Draft Report

Rural Significant Tree Assessment: Barwon Heads, Victoria

Prepared for

City of Greater Geelong

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Ecology and Heritage Partners Pty Ltd

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Contents

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1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by City of Greater Geelong to conduct a Significant Tree Assessment within rural private land at Barwon Heads, Victoria, between Barwon Heads township and Bluestone School Road.

A significant tree assessment has previously been conducted within private properties located in Warrenbeen Court and Saratoga Avenue. The State significant, *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community* (Moonah woodland), was recorded within private land in Warrenbeen Court and Saratoga Avenue (Ecology and Heritage Partners 2016).

It was identified during the previous assessment, and by Council, that additional areas of Moonah woodland were present within private land to the west of Warrenbeen Court and Saratoga Avenue, within farming and rural living properties.

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, in particular Moonah trees; 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 within Barwon Heads, Victoria, bound by Barwon Heads township to the east, Thirteenth Beach Road to the south, Bluestone School Road to the west and Lake Connewarre/Barwon River to the north. The study area is approximately 1,000 hectares in size, predominantly comprises farmland and rural living properties, is generally flat and contains one minor waterway.

According to the Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2017a), 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:

- The DELWP NVIM Tool (DELWP 2017a) and Biodiversity Interactive Map (DELWP 2017c) 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.

  - Current zoning and environmental overlays in the study area

- EVC benchmarks (DELWP 2017b) 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 2017d);
- 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 2017);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected Lists (DELWP 2015a; DELWP 2015b);
- 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

The study area was assessed visually from the closest available accessible public land (i.e. road reserves), and via aerial photography interpretation. The field assessment was undertaken on 5 August 2016, recording:

- Location, estimated Diameter at Breast Height (DBH) and height of scattered Moonah;
- Where possible, location, estimated height and DBH of significant Moonah trees, specifically Moonah over 40 centimetres Diameter at Breast Height (DBH)[1];
- Distribution and general vegetation condition of Moonah Woodlands, in addition to dominant and significant flora species present, or considered likely to be present;
- Observations on the potential impacts by development in the area and adverse impacts on trees.

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 2017b).

3.3 Assessment Qualifications and Limitations

The study area was assessed remotely from adjacent public land and aerial photography interpretation, as such, limited data could be collected on tree DBH, and understorey species present. Targeted flora or fauna surveys were not undertaken, as this was beyond the preliminary scope of the project. The assessment was limited to recording the Moonah woodland and scattered Moonah; other vegetation communities were not

[1] 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 (*Allocasuarina* spp.) within adjacent EVCs.

recorded. 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 assessment of the ecological values present within the study area in order to meet the aims of the assessment.

4 Results

4.1 Remnant patches

The study area contains fragmented patches of Coastal Alkaline Scrub (EVC 858). Coastal Alkaline Scrub is listed as Endangered within the Otway Plain bioregion (Appendix 1.3), and also corresponds with the *Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community* listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act). The presence of Coastal Alkaline Scrub is consistent with the modelled pre-1750s native vegetation mapping (DELWP 2017c).

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 2017b).

Coastal Alkaline Scrub (Moonah Woodland) within the study area was predominantly in poor condition[2] and were dominated by Moonah *Melaleuca lanceolata* with a depleted understorey dominated by grasses, with occasional Seaberry Saltbush *Rhagodia candolleana* (Plates 1 and 2). While the grasses could not be positively identified due to access constraints, it was considered likely that the grasses present were predominantly exotic (e.g. Annual Veldt-grass *Ehrharta longifolia*). The degradation of the understorey is likely to be a result of a slow decline due to grazing and weed invasion.

Condition is a representation of the overall vegetation community structure; despite some areas containing vegetation communities in poor condition, these areas support a threatened vegetation community of State significance and should be managed accordingly.

[2] Definitions of vegetation condition outlined within Appendix 1.2.

Plate 1. Coastal Alkaline Scrub (Moonah Woodland) within the study area in poor condition.

Plate 2. Derived grassland of Coastal Alkaline Scrub within the study area in poor condition.

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.

4.2 Scattered Trees

Fifteen 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

Two Large Old Trees (LOTs) within remnant patches were recorded[3]. However, an accurate assessment of LOTs was difficult due to access constraints; it is likely that additional LOTs were present.

4.4 National and State significant flora, fauna and communities

4.4.1 Flora

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

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

4.4.2 *Fauna*

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 2017).

- 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 (Figure 2). Scattered Moonah are also protected under the FFG Act.

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).

Moonah Woodlands within the study area are unlikely to support any matters of NES.

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

One ecological community (*Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community*) listed as threatened under the FFG Act was recorded within the study area. In its final recommendation the Scientific Advisory Committee (SAC 1998) determined that Moonah Woodland is in a demonstrable state of decline which is likely to result in extinction. The Action Statement for the community outlines key threats to include (DSE 2003):

- Clearing for residential development. Significant loss of this community due to residential development and is likely to continue under existing planning arrangements. Residential

development often results in the retention of a proportion of the components of the community, but almost total loss of the smaller shrub and ground layer components. Regeneration of the retained taller components is rare within residential areas.

- Lack of knowledge about recruitment of Moonah. Within most reserved examples of this community, regeneration of Moonah is rarely observed, resulting in a skewed age distribution that may lead to significant loss of the overstorey and associated degradation of the community in future decades.

Both of these threats are pertinent to the study area, and Moonah Woodland in Warrenbeen Court and Saratoga Avenue (Ecology and Heritage Partners 2016).

The major conservation objectives, as stated in Action Statement, comprise:

- conservation, and where possible enhancement, of the current extent and quality of the community; and,
- investigate and refine our understanding of the community.

Relevant management actions outlined within the Action Statement for the community include:

- Ensure that significant remnants of Moonah Woodland are protected from inappropriate development through the application of the Victorian Planning Provisions and local planning schemes.
- Ensure that relevant plans, including local fire protection plans and National Park and Conservation Reserve management plans, note the presence of significant remnants of Moonah Woodland and incorporate objectives and actions to protect them
- Undertake public education and liaison to make landholders aware of significance of Moonah Woodland remnants that may occur on their properties, to encourage protection and enhancement of these remnants, through incentives, voluntary agreements and conservation covenants

Recommended site specific actions to meet the objectives and actions outlined within the Action Statement for the community are outlined within Section 6.1.

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[4]. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 5.3.1).

[4] 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.

5.3.1 Local Planning Schemes

The study area is located within the City of Greater Geelong municipality and is zoned Farming Zone (FZ). No environmental overlays currently apply to Moonah woodlands recorded the study area (DELWP 2017f).

6 Conclusion

The study area contains indigenous vegetation (Moonah Woodland and scattered Moonah) of State significance, listed as threatened under the FFG Act, and Endangered within the Otway Plain bioregion. Moonah woodland within the study area was in poor condition (the presence of poor condition, or relatively poor condition, Moonah woodland, is an indication of historical grazing and weed invasion). Despite being 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.

Further degradation of vegetation throughout the study area remains a high risk. To ensure that the extent of Moonah woodland 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*; and,
- Continual grazing preventing regeneration of Moonah and other native 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; and,
- 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). It is recommended an education program is implemented to increase awareness of the significance of the Moonah woodland community, including the importance of allowing natural regeneration through exclusion of grazing in patches of Moonah;

If the City of Greater Geelong Planning Scheme 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.

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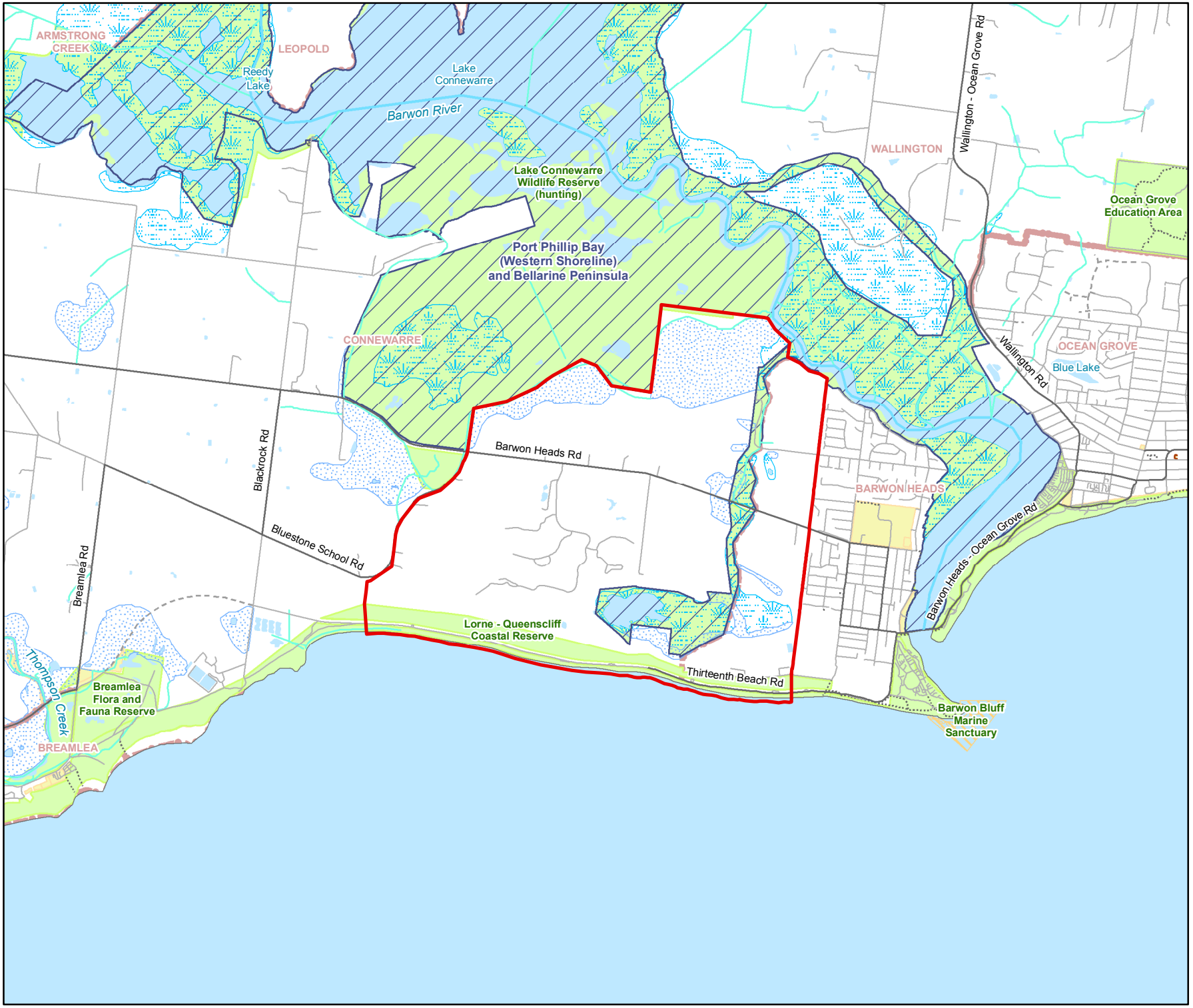
Figures



Legend

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

Figure 1

Location of the study area

Significant Residential Tree Assessment: Barwon Heads, Victoria

N

0 500 1,000

Metres

ecology & heritage partners

Legend

- Study Area

Trees (Moonah)

- Scattered Tree
- LOT in Patch

Vegetation

- Coastal Alkaline Scrub (Moohah Woodland)

Vegetation Condition

- Poor Condition

Figure 2

Ecological Features

Significant Residential Tree Assessment: Barwon Heads, Victoria

N

0 200 400

Metres

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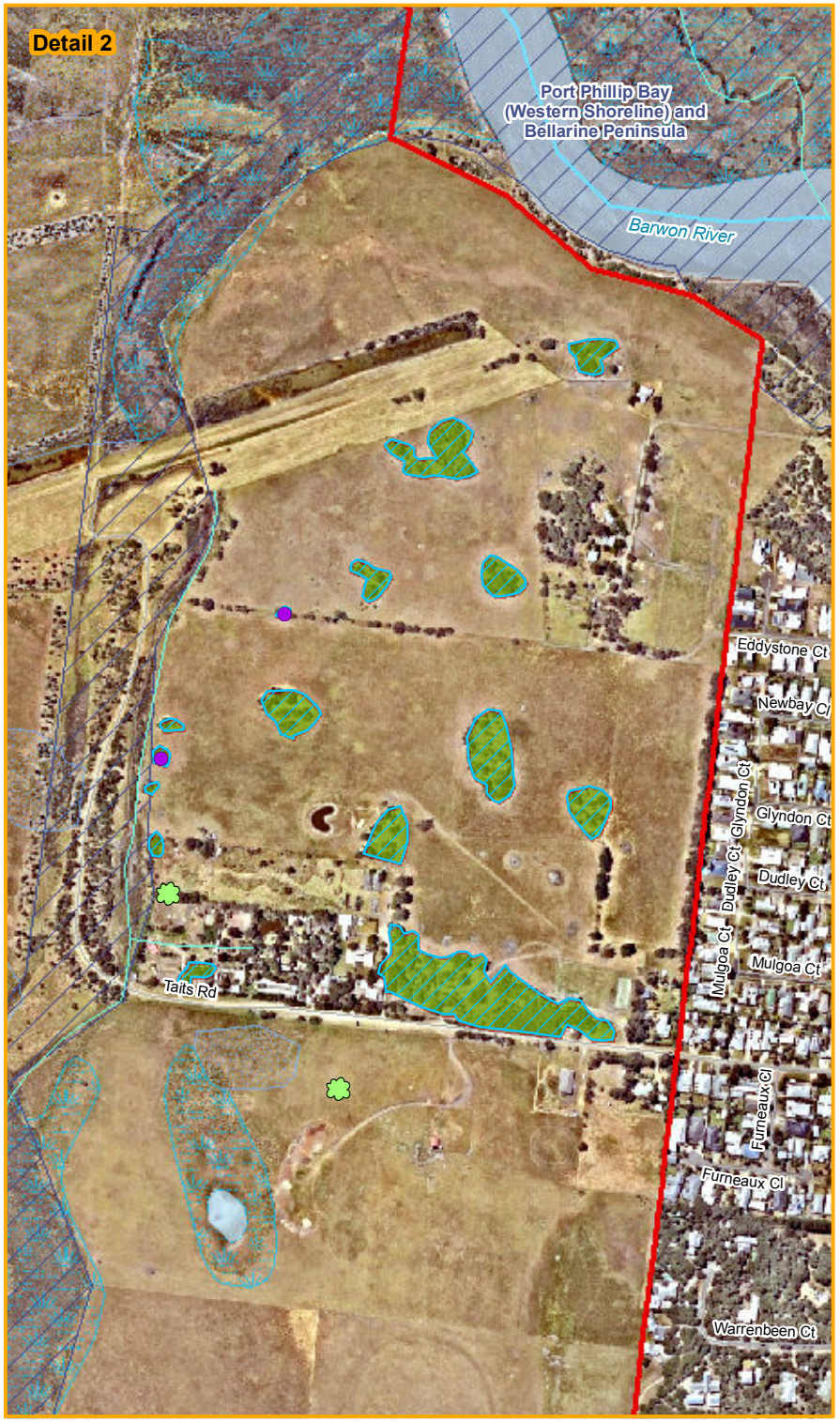

Legend

- Study Area

Trees (Moonah)

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

Vegetation

- Coastal Alkaline Scrub (Moohah Woodland)

Vegetation Condition

- Poor Condition

Figure 2 - detail

Ecological Features

Significant Residential Tree Assessment: Barwon Heads, Victoria

N

0 100 200

Metres

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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	4
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	3
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	3
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	4

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	3
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).