biodiversity Precinct Structure Planning Kit*. Department of Sustainability and Environment, Melbourne.

DSEWPAC (2011) *Survey guidelines for Australia's threatened fish - Guidelines for detecting fish listed as threatened under the* Environment Protection and Biodiversity Conservation Act 1999. Department of Sustainability Environment Water Population and Communities, Canberra.

EPA (2003) *Guideline for Environmental Management: Rapid bioassessment methodology for rivers and streams*, EPA publication 604, EPA Victoria, Melbourne.

EPA (2010) *Environmental Quality Guidelines for Victorian Lakes* Publication 1302, EPA Victoria, Melbourne.

Attachment 1: Curriculum Vitae of Brett Lane

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

Brett Lane
Principal Consultant and Director

Profile

Brett has over 35 years' experience in ecological research and management. He has worked in a range of positions with environmental consultancies in Melbourne and Brisbane and with non-government environmental groups in Australia and East Asia. He has specialist knowledge in birds and wetlands, and extensive experience in ecological impact assessment, including in the infrastructure, renewable energy, property development and mining industries. Brett has undertaken and managed many hundreds of ecological assessments and prepared and reviewed documents that have accompanied development applications on behalf of private companies, government infrastructure agencies and private individuals. His extensive experience has given him an excellent knowledge of the regulatory environment relevant to native vegetation, flora and fauna and he can advise on the scope of scientific information needed to inform the development assessment and decision-making process. He has also defended his scientific work as an expert witness in courts and tribunals. Brett founded BL&A in 2001.

Biography

Working in industry since 1979

Qualifications

BA (Zoology & Physical Geography) *Monash University*

Certificates and Licenses

Management Authorisation – Salvage and Translocation
Victorian Animal Ethics Approval

Employment History

2001 – present
Director, *Brett Lane & Associates Pty Ltd, Melbourne*

1999 – 2000
Natural Resource Specialist, *PPK Environment & Infrastructure Pty Ltd, Melbourne*

1996 – 1998
Senior Ecologist, Ecology Australia Pty Ltd, *Melbourne*

1993 – 1996
Principal Terrestrial Ecologist, *WBM Oceanics Australia, Brisbane*

1991 – 1993
Assistant Director (East Asia), *Asian Wetland Bureau, Kuala Lumpur, Malaysia*

1987 – 1991
Director, *Brett A Lane Pty Ltd (Melbourne)*

1980 – 1986
Wader Studies Co-ordinator, *Royal Australasian Ornithologists' Union (now Birdlife Australia, Melbourne*

1979
Research Assistant, Kinhill Planners Pty Ltd., Melbourne

Key Skills

- Experienced advisor on state and federal biodiversity legislation and policy
- EPBC Act and EES Referrals
- Preparation of environmental assessment reports (preliminary documentation, public environmental report and environmental impact statement)
- Preparation of native vegetation planning permit applications
- Design of developments to comply with biodiversity legislation and policies
- Expert witness for VCAT, planning panels and courts
- Ecological risk assessment
- Native vegetation assessment
- Terrestrial fauna assessment and wetland ecology
- Ornithologist specialising in wetland and migratory shorebirds
- Wind energy development specialist and minimizing impacts on wildlife including collision risk modelling

Experience Knowledge Solutions
Suite 5, 61 - 63 Camberwell Road, Hawthorn East, VIC 3123
PO Box 337, Camberwell, VIC 3124
www.ecologicalresearch.com.au
Ph (03) 9815 2111
Fax (03) 9815 2685
enquiries@ecologicalresearch.com.au

Project Examples

Property Development

Eynesbury Township, Eynesbury, Victoria: Flora, Fauna and Habitat Hectare Assessment, Targeted Flora Surveys, Growling Grass Frog Survey, Plains-wanderer Survey and Development of an Offset Tracking Tool. Net Gain Analysis for Planning Permit Applications of subsequent stages and advice on offset management (2003 – present)

Taylors Rd, Sydenham, Victoria (Broadcast Australia): EPBC Act Referral, preparation of EPBC Act Public Environment Report (PER), Offset Site Search and Offset Management Plan, Spiny Rice-flower Propagation and Translocation Plans, Seed Collection (2006 – present)

Somerfield Estate, Keysborough, Victoria: Flora, Fauna and Growling Grass Frog Survey and Offset Plan Preparation, preparation of offset tracking reports for each stage of development (2008 – present)

Modena Estate, Burnside, Victoria: Flora and Fauna Assessment, targeted threatened species surveys, EPBC Act referrals and assessment approvals, development of offset and mitigation plans (2002 – present)

Renewable Energy

Dundonnell Wind Farm, Dundonnell, Victoria: Overview and Targeted Assessments including Brolga, bat, migratory bird, Striped Legless Lizard, Flora Surveys, assessment of powerline route and road access options, EPBC Act Referral, Input to EES Referral, preparation of EES technical appendix on flora and fauna, Brolga impact assessment, collision risk modelling (2009 – present)

Granville Wind Farm, Granville Harbour, Tasmania: Overview Assessment, targeted surveys including Orange-bellied Parrot and bat surveys, EPBC Act Referral and advice for regulator negotiations (2011 – present)

MacArthur Wind Farm, MacArthur, Victoria: Overview assessment, detailed flora and fauna surveys, impact assessment, input to EPBC Act Referral and state EES, assessment of powerline and road route options, appearance at state Planning Panel hearings as expert witness, preparation of pre-construction and operational flora and fauna management plans, net gain analysis and identification of suitable offsets (2004 – 2012)

Cherry Tree Wind Farm, Victoria: Overview assessment, native vegetation and threatened flora surveys, targeted threatened fauna surveys, assessment of powerline and road route options, offset site sourcing and assessment, preparation of expert witness statement and appearance at VCAT (2010 - 2015)

Mt Gellibrand Wind Farm, Mt Gellibrand, Victoria: Overview assessment, detailed flora and fauna surveys, including targeted Brolga and migratory bird surveys, and Striped Legless Lizard tile grid surveys, input to state planning permit application, preparation of witness statement and appearance at state Planning Panel hearing, preparation and early implementation of pre-construction flora and fauna management plans, including bat and avifauna management plan, native vegetation mapping, offset mapping, development of Brolga monitoring and mitigation strategies (2004 – present).

Road and Rail Infrastructure

Avalon Airport Rail Link, Little River, Victoria: Flora and Fauna Mapping, Constraint Analysis and Net Gain Analysis (2011 – 2013)

Dingley Bypass, Keysborough, Victoria: Flora and Fauna Assessment, including targeted flora surveys, habitat hectare assessment and Net Gain analysis, expert witness at VCAT case (approved) (2008 – 2014)

Nagambie bypass, Nagambie Victoria: Flora and Fauna Assessment, including habitat hectare assessment and Net Gain analysis (2008)

Second Murray River Bridge Crossing at Echuca-Moama: Detailed Flora Assessment, Targeted Flora Survey (2008 – present)

Ecosystem Monitoring and Management

Scientific Review Panel, Kerang Lakes Bypass project (North Central Catchment Management Authority, Goulburn Murray Water): Scientific review of detailed technical reports to inform decisions of water savings plans and associated watering plans for five wetlands that form part of the Ramsar-listed Kerang Lakes wetlands system. (2013)

Northern Victoria Irrigation Renewal Program (NVIRP): Assessed the impact of a major federal water industry investment project on Matters of National Environmental Significance, including threatened flora, threatened fauna and listed migratory birds using wetlands located in the potential impact area. (2009-2011)

Attachment 2: Curricula Vitae for Justin Sullivan and Curtis Doughty

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

Justin Sullivan
Senior Ecologist

Profile

Justin first joined BL&A in 2008 and currently is working in the role of Senior Ecologist. Since being at BL&A Justin has been highly involved in a broad range of work including impact assessments for residential development, environmental monitoring projects including River Red-gum monitoring on the Murray River, and impact assessments for major infrastructure projects including roads, powerlines and wind farms.

Between 2011 and 2014 Justin worked in the role of Project Manager at BL&A and demonstrated his knowledge of the environmental planning process in Victoria, as well as working towards positive environmental outcomes. Between 2015 and 2016 Justin worked as Biodiversity Officer at Yarra Ranges Council, where he was responsible for reviewing and assessing planning applications and oversaw the management of a number of Council bushland reserves in the Yarra Ranges Shire. Since early 2017, Justin has been working in the role of Senior Ecologist at BL&A. He has an excellent knowledge of Victoria's flora and fauna and provides high level reports for a broad range of assessment types.

Biography

Working in industry since 2008

Qualifications

BSC (Honours in Botany), *La Trobe University*

Certificates and Licenses

DELWP Certificate of Competency in Vegetation Quality Assessments Registration No.HH061
Construction Induction 'White Card'
First Aid Certificate HLTAID001-3

Employment History

2017 - current
Senior Ecologist, *BL&A, Melbourne*

2015 - 2016
Biodiversity Offsets Officer & Environmental Planner, *Yarra Ranges Shire Council*

2011 - 2014
Botanist and Project Manager, *BL&A, Melbourne*

2008 - 2011
Field Botanist, *BL&A, Melbourne*

2001
Assistant Ranger, *Point Cook Coastal Park, Point Cook, Vic.*

Key Skills

- Specialist botanical knowledge of Victoria's flora
- Working knowledge of Victoria's Planning Scheme, namely particular provisions (i.e. Clause 52.17)
- Working knowledge of environmental regulations relevant Victoria (i.e. EPBC Act, FFG Act)
- Demonstrated ability in Habitat hectare and tree assessment
- Working fauna survey skills
- Experienced in undertaking targeted surveys for listed flora and fauna species
- Provided environmental planning advice to applicants, Council Officers and other regulators
- Regularly provides project design recommendations to applicants
- Experienced in preparation of a variety of reports, including Flora and Fauna Assessments, Native Vegetation Assessments, EPBC Act Referrals, Offset Management Plans, and Targeted survey Reports, always to a high standard
- Project Management including budgeting, staffing and client liaison

Experience Knowledge Solutions
Suite 5, 61 - 63 Camberwell Road, Hawthorn East, VIC 3123
PO Box 337, Camberwell, VIC 3124
www.ecologicalresearch.com.au
Ph (03) 9815 2111
Fax (03) 9815 2685
enquiries@ecologicalresearch.com.au

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

Project Examples

Property Development

Modeina Estate, Burnside, Victoria: Flora and Fauna Assessment, EPBC Act referral (2009 – present)

Somerfield Estate, Keysborough, Victoria: Flora, Fauna and Growling Grass Frog Survey and Offset Plan Preparation (2008 – 2014)

Harpley Estate, Black Forest Road, Werribee, Victoria: Striped Legless Lizard Salvage Plan, Eastern Kangaroo Management Plan and Environmental Management Plan (2012—present)

South Dudley Road, Wonthaggi Residential Development, Wonthaggi, Victoria: Flora, Fauna and Growling Grass Frog Survey (2011).

Renewable Energy

Moorabool Wind Farm, Moorabool, Victoria: Native Vegetation Assessment of the Wind Farm and Transmission Line (present)

Ararat Wind Farm, Ararat, Victoria: Flora and Fauna Assessment of the Wind Farm and Transmission Line, Offset Plan, Native Vegetation and Pest Plans (2007 – 2014)

Bald Hills Wind Farm, South East Gippsland, Victoria: Native Vegetation Management Plan and preparation of Offset Plan (2008 – 2014)

Stockyard Hill Wind Farm, Beaufort, Victoria: Native Vegetation Assessment (2007 – 2011)

Road and Rail Infrastructure

Second Murray River Bridge Crossing at Echuca-Moama: Detailed Flora and Fauna Assessment, Targeted Flora and Fauna Surveys, Bat Survey and Net Gain Assessment (2008 – 2014)

Burke Road, Glen Iris and North Road, Ormond Level Crossing Removal Project, Victoria: Flora and Fauna Assessment (2012)

Cardinia Road Upgrade, Pakenham, Victoria: Flora and Fauna Assessment (2012)

Ecosystem Monitoring and Management

River Red Gum Monitoring Project, Murray River, Mildura Region, Victoria: Monitoring of River Red-gum health at various reaches along the Murray River system (2008 – 2013).

Wimmera River Monitoring Project, Wimmera River, Horsham Region, Victoria: Monitoring of River Red-gum and River health (2008 – 2009).

Water and Pipeline Infrastructure

Altona Recycled Water Project Stage 2, Werribee to Altona, Victoria: Flora and Fauna Assessment (2011 – 2014)

Kurrak Rd to Browns Lane Outfall Sewer Development, Plenty, Victoria: Flora and Fauna Assessment (2008 –2014)

Bellbird Ridge Estate, Sewer Alignment Development, Diamond Creek, Victoria: Flora, Fauna and Native Vegetation Assessment (2010)

Point Cook Sustainable Alternative Water Scheme Project, Point Cook, Victoria: Native Vegetation Impact Assessment (2011)

Telstra Tower, Tinderbox Hills, Tasmania: Flora and Fauna Assessment (2012)

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

John Curtis Doughty
Senior Zoologist

Profile

Curtis has a Bachelor of Environmental Science and has been working in environmental consultancy at BL&A since 2005. During this time Curtis has been highly involved in a broad range of work including impact assessments for residential development and for major infrastructure projects such as wind farms, roads and rail.

He has been involved in impact assessments Australia-wide and specialises in targeted surveys to inform a better judgement on potential impacts a proposed development may pose to threatened species. Some examples of targeted surveys include: migratory shorebirds, Carnaby's Black Cockatoo, Glossy Black Cockatoo, Swift Parrot, Superb Parrot, Brolga, Powerful Owl, Wedge-tailed Eagle, Southern Brown Bandicoot, Striped Legless Lizard, Swamp Skink, Growling Grass Frog and Golden Sun Moth.

Biography

Working in industry since 2005

Qualifications

BSc Environmental Science, *Charles Sturt University*
Diploma of Natural Resource Management, *Swinburne University*

Certificates and Licenses

Development and building in bushfire prone areas
Management Authorisation – Salvage and Translocation
Train Track Safety Awareness
Construction Induction 'Red Card'
NSW Scientific License

Employment History

2005 – present
Zoologist, Brett Lane and Associates Pty. Ltd., Melbourne VIC

Key Skills

- Ornithologist
- Growling Grass Frog monitoring
- Implementation of bird and bat management plans at wind farms
- Carcass searches
- Small mammal trapping
- Growling Grass Frog management plan preparation
- Brolga habitat assessment, population monitoring and behavioural observations
- Terrestrial Fauna Assessments
- Targeted surveys for listed flora and fauna species
- Bird Utilisation Surveys
- Desktop assessments
- Management plan preparation for listed fauna values and offset sites
- Striped Legless Lizard Salvage Protocol implementation
- Project design recommendation
- EPBC Act and EES Referrals
- Offset site selection

Experience Knowledge Solutions
Suite 5, 61 - 63 Camberwell Road, Hawthorn East, VIC 3123
PO Box 337, Camberwell, VIC 3124
www.ecologicalresearch.com.au
Ph (03) 9815 2111
Fax (03) 9815 2685
enquiries@ecologicalresearch.com.au

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

Project Examples

Property Development

Princess Street, Bunyip, Victoria: Flora and fauna assessment and targeted Southern Brown Bandicoot survey (2012).

Rifle Butts Road, Mansfield, Victoria: Flora and Fauna Assessment (2012).

Quandong Station, Victoria: Flora and fauna assessment and targeted fauna surveys (2010 - 2012).

Harpley Estate, Werribee, Victoria: Flora and fauna assessment, Fat-tailed Dunnart targeted survey and kangaroo monitoring and management plan (2008 - 2012).

Manor Lakes, Wyndham Vale, Victoria: Targeted Plains Wanderer survey and kangaroo monitoring (2010 - 2011).

Eynesbury, Victoria: Targeted flora and fauna surveys and Striped Legless Lizard salvage protocol (2005 - 2012).

Renewable Energy

Gullen Range Wind Farm, NSW: Bird utilisation surveys, carcass searches, raptor surveys, avoidance behaviour surveys (2015).

Capital wind Farm, NSW: Glossy Black Cockatoo surveys, raptor surveys, waterbird surveys, bird utilisation surveys 2014 – 2015).

Taralga Wind Farm, NSW: Bird utilisation surveys (2012).

Cullerin Range Wind Farm, NSW: Bird and avifauna mortality monitoring (2012 - ongoing).

Coonooer Wind Farm, Victoria: Targeted fauna surveys (2010—2012).

White Rock Ridge Wind Farm, TAS: Monitoring Migratory Shorebird usage at the island (2010 - 2011)

Road and Rail Infrastructure

Avalon Airport Rail Link, Victoria: Targeted surveys (2011 - present).

Second Murray River Crossing at Echuca - Moama, Victoria and NSW: Targeted surveys (2011 - 2012).

Bulla Bypass and Tullamarine Freeway extension, Victoria: Flora and Fauna Assessment and targeted Brown Toadlet survey (2011 - 2012).

Ecosystem Monitoring and Management

Cheetham Wetlands, Point Cook, Victoria: Shorebird and waterbird surveys for monitoring purposes (2013 – 2015).

Moonee Ponds Creek, Tullamarine, Victoria: Growling Grass Frog Monitoring (2007 - 2014).

Lolipop Creek, Werribee, Victoria: Growling Grass Frog Management Plan.

Merri Creek, Craigieburn, Victoria: Determining Growling Grass Frog Corridors (2012).

Mittagong Creek, Hidden Valley, Victoria: Flora and fauna assessment (2012).

Lake Goldsmith, Victoria: Migratory shorebird and waterbird monitoring (2011).

Water and Pipeline Infrastructure

Doherty's Rd pipeline, Laverton North, Victoria: Flora and fauna assessment (2011).

Point Cook Water Pipeline, Victoria: Flora and fauna assessment (2011).

Mining Developments

Proposed Lancefield Sand Quarry, Victoria: Fauna Assessment (2015)

Cavehill Quarry, Lilydale, Victoria: Kangaroo monitoring and management plan (2014).

Bushfire Assessments

11 and 12 Oaks Court, Lysterfield South, Victoria: Bushfire assessment (2014).

990 Sayers Road, Tarneit, Victoria: Bushfire assessment (2014).

Experience Knowledge Solutions
Suite 5, 61 - 63 Camberwell Road, Hawthorn East, VIC 3123
PO Box 337, Camberwell, VIC 3124
www.ecologicalresearch.com.au
Ph (03) 9815 2111
Fax (03) 9815 2685
enquiries@ecologicalresearch.com.au

Attachment 3: Detailed review of native vegetation mapping issues with earlier draft of Technical Report

NORTH EAST LINK

ECOLOGY PEER REVIEW: SCATTERED TREE ASSESSMENT

Prepared for Clayton Utz

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management
Suite 5 61–63 Camberwell Road, Hawthorn, VIC 3123
P.O. Box 337, Camberwell, VIC 3124
Ph. (03) 9815 2111
Fax. (03) 9815 2685

15th November 2018

Report No. 18140

CONTENTS

TABLES

1. INTRODUCTION

North East Link Authority (NELA) engaged Brett Lane and Associates (BL&A) to undertake an independent peer review of the assessment of scattered trees and patches of native vegetation that forms part of the ecological assessment that is under preparation for the purposes of the Environmental Effects Statement for the North East Link Project. As part of this review, a team from BL&A comprising Brett Lane (Director and Principal Consultant), Justin Sullivan (Senior Botanist) and Curtis Doughty (Senior Zoologist) undertook a detailed review of the report prepared by GHD titled "North East Link Project Environment Effects Statement Technical Report – Ecology, Draft dated September 2018" (GHD Report). The peer review included both a desktop review of the GHD report, and a three-day field survey to review the application of the methods adopted and the results of the ecological assessment.

We reviewed the accuracy of the approach to mapping and classification of native vegetation within the Project Boundary (including patches of native vegetation and scattered trees).

2. REVIEW OF SCATTERED TREE ASSESSMENT

During the field-based review, it became apparent that the approach adopted for the scattered tree component of the native vegetation assessment was not consistent with the planted vegetation exemption contained in the table to Clause 52.17-7, with the report classifying trees planted for amenity purposes as scattered trees requiring an offset.

The extent of native vegetation removal and the related offset requirements for the North East Link Project is to be determined based on Clause 52.17 and the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017, the 'Guidelines'). Based on this, scattered trees are assessed by deeming a large tree (that is, a tree that exceeds or is equal to the EVC Benchmark diameter at 1.3 m above ground level) to be a circular area with a radius of 15 metres (i.e., 705 sq. m) and a small tree (that is, a tree that is less than the EVC Benchmark diameter at 1.3 m above ground level) to be a circular area with a radius of 10 metres (i.e. 310 sq. m.).

The exemption in Clause 52.17 and the extent of the changes to the scattered tree assessment are explained further below. This includes reference to regulatory definitions and exemptions, as well as a list of all examples found where the tree classification requires amendment.

The effect of Clause 52.17 is to require that planning permission be obtained to remove, destroy or lop native vegetation in certain circumstances. Clause 52.17-7 provides a table of exemptions and includes the following exemption:

52.17-7 *The requirement to obtain a permit does not apply to:*

Planted vegetation	*Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding.* *This exemption does not apply to native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity unless the removal, destruction or lopping of the native vegetation is in accordance with written permission of the agency (or its successor) that provided the funding.*

The effect of this exemption is that native vegetation planted for amenity/road screening is exempt from the need for planning permission under Clause 52.17 and is therefore not required to be offset in accordance with the Guidelines. Whereas for native planted vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity, the exemption would not apply unless the removal, destruction or lopping is in accordance with written permission of the agency (or its successor) that provided the funding.

In our view, native vegetation is likely to serve a land protection purpose or enhance biodiversity if it fits the local vegetation type (EVC), provides a mix of layers (i.e. trees, shrubs and graminoids) and is done with a clear conservation/biodiversity enhancement and/or land protection objective. In such cases, the exemption would not apply and the

vegetation should be considered native vegetation and a permit and offset obtained for its removal, destruction or lopping.

The approach to amenity plantings adopted by GHD is documented in Section 5.4.5 (Amenity Plantings) of the GHD report. However, it was determined during the field-based element of our peer review that this approach was not consistently applied in the field and in various instances that we considered to be amenity plantings subject to the above exemption trees had instead been mapped in the GHD report as scattered trees to be offset inaccordance with the Guidelines.

One of the clearest examples illustrating this was in the triangle of land south east of the intersection of the Eastern Freeway and Chandler Highway. This area comprised numerous planted trees (evenly spaced) including Spotted Gum, Giant Honey-Myrtle (both non-indigenous commonly planted trees) as well as planted River Red-gums, all of similar age. Whilst the broad area had been noted as 'Amenity planting' in the GHD report maps (Figure 10-23), 17 trees (all the River Red-gums) had also been considered as 'Scattered Trees'. A small number of trees in this area were also mapped in the GHD Report as belonging to patch of Plains Grassy Woodland. We characterise this area also, as having been planted for amenity purposes.

Based on the exemption under Clause 52.17 discussed above, the classification of amenity plantings should apply to all elements of the vegetation within this area including the planted River Red-gums. Based on the location of this planting (adjacent to a roadway), the even spacing of planted trees and the species/lifeform composition (trees only, no shrubs or grasses etc) it is clear that such planting lacks a conservation/biodiversity objective. As such, all planted River Red-gums in this area are exempt and should not be taken into account for the purposes of calculating offsets in accordance with the Guidelines. There were various other instances where BL&A characterised trees as being planted for amenity purposes which the GHD report had identified as scattered trees. All occurrences of this recorded in BL&A's field-based review are detailed in Table 1. Representative photos are provided where available from the peer review field survey.

Table 1: Trees that are considered to be exempt from permit under Clause 52.17

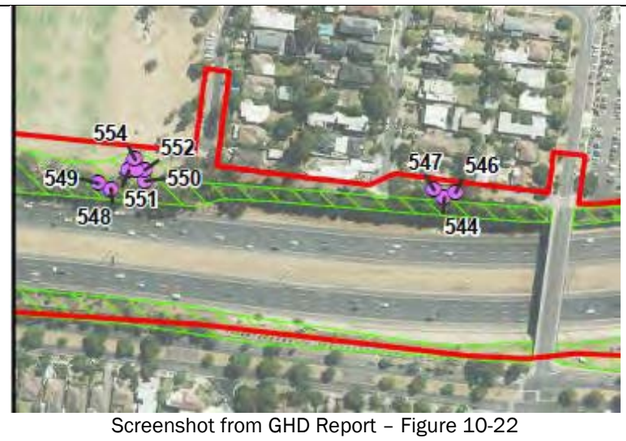
Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
AK Line Reserve, Watsonia	This area supports various tree species (including many non-indigenous species, i.e. Yellow Gum, Southern Mahogany, Mallet, Yate) which have been planted for amenity around a football field. The lawn is mown underneath and managed for amenity.	300-306	 Screenshot from GHD Report – Figure 10-6	
Watsonia Train Station and surrounds	This area comprised various tree species, most of which were non-indigenous and likely to have been planted (i.e. Yellow Gum). Some trees in this area were misidentified (*Eucalyptus nicholii* was identified in the GHD report as Eucalyptus radiata). Others, namely the few River Red-gums, Red Box and Yellow Box specimens were noted as potential remnants.	114, 291, 292, 293, 295, 296 and 297	 Screenshot from GHD Report – Figure 10-6	No photo

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Winsor Reserve	Two trees mis-identified.	107 and 289	 Screenshot from GHD Report – Figure 10-7	No photo
Area immediately south of Lower Plenty Road	This area supported a number of evenly spaced planted River red gums with a mown lawn underneath. These trees are considered to be planted for amenity.	263 to 270	 Screenshot from GHD Report – Figure 10-9	

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Bulleen Road area	Four trees (Trees 66 - 69) mis-identified; Non-native amenity plantings	66-69	 Screenshot from GHD Report – Figure 10-12	 
Templestowe Football Oval	Trees 51 and 243 to 246 are planted River Red-gums that occur amongst rows of other planted River Red-gums.	51 and 243-246	 Screenshot from GHD Report – Figure 10-13	

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Maugie Street, Abbotsford	Trees 167-172 (RRGs and Ironbark) planted in row - considered amenity plantings	167-172	 Screenshot from GHD Report – Figure 10-25	
Trenerry Crescent, Abbotsford	Planted RRGs on freeway embankment, considered amenity plantings	173-185	 Screenshot from GHD Report – Figure 10-25	No photo

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Merri Creek	Planted non-native Southern Mahogany trees mis-identified as Bundy.	195, 197, 200, 203	 Screenshot from GHD Report – Figure 10-25	
Between Merri Creek and Yarra River	Planted trees considered to be amenity plantings. Only particular trees in this area have been mapped, while others have been disregarded.	215, and 1 to 18	  Screenshot from GHD Report – Figure 10-25 and 10-24	

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Chandler Hwy interchange	As discussed above	All trees in this locality	 Screenshot from GHD Report – Figure 10-23	
Kate Campbell Reserve	Amenity plantings	529-535	 Screenshot from GHD Report – Figure 10-23	No photo
Willsmere Park	Trees considered amenity plantings.	548-553 as well trees 544, 546 and 547	 Screenshot from GHD Report – Figure 10-22	

Locality	Discussion	Relevant tree number (GHD Ecology Report Version 3A)	Relevant map	Representative Photo
Musca Street Reserve	All trees in this park were considered to be planted (most are in mulched garden beds amongst other planted trees, namely Spotted Gums). Also additional planted River Red-gums to the south were not mapped. Unlikely to have been planted for conservation objective. Considered amenity plantings.	561-578, 580, 584-590, 594-599	 Screenshot from GHD Report – Figure 10-6-21	
Koonung Creek section	Two *Eucalyptus nicholii* (non-indigenous) misidentified as *E. radiata.*	621 and 623	 Screenshot from GHD Report – Figure 10-6-20	No photo

3. CONCLUSION AND RECOMMENDATION

The inclusion of amenity plantings that would not require a permit to be removed, destroyed or lopped as scattered trees in the GHD report results in a significantly higher offset requirement than would otherwise be the case. It is appropriate that the project has an environmental performance requirement that the impact of tree canopy losses be mitigated, regardless of their status as amenity plantings. However, there is no requirement for NELA to replace amenity planting trees under the Guidelines.

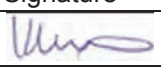
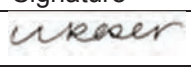
We understand that NELA is proposing to mitigate the loss of amenity plantings and that this will be addressed in the EPRs for the project.

Replacing trees that are exempt, such as amenity plantings in the area of the project will lead to a better local amenity outcome than providing native vegetation offsets for them, and is a preferred approach.

BL&A therefore recommend that the scattered tree assessment in the GHD report be reconsidered and is revised as per the approach outlined in this review. This is expected to result in a reduction to the number of scattered trees being impacted by the project, and will therefore reduce the quantum of offsets required.

GHD
180 Lonsdale Street
Melbourne Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
FINAL	T Wills	K Aldous		M Roser		April 19

www.ghd.com