Final Report

Significant Residential Tree Assessment: Warrenbeen Court, Barwon Heads, Victoria

Prepared for

City of Greater Geelong

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Ecology and Heritage Partners Pty Ltd

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Bioregion	Otway Plain
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Council	City of Greater Geelong

1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by City of Greater Geelong to conduct a Significant Tree Assessment within private land at Warrenbeen Court and a portion of Saratoga Avenue, Barwon Heads, Victoria.

Warrenbeen Court is located to the north of Barwon Heads Road. Residential properties in the area are relatively large and are characterised as having a 'bushland setting'. Much of the area is also identified as *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community,* listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act).

A private covenant on titles of land within Warrenbeen Court restrict where building works can occur on a site with the intent of protecting vegetation outside of the building platforms. However, there currently is no protection for the majority of vegetation within the area under the Greater Geelong Planning Scheme given many of the properties are less than 0.4 hectares[1].

The City of Greater Geelong is preparing an update to the Barwon Heads Structure Plan. As such, the aim of this assessment is to:

- Identify the type and significance of trees on private property within the identified study area; and,
- Make recommendations on the need for planning controls to ensure the protection of significant vegetation based on the data.

2 Study Area

The study area is located at 4-50 Warrenbeen Court and 29-36 Saratoga Avenue, Barwon Heads, Victoria, including adjacent road reserves and public reserves. The study area covers approximately 9 hectares and is bound by residential development to the north, south and east and farmland to the west. The study area is generally flat, with no ridges, crests or waterways within or immediately adjacent to the site.

According to the Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2016a), the study area occurs within the Otway Plain bioregion. It is located within the jurisdiction of the Corangamite Catchment Management Authority (CMA) and the City of Greater Geelong municipality.

3 Methods

3.1 Desktop Assessment

Relevant literature, online-resources and databases were reviewed to provide an assessment of flora and fauna values associated with the study area. The following information sources were reviewed:

[1] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

- The DELWP NVIM Tool (DELWP 2016a) and Biodiversity Interactive Map (DELWP 2016c) for:
    - Modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species; and,
    - The extent of historic and current EVCs.
- Ecological Vegetation Class (EVC) benchmarks (DELWP 2016b) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2016d);
- The Flora Information System (FIS) (Viridans 2014a) and Atlas of Victorian Wildlife (AVW) (Viridans 2014b) for assistance with the distribution and identification of flora and fauna species;
- The Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoEE 2016);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected Lists (DELWP 2015b; DELWP 2015c);
- The Planning Maps Online (DELWP 2016e) and Planning Schemes Online (DELWP 2016f) to ascertain current zoning and environmental overlays in the study area;
- Other relevant environmental legislation and policies as required;
- Aerial photography of the study area; and,
- Previous ecological or other relevant assessments of the study area.

3.2 Field Assessment

A field assessment was undertaken on 29 July and 3 August 2015, recording:

- Location, species, Diameter at Breast Height (DBH) and height of scattered indigenous[2] trees over three meters in height, and scattered native[3] trees over five metres in height;
- Location, height and DBH of significant Moonah *Melaleuca lanceolata* subsp. *lanceolata* trees, specifically Moonah over 40 centimetres Diameter at Breast Height (DBH)[4];
- Distribution of Moonah patches;
- Distribution of remnant vegetation (Ecological Vegetation Classes [EVCs]);
- General vegetation condition and dominant and significant flora species;

[2] Indigenous is defined as a species originating from the local region.
[3] Native is defined as a species originating from within the State
[4] A Large Old Tree size is not specified within the relevant EVC benchmark for Moonah; the DBH of 40cm is considered appropriate as an indicator of 'significant trees' based on a desktop review of Moonah DBH within the Council tree database, and given this DBH is used for classification of Large Old Trees for similar sized species (Sheoaks Allocasuarina spp.) within adjacent EVCs.

- Fauna habitat and incidental records of fauna species;
- Observations on the potential impacts by development in the area and adverse impacts on trees.

To obtain information on flora and fauna values within the study area, the study area was walked, with all observed vascular flora and fauna species recorded, any significant records mapped and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions (DELWP 2016b).

The following properties were accessed on foot, following permission to enter from the landowners:

- 14-15 Warrenbeen Court;
- 16-17 Warrenbeen Court;
- 19-20 Warrenbeen Court;
- 26-27 Warrenbeen Court;
- 28-30 Warrenbeen Court;
- 31 Saratoga Avenue.

The remainder of the properties were assessed remotely from adjacent public land and aerial photography interpretation.

3.3 Assessment Qualifications and Limitations

Several properties were not directly accessed (Section 3.2), and as such these properties were assessed remotely from adjacent public land and aerial photography interpretation. However, it was considered that sufficient evidence had been obtained from these sources to accurately map vegetation extent and outline general vegetation condition on all properties. The field assessment was undertaken during a sub-optimal season for the identification of flora and fauna species (late-winter). The 'snap shot' nature of a standard biodiversity assessment, along with sub-optimal timing of the survey, meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Targeted flora or fauna surveys were not undertaken, as this was beyond the preliminary scope of the project. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate assessment of the ecological values present within the study area.

4 Results

4.1 Remnant patches

Remnant indigenous vegetation in the study area is representative of one EVC: Coastal Alkaline Scrub (EVC 858). The presence of this EVC is consistent with the modelled pre-1750s native vegetation mapping (DELWP 2016c). The remainder of the study area comprises introduced and planted vegetation, present as ornamental plantings or lawns. Specific details relating to observed EVCs are provided below.

4.1.1 Vegetation condition

Coastal Alkaline Scrub occurs on near coastal, deep calcareous (alkaline), and largely stable sand dunes and swales, commonly dominated by Moonah. It typically occurs as a low woodland, or tall shrubland, to eight metres tall, typically with a medium shrub layer, small shrub layer and sedges, grasses and herbs in the

ground layer (DELWP 2016b). Coastal Alkaline Scrub is listed as Endangered within the Otway Plain bioregion (Appendix 1.3), and the EVC corresponds with the *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community* listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act).

Coastal Alkaline Scrub (Moonah Woodland) within the study area was predominantly in poor to good condition[5] (Plates 1 and 2), primarily in moderate to good condition. The condition is a representative of the overall vegetation community structure. Areas of in lower condition indicate an issue of a need for improved management.

Areas in good condition contained an intact overstorey and a relatively species rich understorey, with a moderate to low cover of weeds (Plate 1). Areas in moderate condition contained an intact overstorey, however the understorey was depleted containing only occasional shrubs or scramblers. The degradation of the understorey in some areas appears to have been caused by removal of understorey species and thick mulching preventing the recruitment of indigenous plants. In other areas the cause of degradation is not clear, but may have been the result of a slow decline in quality over time from residential use of the site (eg. trampling by humans and/or dogs, weed invasion, mowing). Areas in poor condition were present as a derived grassland of Coastal Alkaline Scrub following historical removal of trees and shrubs (Plate 2). Condition is a representation of the overall vegetation community structure; despite some areas containing vegetation communities in poor condition, these areas still support a threatened vegetation community of State significance. A further description of the vegetation communities present within the study area is outlined below.

Plate 1. Coastal Alkaline Scrub (Moonah Woodland) within the study area in good condition (Ecology and Heritage Partners Pty Ltd 03/08/2016).

Plate 2. Derived grassland of Coastal Alkaline Scrub within the study area in poor condition (Ecology and Heritage Partners Pty Ltd 03/08/2016).

The overstorey in all areas was dominated by Moonah, with occasional Drooping Sheoak *Allocasuarina verticillata*. The shrub layer was dominated by Seaberry Saltbush *Rhagodia candolleana* subsp. *candolleana*, with occasional Hedge Wattle *Acacia paradoxa*, Ruby Salt-bush *Enchylaena tomentosa* subsp. *tomentosa* Boobialla *Myoporum insulare* and Thyme Rice-flower *Pimelea serpyllifolia* subsp. *serpyllifolia*. Small-leaved

[5] Definitions of vegetation condition outlined within Appendix 1.2

Clematis *Clematis microphylla* var. *microphylla* and Bower Spinach *Tetragonia tetragonioides* were frequently present as scramblers/climbers. A sparse cover of grasses and other graminoids was present, including Slender Wallaby-grass *Rytidosperma racemosum* subsp. *racemosum*, Spear-grass *Austrostipa* spp. and Black-anther Flax lily *Dianella admixta*. Kidney-weed *Dichondra repens* was also occasionally present in the ground layer.

Areas of derived grassland of Coastal Alkaline Scrub were dominated by Wallaby-grasses and Spear-grass, with occasional herbs or prostrate shrubs (Plate 2; Figure 2). The occasional Moonah seedling suggests that these areas were likely to have formerly been Coastal Alkaline Scrub, with the historical removal of woody plants rendering the community into a derived grassland. A low to moderate cover of weeds was present in the derived grassland.

Common and high threat weeds throughout the study area included Annual Veldt-grass *Ehrharta longifolia* Cat's Ear *Hypochoeris radicata* and the noxious weeds Bridal Creeper *Asparagus asparagoides*, Soursob *Oxalis pes-caprae* and African Boxthorn *Lycium ferocissimum.*

4.1.2 Fauna Habitat

Woodland and scattered remnant trees occur throughout the study area and provide an important resource for avian and arboreal fauna. The majority of the Moonah trees are mature, providing an array of small and medium hollows, bark fissures and crevices. These are likely to be used for shelter and nesting by a range of hollow-dependent fauna including parrots, microbats and possums. When in flower, Moonah is likely to provide an abundant nectar source for avian fauna.

Species observed utilising woodland and scattered trees within the study area included White-plumed Honeyeater *Lichenostomus penicillatus*, Singing Honeyeater *Lichenostomus virescens*, Willie Wagtail *Rhipidura leucophrys* and Red Wattlebird *Anthochaera carunculata*.

4.2 Scattered Trees

Three scattered trees (Moonah) were present within the study area. These trees would once have been part of the Coastal Alkaline Scrub EVC, however the understorey vegetation consists of predominantly introduced species (mainly exotic pasture grasses) and the trees no longer form part of a remnant patch.

4.3 Significant Trees

Five Large Old Trees (LOTs) and two VLOTs were recorded[6]. Only the VLOTs contained significant fissures, hollows and crevices for fauna, and upon review of habitat values present, it is suggested that only VLOTs are considered 'significant trees' for the purpose of this assessment.

[6] Based on an assumed LOT DBH of 40cm (See Section 3.2)

4.4 National and State significant flora, fauna and communities

4.4.1 Flora

The VBA contains records of three nationally[7] significant and 24 State significant flora species previously recorded within 10 kilometres of the study area (DELWP 2016d) (Appendix 1; Figure 3). The PMST nominated an additional seven nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoEE 2016).

The nationally significant Leafy Greenhood *Pterostylis cucullata* (Plate 3) was recorded within the study area in 1999 (Figure 3). There is a moderate likelihood of the species persisting within the study area.

Plate 3. Leafy Greenhood recorded on the Mornington Peninsula (Ecology and Heritage Partners Pty Ltd 10/08/2016).

One specimen of the State significant Bellarine Yellow Gum *Eucalyptus leucoxylon* subsp. *bellarinensis* was recorded recruiting within 26-27 Warrenbeen Court. Bellarine Yellow Gum is listed as endangered within Victoria and is listed as threatened under the FFG Act. Bellarine Yellow Gum has been planted within 28-30 Warrenbeen Court (Wayne Maher, pers. comm.), and it is possible the specimen in 26-27 Warrenbeen Court had recruited from the planted parent plant. While not typically considered a representative species of the vegetation community recorded within the study area (Coastal Alkaline Scrub), occasional remnant Bellarine Yellow Gum may occur within the community.

[7] National and State significance are defined in Appendix 1.1

The State significant Coast Twin-leaf *Zygophyllum billardierei* and Coast Wirilda *Acacia uncifolia* have previously been recorded in close proximity to the study area in 1999 (Figure 3). There is a moderate likelihood of these species persisting within the study area.

Based on the modified nature of the study area, landscape context and the proximity of previous records, additional significant flora species are considered unlikely to occur within the study area (Appendix 1).

4.4.2 Fauna

The VBA contains records of 45 nationally significant, 44 State significant and 21 regionally significant fauna species previously recorded within 10 kilometres of the study area (DELWP 2016d) (Appendix 2; Figure 4). The PMST nominated an additional 17 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoE 2016).

Based on the modified nature of the study area, landscape context and the proximity of previous records, national or state significant fauna species are considered unlikely to occur within the study area on a regular basis, or rely on the study area for important breeding or foraging habitat (Appendix 2).

4.4.3 Communities

Six nationally listed ecological communities are predicted to occur within 10 kilometres of the study area (DoE 2016).

- Giant Kelp Marine Forests of South East Australia;
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Natural Damp Grassland of the Victorian Coastal Plains;
- Natural Temperate Grassland of the Victorian Volcanic Plain;
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and,
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

However, vegetation within the study area did not meet the diagnostic characteristics that define any nationally listed communities.

One state significant ecological community is present within the study area, *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community*, listed as threatened under the FFG Act. This community corresponds with all areas mapped as Coastal Alkaline Scrub and derived grasslands (Figure 2).

5 Legislative and Policy Implications

5.1 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environment Significance (NES).

The nationally significant Leafy Greenhood *Pterostylis cucullata* was recorded within the study area in 1999 (Figure 3). There is a moderate likelihood of the species persisting within the study area. Any proposed development within the study area should consider the potential presence of this species. A referral to the Commonwealth minister will be required if any proposed development is likely to have a significant impact on the species.

5.2 *Flora and Fauna Guarantee Act 1988* (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

One ecological community (*Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community*) and one flora species (Bellarine Yellow Gum) listed as threatened under the FFG Act were recorded within the study area. In addition, there is suitable habitat within the study area for the FFG Act listed Coast Wirilda. A permit under the FFG Act is required for the removal of *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community*, Bellarine Yellow Gum and Coast Wirilda within public land (ie. road reserves and council managed reserves).

5.3 *Planning and Environment Act 1987* (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies or a subdivision is proposed with lots less than 0.4 hectares[8]. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 5.3.1).

5.3.1 Local Planning Schemes

The study area is located within the City of Greater Geelong municipality and is zoned General Residential Zone, Category 2 (GRZ2). No environmental overlays apply to the study area (DELWP 2015f).

5.3.2 Implications

A Planning Permit from City of Greater Geelong is required to remove, destroy or lop any native vegetation on lots greater than 0.4 hectares in size (but not on lots less than 0.4 hectares based on the current planning controls that apply to the study area).

[8] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

6 Conclusion

The study area contains indigenous vegetation of State significance, listed as threatened under the FFG Act, and Endangered within the Otway Plain bioregion. The study area contains Moonah woodland ranging from poor to good condition. Very Large Old Trees are present, and contain good quality habitat for indigenous fauna, supporting hollows, cracks and crevices. The understorey many areas is currently in good condition, and contains a relatively high species richness for the EVC. While the condition of overstorey vegetation (Moonah) was largely homogenous throughout the study area, large variation was noted in the condition of understorey vegetation. The presence of poor condition, or relatively poor condition, Moonah woodland, is an indication of poor management of the understorey. Despite some areas containing vegetation communities in poor condition, these areas still support a threatened vegetation community of State significance. As such, all areas supporting remnant vegetation within the study area, including those in poor condition, should be retained and maintained, to prevent further incremental decrease in the extent and condition of the community.

As a Planning Permit is currently not required to remove native vegetation on properties smaller than 0.4 hectares in area, there are no planning controls to prevent the removal of Moonah, or other native vegetation such as understorey vegetation within several properties.

Further degradation of understorey vegetation throughout the study area remains a high risk. To ensure that the significance of the Moonah in this area is maintained, and over time enhanced, it is important that Council protect remnant vegetation within the study area through planning controls as well as undertaking public education with landowners to encourage better awareness and management.

Risks to ecological values within the study area include:

- Removal of the FFG Act listed *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community*;
- Removal of understorey vegetation;
- Mulching of Moonah woodlands, preventing recruitment of indigenous species.

6.1 Recommendations

6.1.1 Planning schemes amendments

To mitigate the risks to ecological values within the study area, it is recommended that additional planning controls are implemented to

- Protect and ensure the long term future of Moonah woodlands;
- Protect and improve the diversity of vegetation within Moonah woodlands, including understorey vegetation (eg. shrubs, scramblers/climbers, grasses and herbs;
- Encourage natural regeneration of Moonah and indigenous understorey vegetation;
- Promote the use of locally indigenous plants for regeneration and revegetation;

This may be in the form of a:

- Vegetation Protection Overlay (VPO); requiring a planning permit to:

  - Remove, destroy or lop any native vegetation.
- Environmental Significance Overlay (ESO); requiring a planning permit to:
  - Construct a building or construct or carry out works;
  - Construct a fence;
  - Construct bicycle pathways and trails;
  - Subdivide land;
  - Remove, destroy or lop any native vegetation.
- Significant Landscape Overlay (SLO); requiring a planning permit to:
  - Construct a building or construct or carry out works;
  - Construct a fence;
  - Remove, destroy or lop any native vegetation.

An ESO or SLO may have an advantage over a VPO given a permit is triggered to construct a building or carry out works, in addition to the removal of native vegetation (the trigger for a permit to construct a building or carry out works may be more enforceable than removal of native vegetation, in some circumstances).

Opportunities to maintain and improve ecological values through an ESO/VPO/SLO include a requirement under the proposed ESO/VPO/SLO to:

- Outline measures to encourage ecological restoration, regeneration and revegetation with indigenous species;
- Provide a landscape plan to construct a building or construct or carry out works, which incorporates the use of indigenous species for revegetation, and restricts the use of mulching within areas of remnant vegetation;
- Outline the reason for removing any native vegetation and the practicality of any alternative options which do not require removal of native vegetation.

6.1.2 Public education

Moonah woodlands, diversity of indigenous understorey vegetation and fauna habitat within the study area is at risk of decline due to a lack of knowledge on the significance of the vegetation (and habitat it provides) and impacts of mulching on natural regeneration. It is recommended an education program is implemented to:

- Increase awareness of the significance of the Moonah woodland community, including the importance of maintaining understorey species (eg. Seaberry Saltbush and Bower Spinach) for biodiversity;
- Increase awareness on the impacts of mulching on natural regeneration, and advise that areas supporting indigenous vegetation should not be mulched;
- Advise that indigenous understorey species (shrubs, grasses and herbs) must not be removed;

- Provide recommendations on appropriate indigenous species for landscape planting.

If the City of Greater Geelong Planning Schemes is amended to include a planning overlay applicable to the study area, the education program should also include the implications of the planning scheme amendment.

It is also recommended any education program also include the identification of Leafy Greenhood, given this nationally significant species has been previously recorded within the study area. Any new records of the species should be reported to the City of Greater Geelong's environmental unit and the Commonwealth Department of Environment and Energy.

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Figures

Legend

- Study Area
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Major Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Ramsar wetland
- Crown Land
- Localities

Figure 1

Location of the study area
Warrenbeen Court Significant Residential Tree Study, Barwon Heads

N

0 500 1,000
Metres

ecology & heritage partners

Legend

- Study Area

Trees (Moonah)

- Scattered Tree (LOT)
- VLOT in Patch
- LOT in Patch

Threatened flora

- Bellarine Yellow Gum

Vegetation

- Coastal Alkaline Scrub (Moonah Woodland)
- Derived Grassland
- Planted Moonah

Vegetation condition*

- Good condition
- Moderate condition
- Poor-moderate condition
- Poor condition

* Condition is a representation of the overall vegetation community structure. Poor condition indicates an issue of a need for improved management.

Figure 2

Ecological features

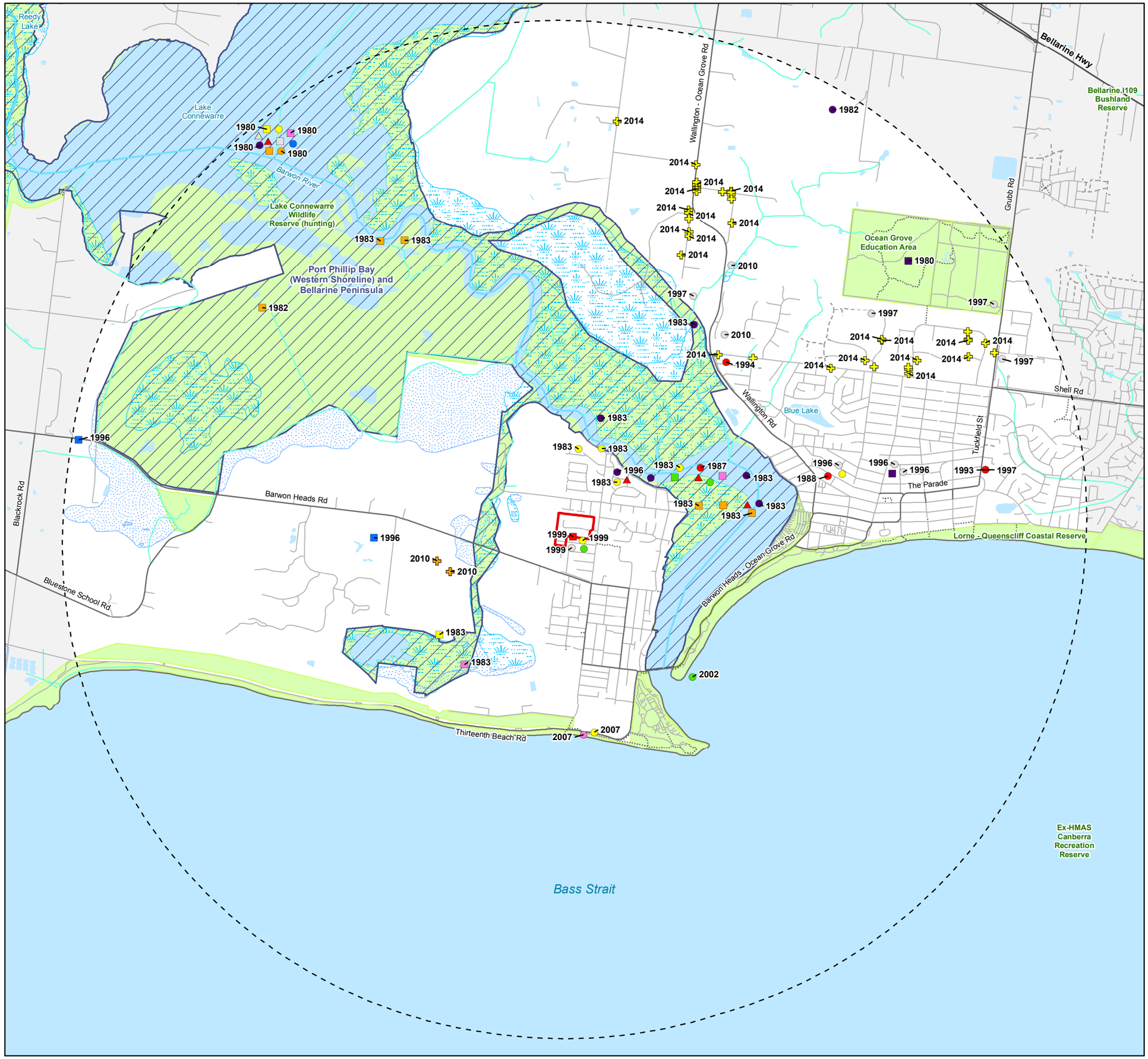
Warrenbeen Court Significant Residential Tree Study, Barwon Heads

N

0 20 40

Metres

ecology & heritage partners



Legend

Study Area

Significant flora

- Bellarine Yellow-gum
- Coast Bitter-bush
- Coast Fescue
- Coast Twin-leaf
- Coast Wirilda
- Creeping Rush
- Dune Poa
- Grey Mangrove
- Ivy-leaf Duckweed
- Leafy Greenhood
- Marsh Saltbush
- Prickly Arrowgrass
- Rare Bitter-bush
- Salt Blown-grass
- Salt Lawrencia
- Snowy Mint-bush
- Tiny Arrowgrass
- Yellow Sea-lavender

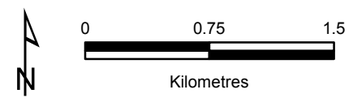
Ecology and Heritage Partners records

- Beaded Glasswort
- Bellarine Yellow-gum

Figure 3

Previously documented significant flora within 5km of the study area

Warrenbeen Court Significant Residential Tree Study, Barwon Heads



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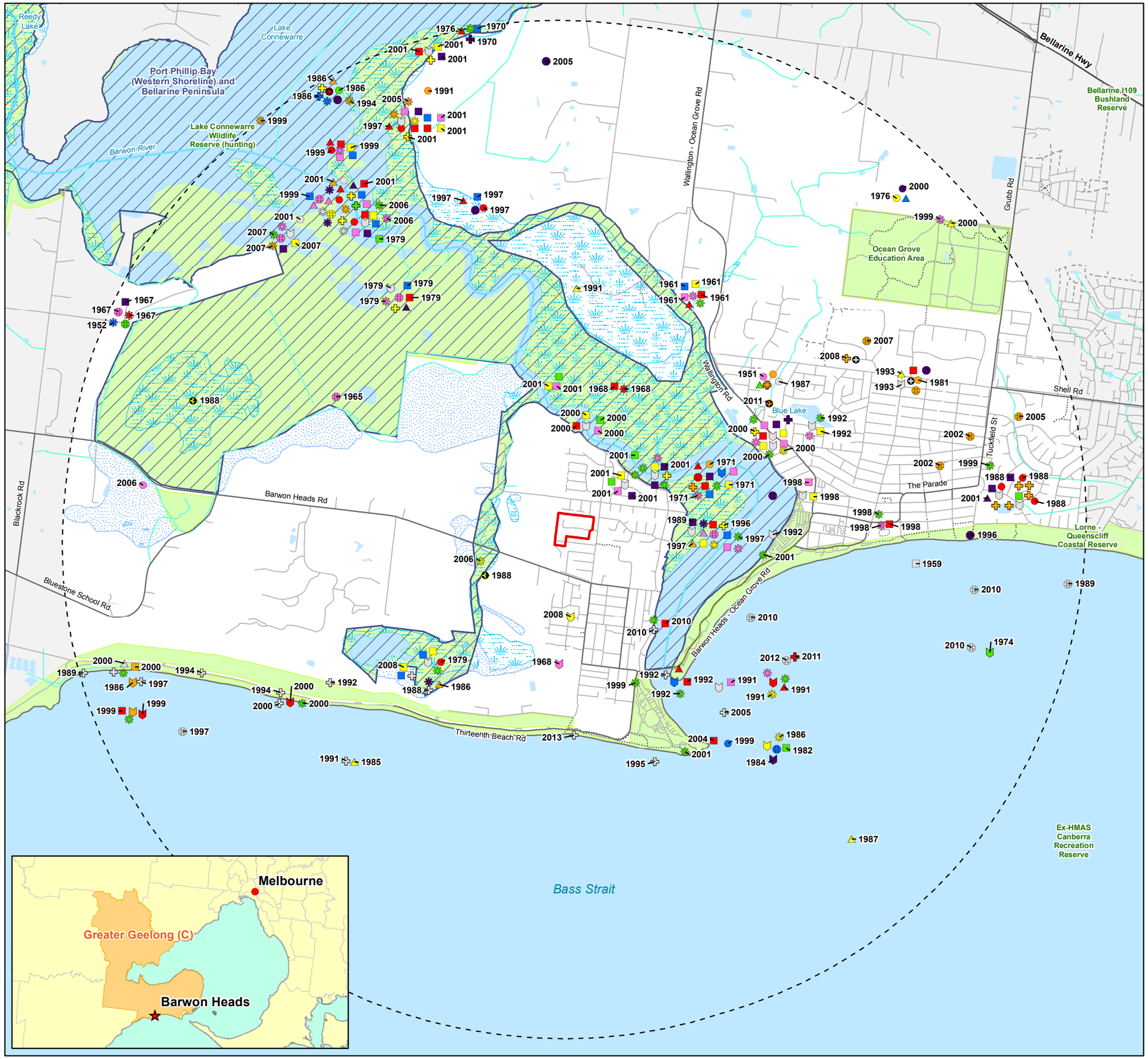

Legend

- Study Area

Significant fauna

- Australasian Bittern
- Australasian Shoveler
- Black Falcon
- Black-eared Cuckoo
- Black-tailed Godwit
- Blue Petrel
- Brolga
- Brown Toadlet
- Brush-tailed Phascogale
- Caspian Tern
- Common Diving-Petrel
- Common Greenshank
- Common Sandpiper
- Curlew Sandpiper
- Eastern Curlew
- Eastern Great Egret
- Fairy Prion
- Fairy Tern
- Great Knot
- Grey Goshawk
- Ground Parrot
- Growling Grass Frog
- Gull-billed Tern
- Hardhead
- Hooded Plover
- Humpback Whale
- Latham's Snipe
- Little Egret
- Little Tern
- Long-toed Stint
- Magpie Goose
- Marsh Sandpiper
- Musk Duck
- Nankeen Night Heron
- Orange-bellied Parrot
- Pacific Golden Plover
- Pacific Gull
- Pectoral Sandpiper
- Pied Cormorant
- Red Knot
- Royal Spoonbill
- Ruddy Turnstone
- Sanderling
- Shy Albatross
- Small Ant Blue
- Sooty Oystercatcher
- Southern Brown Bandicoot
- Southern Giant-Petrel
- Southern Right Whale
- Spotted Harrier
- Swift Parrot
- Terek Sandpiper
- Wandering Albatross
- Whimbrel
- Whiskered Tern
- White-bellied Sea-Eagle
- White-throated Needletail
- White-winged Black Tern
- Yarra Pygmy Perch
- Yellow Sedge-skipper

Figure 4

Previously documented significant fauna within 5km of the study area

Warrenbeen Court Significant Residential Tree Study, Barwon Heads

N

0 0.75 1.5

Kilometres

ecology & heritage partners

Appendix 1.1 – Defining Species/Community Significance

Table A1.1. Criteria for defining Site Significance ratings.

National Significance
A species or community is of national significance if: • It is listed under the EPBC Act.
State Significance
A species or community is of State significance if: • It is listed as rare, endangered, vulnerable or threatened under the *Advisory List of Rare or Threatened Plants in Victoria* (DEPI 2014). • It is listed as threatened under the FFG Act.

Appendix 1.2 – Vegetation Condition

Table A1.2 Defining Vegetation Condition ratings.

Criteria for defining Vegetation Condition
High Quality: Vegetation dominated by a diversity of indigenous species, with defined structures (where appropriate), such as canopy layer, shrub layer, and ground cover, with little or few introduced species present.
Moderate Quality: Vegetation dominated by a diversity of indigenous species, but is lacking some structures, such as canopy layer, shrub layer or ground cover, and/or there is a greater level of introduced flora species present.
Low Quality: Vegetation dominated by introduced species, but supports low levels of indigenous species present, in the canopy, shrub layer or ground cover.

Appendix 1.3 – Bioregional Conservation Status

Table A1.3 Defining Bioregional Conservation Status of EVCs within a specified bioregion.

Criteria for defining Vegetation Condition
Presumed Extinct: Probably no longer present in the bioregion (the accuracy of this resumption is limited by the use of remotely - sensed 1:100 000 scale woody vegetation cover mapping to determine depletion - grassland, open woodland and wetland types are particularly affected).
Endangered: Less than 10% pre-European extent remains; OR Combination of depletion, degradation, current threats and rarity is comparable overall to the above: • 10 to 30% pre-European extent remains and severely degraded over a majority of this area; or • naturally restricted EVC reduced to 30% or less of former range and moderately degraded over a majority of this area; or • rare EVC cleared and/or moderately degraded over a majority of former area.
Vulnerable: 10 to 30% pre-European extent remains; OR • Combination of depletion, degradation, current threats and rarity is comparable overall to the above: • greater than 30% and up to 50% pre-European extent remains and moderately degraded over a majority of this area; or • greater than 50% pre-European extent remains and severely degraded over a majority of this area; or

Criteria for defining Vegetation Condition
• naturally restricted EVC where greater than 30% pre-European extent remains and moderately degraded over a majority of this area; or • rare EVC cleared and/or moderately degraded over a minority of former area.
Depleted: Greater than 30% and up to 50% pre-European extent remains; OR Combination of depletion, degradation and current threats is comparable overall to the above and: • greater than 50% pre-European extent remains and moderately degraded over a majority of this area.
Rare: Rare EVC (as defined by geographic occurrence) but neither depleted, degraded nor currently threatened to an extent that would qualify as Endangered, Vulnerable or Depleted.
Least Concern: Greater than 50% pre-European extent remains and subject to little to no degradation over a majority of this area.

Appendix 2 – Flora

Table A2.2 Significant flora recorded within 10 kilometres of the study area

Likelihood: Habitat characteristics of significant flora species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings are defined below.

1 - Known occurrence

- Recorded within the study area recently (i.e. within ten years)

2 - High Likelihood

- Previous records of the species in the local vicinity; and/or,
- The study area contains areas of high quality habitat.

3 - Moderate Likelihood

- Limited previous records of the species in the local vicinity; and/or,
- The study area contains poor or limited habitat.

4 - Low Likelihood

- Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.

5 – Unlikely

- No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
NATIONAL SIGNIFICANCE							
Glycine latrobeana	Clover Glycine	-	-	VU	L	v	5
Ixodia achillaeoides subsp. *arenicola*	Coast Ixodia	-	-	VU	-	v	5
Lachnagrostis adamsonii	Adamson's Blown-grass	1	2003	EN	L	v	5
Lepidium aschersonii	Spiny Peppercress	1	2006	VU	L	e	5
Leucochrysum albicans var. *tricolor*	Hoary Sunray	-	-	EN	-	e	5
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	-	-	CR	L	e	5
Prasophyllum frenchii	Maroon Leek-orchid	-	-	EN	L	e	5
Pterostylis cucullata	Leafy Greenhood	1	1999	VU	L	P	2
Thelymitra epipactoides	Metallic Sun-orchid	-	-	EN	L	e	5

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
Xerochrysum palustre	Swamp Everlasting	-	-	VU	L	v	5
STATE SIGNIFICANCE							
Acacia cupularis	Cup Wattle	1	2004	-	-	r	5
Acacia uncifolia	Coast Wirilda	12	2010	-	-	r	2
Adriana quadripartita	Coast Bitter-bush	18	2005	-	-	v	5
Adriana quadripartita s.s. (glabrous form)	Rare Bitter-bush	2	2002	-	L		5
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush	10	2007	-	-	r	5
Avicennia marina subsp. *australasica*	Grey Mangrove	10	1996	-	-	r	5
Caladenia venusta	Large White Spider-orchid	2	1931	-	-	r	5
Eucalyptus leucoxylon subsp. *bellarinensis*	Bellarine Yellow-gum	21	2013	-	L	e	1
Heterozostera tasmanica	Tasman Grass-wrack	3	2002	-	-	r	5
Juncus revolutus	Creeping Rush	4	1984	-	-	r	5
Lachnagrostis robusta	Salt Blown-grass	2	1996	-	-	r	5
Lawrencia spicata	Salt Lawrencia	8	2007	-	-	r	5
Lemna trisulca	Ivy-leaf Duckweed	1	1980	-	-	k	5
Lepidosperma canescens	Hoary Rapier-sedge	2	1875	-	-	r	5
Limonium australe var. *australe*	Yellow Sea-lavender	6	2002	-	-	r	5
Lotus australis var. *australis*	Austral Trefoil	1	1989	-	-	k	5
Poa billardierei	Coast Fescue	4	1989	-	-	r	5
Poa poiformis var. *ramifer*	Dune Poa	2	2007	-	-	r	5
Prostanthera nivea var. *nivea*	Snowy Mint-bush	2	1996	-	-	r	5
Ruppia tuberosa	Tuberous Tassel	2	2002	-	-	k	5

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
Triglochin minutissima	Tiny Arrowgrass	3	2007	-	-	r	5
Triglochin mucronata	Prickly Arrowgrass	4	2007	-	-	r	5
Zygophyllum billardierei	Coast Twin-leaf	12	2007	-	-	r	2

Notes: EPBC = *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), FFG = *Flora and Fauna Guarantee Act 1988* (FFG Act), DEPI= Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014), L = Listed, # = Records identified from EPBC Act Protected Matters Search Tool, Data source: Victorian Biodiversity Atlas (DELWP 2016d); Protected Matters Search Tool (DoE 2016). Order: Alphabetical. .

Appendix 3 – Fauna

Table A3.1. Significant fauna within 10 kilometres of the study area

Likelihood: Habitat characteristics of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings are defined below.

1 - High Likelihood
- Known resident in the study area based on site observations, database records, or expert advice; and/or,
- Recent records (i.e. within five years) of the species in the local area (DELWP 2015); and/or,
- The study area contains the species' preferred habitat.

2 - Moderate Likelihood
- The species is likely to visit the study area regularly (i.e. at least seasonally); and/or,
- Previous records of the species in the local area (DELWP 2015); and/or,
- The study area contains some characteristics of the species' preferred habitat.

3 - Low Likelihood
- The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or,
- There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or,
- The study area contains few or no characteristics of the species' preferred habitat.

4 - Unlikely
- No previous records of the species in the local area; and/or,
- The species may fly over the study area when moving between areas of more suitable habitat; and/or,
- Out of the species' range; and/or,
- No suitable habitat present.

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
NATIONAL SIGNIFICANCE								
Swamp Antechinus	*Antechinus minimus maritimus*	-	-	VU	L	NT	VU	4
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1973	3	EN	L	NT	NT	4
Grey-headed Flying-fox	*Pteropus poliocephalus*	-	-	VU	L	VU	VU	4
Wandering Albatross	*Diomedea exulans*	1981	35	VU	L	EN	VU	4
Black-browed Albatross	*Thalassarche melanophris melanophris*	2008	53	VU	-	VU	NT	4
Shy Albatross	*Thalassarche cauta*	2008	53	VU	L	VU	VU	4
Grey-headed Albatross	*Thalassarche chrysostoma*	1987	4	EN	L	VU	VU	4
Indian Yellow-nosed Albatross	*Thalassarche carteri*	2007	12	VU	L	VU	-	4
Antipodean Albatross	*Diomedea exulans antipodensis*	-	-	VU	-	-	VU	4
Campbell Albatross	*Thalassarche melanophris impavida*	-	-	VU	-	-	VU	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
White-capped Albatross	*Thalassarche cauta steadi*	-	-	VU	-	-	VU	4
Salvin's Albatross	*Thalassarche salvini*	-	-	VU	-	-	VU	4
Buller's Albatross	*Diomedea bulleri*	-	-	VU	-	-	VU	4
Southern Royal Albatross	*Diomedea epomophora epomophora*	-	-	VU	-	-	VU	4
Northern Royal Albatross	*Diomedea epomophora sanfordi*	-	-	EN	-	-	VU	4
Sooty Albatross	*Phoebetria fusca*	-	-	VU	L	-	VU	4
Southern Giant-Petrel	*Macronectes giganteus*	1988	47	EN	L	VU	VU	4
Northern Giant-Petrel	*Macronectes halli*	1988	15	VU	L	NT	-	4
Blue Petrel	*Halobaena caerulea*	1999	4	VU	-	-	-	4
Fairy Prion	*Pachyptila turtur*	2000	43	VU	-	VU	-	4
Soft-plumaged Petrel	*Pterodroma mollis*	-	-	VU	-	-	-	4
Gould's Petrel	*Pterodroma leucoptera*	-	-	EN	-	-	VU	4
Australasian Bittern	*Botaurus poiciloptilus*	2008	41	EN	L	EN	VU	4
Lesser Sand Plover	*Charadrius mongolus*	1998	34	EN	-	CR	-	4
Hooded Plover	*Thinornis rubricollis rubricollis*	2013	148	VU	L	VU	VU	4
Plains-wanderer	*Pedionomus torquatus*	1893	1	CR	L	CR	EN	4
Australian Painted Snipe	*Rostratula australis*	1985	4	VU	L	CR	VU	4
Western Alaskan Bar-tailed Godwit	*Limosa lapponica baueri*	-	-	VU	-	-	VU	4
Northern Siberian Bar-tailed Godwit	*Limosa lapponica menzbieri*	-	-	EN	-	-	VU	4
Eastern Curlew	*Numenius madagascariensis*	2008	107	CR	-	VU	-	4
Great Knot	*Calidris tenuirostris*	2001	43	CR	L	EN	-	4
Red Knot	*Calidris canutus*	2008	61	EN	-	EN	-	4
Fairy Tern	*Sternula nereis nereis*	2006	115	VU	L	EN	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Superb Parrot	*Polytelis swainsonii*	1896	1	VU	L	EN	VU	4
Swift Parrot	*Lathamus discolor*	2007	32	CR	L	EN	EN	4
Orange-bellied Parrot	*Neophema chrysogaster*	2011	104	CR	L	CR	CR	4
Ground Parrot	*Pezoporus wallicus wallicus*	1986	4	-	L	EN	VU	4
Rufous Bristlebird (Otways subsp.)	*Dasyornis broadbenti caryochrous*	1914	1	-	L	NT	VU	4
Regent Honeyeater	*Anthochaera phrygia*	-	-	CR	L	CR	EN	4
Painted Honeyeater	*Grantiella picta*	-	-	VU	L	VU	NT	4
Growling Grass Frog	*Litoria raniformis*	1997	6	VU	L	EN	VU	4
Dwarf Galaxias	*Galaxiella pusilla*	-	-	VU	L	EN	VU	4
Australian Grayling	*Prototroctes maraena*	1986	7	VU	L	VU	VU	4
Yarra Pygmy Perch	*Nannoperca obscura*	2011	57	VU	L	VU	VU	4
Small Ant Blue	*Acrodipsas myrmecophila*	1974	35	-	L	CR	EN	4
STATE SIGNIFICANCE								
Brush-tailed Phascogale	*Phascogale tapoatafa*	1963	3	-	L	VU	NT	4
Magpie Goose	*Anseranas semipalmata*	2006	29	-	L	NT	-	4
Musk Duck	*Biziura lobata*	2006	63	-	-	VU	-	4
Freckled Duck	*Stictonetta naevosa*	2005	6	-	L	EN	-	4
Australasian Shoveler	*Anas rhynchotis*	2006	104	-	-	VU	-	4
Hardhead	*Aythya australis*	2005	90	-	-	VU	-	4
Blue-billed Duck	*Oxyura australis*	1995	25	-	L	EN	-	4
White-throated Needletail	*Hirundapus caudacutus*	2008	34	-	-	VU	-	4
White-faced Storm-Petrel	*Pelagodroma marina*	2000	22	-	-	VU	-	4
Little Bittern	*Ixobrychus minutus dubius*	2001	2	-	L	EN	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Eastern Great Egret	*Ardea modesta*	2007	231	-	L	VU	-	4
Intermediate Egret	*Ardea intermedia*	1999	9	-	L	EN	-	4
Little Egret	*Egretta garzetta nigripes*	2008	116	-	L	EN	-	4
Square-tailed Kite	*Lophoictinia isura*	2007	1	-	L	VU	-	4
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2005	17	-	L	VU	-	4
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	2000	7	-	L	VU	-	3
Black Falcon	*Falco subniger*	2008	20	-	-	VU	-	3
Brolga	*Grus rubicunda*	2014	13	-	L	VU	-	4
Lewin's Rail	*Lewinia pectoralis pectoralis*	1980	1	-	L	VU	NT	4
Baillon's Crake	*Porzana pusilla palustris*	2001	15	-	L	VU	-	4
Pacific Golden Plover	*Pluvialis fulva*	2006	56	-	-	VU	-	4
Grey Plover	*Pluvialis squatarola*	1981	41	-	-	EN	-	4
Greater Sand Plover	*Charadrius leschenaultii*	1981	14	-	-	CR	-	4
Black-tailed Godwit	*Limosa limosa*	2004	37	-	-	VU	-	4
Whimbrel	*Numenius phaeopus*	1986	20	-	-	VU	-	4
Terek Sandpiper	*Xenus cinereus*	2008	2	-	L	EN	-	4
Common Sandpiper	*Actitis hypoleucos*	2008	49	-	-	VU	-	4
Grey-tailed Tattler	*Tringa brevipes*	1988	39	-	L	CR	-	4
Common Greenshank	*Tringa nebularia*	2008	229	-	-	VU	-	4
Marsh Sandpiper	*Tringa stagnatilis*	2001	38	-	-	VU	-	4
Wood Sandpiper	*Tringa glareola*	1999	4	-	-	VU	-	4
Ruddy Turnstone	*Arenaria interpres*	2000	75	-	-	VU	-	4
Little Tern	*Sternula albifrons sinensis*	2008	53	-	L	VU	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	1999	25	-	L	EN	-	4
Caspian Tern	*Hydroprogne caspia*	2010	188	-	L	NT	-	4
Powerful Owl	*Ninox strenua*	1892	1	-	L	VU	-	4
Masked Owl	*Tyto novaehollandiae novaehollandiae*	1979	2	-	L	EN	NT	4
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1896	1	-	-	NT	NT	4
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	1981	10	-	L	VU	-	4
Speckled Warbler	*Chthonicola sagittatus*	1914	1	-	L	VU	NT	4
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1891	1	-	L	EN	NT	4
Hooded Robin	*Melanodryas cucullata cucullata*	1978	2	-	L	NT	NT	4
Brown Toadlet	*Pseudophryne bibronii*	2000	1	-	L	EN	DD	4
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1988	28	-	L	VU	LC	4
REGIONAL SIGNIFICANCE								
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	1945	1	-	-	NT	-	4
Common Diving-Petrel	*Pelecanoides urinatrix*	2000	20	-	-	NT	-	4
Pied Cormorant	*Phalacrocorax varius*	2007	149	-	-	NT	-	4
Black-faced Cormorant	*Phalacrocorax fuscescens*	2000	43	-	-	NT	-	4
Nankeen Night Heron	*Nycticorax caledonicus hillii*	1989	21	-	-	NT	-	4
Glossy Ibis	*Plegadis falcinellus*	2007	31	-	-	NT	-	4
Royal Spoonbill	*Platalea regia*	2007	228	-	-	NT	-	4
Spotted Harrier	*Circus assimilis*	1982	5	-	-	NT	-	4
Sooty Oystercatcher	*Haematopus fuliginosus*	1992	37	-	-	NT	-	4
Latham's Snipe	*Gallinago hardwickii*	2008	67	-	-	NT	-	4
Sanderling	*Calidris alba*	2008	19	-	-	NT	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Long-toed Stint	*Calidris subminuta*	1986	7	-	-	NT	-	4
Pectoral Sandpiper	*Calidris melanotos*	2001	13	-	-	NT	-	4
Little Button-quail	*Turnix velox*	1893	1	-	-	NT	-	4
Whiskered Tern	*Chlidonias hybridus javanicus*	2007	98	-	-	NT	-	4
White-winged Black Tern	*Chlidonias leucopterus*	1992	9	-	-	NT	-	4
White-fronted Tern	*Sterna striata*	1986	9	-	-	NT	-	4
Pacific Gull	*Larus pacificus pacificus*	2010	247	-	-	NT	-	4
Black-eared Cuckoo	*Chrysococcyx osculans*	2001	5	-	-	NT	-	4
Azure Kingfisher	*Alcedo azurea*	1981	2	-	-	NT	-	4
Spotted Quail-thrush	*Cinclosoma punctatum*	1978	1	-	-	NT	-	4

Notes: EPBC = *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), FFG = *Flora and Fauna Guarantee Act 1988* (FFG Act), DSE = Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013) , # = Records identified from EPBC Act Protected Matters Search Tool, L = Listed. Data sources: Victorian Biodiversity Atlas (DELWP 2016); Victorian Fauna Database (Viridans 2014b); Protected Matters Search Tool (DoE 2016). Taxonomic order: Mammals (Strahan 1995 in Menkhorst & Knight 2004); Birds (Christidis & Boles, 2008); Reptiles and Amphibians (Cogger *et al.* 1983 in Cogger 1996); Fish (Nelson 1994); Mussels & Crustaceans (Alphabetical); Invertebrates (Alphabetical).