



ÖKOLOGIE CONSULTING

Ecological Assessment

**Council Land at 690 Batman Road and Freehold
Land at Glenrana Drive, Indented Head**

**Prepared for
City of Greater Geelong**



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Document Information

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Report prepared by Okologie Consulting for City of Greater Geelong

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Summary

Okologie Consulting was engaged by the City of Greater Geelong to prepare an ecological assessment for Council owned land at 690 Batman Road, Indented Head and freehold land at Seabreeze Estate, Glenrana Drive, Indented Head, owned by Mira Ira Nominees Pty Ltd.

The aim of the assessment was to identify areas of ecological value at 690 Batman Road and Seabreeze Estate, to inform a proposed land swap between Council and Mira Ira Nominees. The City of Greater Geelong seeks to swap the developable land at 690 Batman Road for areas of high ecological value within Seabreeze Estate.

Site Description

The subject site consists of two separate land parcels; Council owned land at 690 Batman Road, Indented Head (LP210545) comprising approximately four hectares; and, freehold land owned by Mira Ira Nominees Pty Ltd at Seabreeze Estate, Glenrana Drive, Indented Head (PS643962) covering approximately 15 hectares.

Results

The site was characterised by open, cleared areas of exotic grassland to the north and west, interspersed by a wetland/woodland complex to the northwest that was contiguous with woodland through to the south of the site. The majority of the site has been modified from previous agricultural activities (i.e. grazing), land clearing and weed invasion. Areas of remnant vegetation within the site were attributed to Plains Grassy Woodland, Grassy Woodland and Plains Freshwater Sedge Wetland based on floristic, life form and ecological characteristics.

Two areas of Plains Freshwater Sedge Wetland meet the criteria for *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* ecological community listed as Critically Endangered under the *Environment Protection Biodiversity Conservation Act 1999*.

No listed threatened flora species were recorded within the site and none are considered likely to occur due to the modified condition of habitat within the site. One listed threatened fauna species, Latham's Snipe *Gallinago hardwickii*, was recorded within the freshwater wetland habitat during the field assessment. Latham's Snipe is a listed Migratory Wetland Species under the *Environment Protection Biodiversity Conservation Act 1999*, and is listed as Near Threatened in Victoria.

Assessment of Land Values

An assessment of land values was undertaken to determine the areas of ecological value and developable land within the site, which identified:



- 1.15 hectares of very high ecological value land.
- 4.65 hectares of high ecological value land.
- 3.07 hectares of moderate ecological value land.
- 4.16 hectares of low ecological value land.
- 6.27 hectares of very ecological value land (developable land).

Biodiversity Impact Report

A Biodiversity Impact Report was generated to determine the biodiversity information for the site. The report found that the site supports 12.197 hectares of marked native vegetation, comprising 9.178 hectares of remnant patches and 43 scattered trees.

The Biodiversity Impact Report identified the majority of habitat zones within the site provides habitat for Purple Blown-grass *Lachnagrostis punicea* subsp. *filifolia* (listed as Rare in Victoria) and Orange-bellied Parrot *Neophema chrysogaster* (listed as Critically Endangered in Victoria). The presence of habitat for these species results in a specific offset amount for the entire site of:

- 5.160 specific units of habitat for Purple Blown-grass.
- 5.037 specific units of habitat for Orange-bellied Parrot.

A proposal to remove native vegetation (habitat zones) within the site may not result in impacts on rare or threatened species habitat being above the specific offset threshold for these species, depending on the area and location of vegetation removal within the site. The Biodiversity Impact Report results (threatened species data) were not included in the criteria for determining the areas of ecological value and developable land due the limitations of the accuracy of this data.

Key Threats and Recommendations

The key threats to ecological values within the site are invasive weeds (noxious and environmental), unauthorised access to areas of woodland and a change in land use practices. It is recommended that an Environment Management Plan be prepared, which outlines active management actions, with the aim of protecting/enhancing ecological values in the site, including:

- A Weed Management Plan that outlines the target weed species, methods of control, implementation schedule and timeframes, monitoring, compliance and reporting requirements.
- Measures to prevent unauthorised vehicle access to the site (such as bollards or fencing).
- Biomass control measure such as slashing or crash grazing to reduce biomass cover in the woodland understorey.



1 Introduction

1.1 Project Background

Okologie Consulting was engaged by the City of Greater Geelong (CoGG) to prepare an ecological assessment for Council owned land at 690 Batman Road, Indented Head and freehold land at Seabreeze Estate, Glenrana Drive, Indented Head, owned by Mira Ira Nominees Pty Ltd.

The aim of the assessment was to identify areas of ecological value at 690 Batman Road and Seabreeze Estate, to inform a proposed land swap between Council and Mira Ira Nominees. The CoGG seeks to swap the developable land at 690 Batman Road for areas of high ecological value within Seabreeze Estate. The CoGG identified the potential significance of the ecological values within this site in a local and regional context, which formed the basis for this assessment.

Part of the land within the site has been previously assessed by Mark Trengrove Ecological Services (2008; 2010; 2103), with the most recent assessment in 2013 undertaken for a Planning Permit (1222/2012) to remove native vegetation.

1.2 Objectives

The objectives of the assessment were to:

- Identify the ecological values (terrestrial flora and fauna species and associated habitats) within the site.
- Map the extent of ecological values and developable land.
- Outline the key threats to ecological values within the site.
- Detail the key issues requiring active management.

1.3 Site Description

The subject site consists of two separate land parcels; Council owned land at 690 Batman Road, Indented Head (LP210545) comprising approximately four hectares; and, freehold land owned by Mira Ira Nominees Pty Ltd at Seabreeze Estate, Glenrana Drive, Indented Head (PS643962) covering around 15 hectares (Figure 1). The site is bounded by Batman road to the north, Seascape Drive and Annmaree Drive to the east and private property to the south and west.

The topography of the site is generally flat to slightly undulating across the site. An unnamed ephemeral creekline runs south to north through the site towards Corio Bay. A constructed wetland intersects the site; however, it was located outside the assessment area (Figure 1).






The site occurs within the Otway Plain bioregion, the CoGG municipality and the Corangamite Catchment Management Authority boundary. The Native Vegetation Location Risk mapping shows the site occurs within Location A (DEPI 2014a). The site is zoned Residential 3 Zone and is not subject to any environmental overlays (DTPLI 2014).

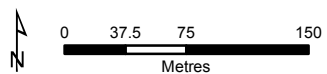
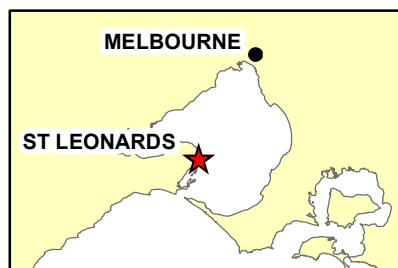
Figure 1

Site Location

690 Batman Road and
Glenrana Drive,
Indented Head

Legend

-  Subject Site - Freehold land (PS64962)
-  Council Land (LP210545)
-  Watercourse



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2 Methodology

2.1 Species Information

Scientific and common names of flora species follow the Australian Plant Census (Australian National Botanic Gardens 2012). The names of terrestrial vertebrate fauna follow the Victorian Biodiversity Atlas (VBA) (DEPI 2014b). Vegetation community names follow the Ecological Vegetation Class (EVC) bioregion benchmarks (DEPI 2014a).

Native flora and fauna species referred to as 'threatened' signifies:

- Listed as critically endangered, endangered, vulnerable or migratory under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act).
- Listed as Threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act).
- Listed as critically endangered, endangered, vulnerable or rare on Victoria's rare or threatened flora and fauna advisory lists (DSE 2005; 2013).

2.2 Desktop Assessment

The desktop assessment included review of relevant databases and other resources, including:

- Biodiversity Interactive Map for modelled biodiversity data (DEPI 2014a).
- The VBA for threatened flora and fauna species records (DEPI 2014b).
- The Protected Matters Search Tool (PMST) for information relating to matters of National Environmental Significance (listed species and communities) under the EPBC Act (DOE 2014a).
- Planning Schemes Online for planning information (DTPLI 2014).
- Relevant environmental legislation, policies and strategies.
- Previous reports for the site and surrounding area.

2.3 Field Assessment

The field assessment was undertaken on 15 and 16 October 2014. The weather was cool and overcast, with a temperature of 16°C over both survey days (BOM 2014). The assessment involved traversing the entire site on foot to identify ecological values. A list of all observed flora and fauna species, and associated habitats were documented during the assessment.

The extent of native vegetation was mapped onto an aerial photograph and with a differential GPS (accuracy \pm two metres post-processing), and coordinates were recorded to GDA 94 (WGS 84). EVCs were determined by reference to the relevant



bioregion pre-1750 and extant EVC mapping and benchmarks descriptions (DEPI 2014a), and review of remnant vegetation in the local area. Native vegetation within the site was classified and mapped according to the definitions under the Guidelines (DEPI 2013a).

A Vegetation Quality Assessment was undertaken in accordance with the Guidelines (DEPI 2013a) and the *Vegetation quality assessment manual – guidelines for applying the habitat hectares scoring method Version 1.3* (DSE 2004) by an accredited assessor (Mark Stockdale, Vegetation Quality Assessment Registration Number: HH026).

2.4 Biodiversity Assessment Guidelines

Under the Guidelines native vegetation is classified as a *remnant patch* or *scattered tree* (DEPI 2013a).

A remnant patch of native vegetation (measure in hectares) is either:

- An area of native vegetation¹, with or without trees, where at least 25 per cent of the total perennial understorey plant cover is native plants.
- An area with three or more indigenous canopy trees where the tree canopy cover is at least 20 per cent.

Scattered tree

- An indigenous canopy tree² that does not form part of a remnant patch (DEPI 2013a).

2.5 Limitations

The preferred survey period for undertaking vegetation assessments in Victoria is spring, which maximises the likelihood of detecting all flora species within a site; however, some annual species may not have been present at the time of the survey. The short duration of the assessment limited the opportunity to observe migratory, transitory or uncommon fauna species.

The information outlined in this report relies on the accuracy of ecological database information, GIS layers and spatial imagery. To minimise potential errors, the most current available data was obtained from relevant sources.

¹ An area of native vegetation is defined as *continuous and unbroken native vegetation*. A break in remnant patch will occur where the definition of remnant patch has not been met for a continuous width of at least 10 metres (DEPI 2013a).

² DEPI also defines a scattered tree as 'A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type' (DEPI 2013b).



The Department of Environment and Primary Industries (DEPI) biodiversity reporting uses a range of biodiversity tools to generate site-based and landscape scale biodiversity information, which includes threatened species habitat values and native vegetation modelled data. The limitations of this modelled data does not necessarily reflect the site habitat conditions for threatened species. The information within biodiversity reports produced by DEPI may also differ from the biodiversity data available to consultants (i.e. VBA, Biodiversity Interactive Map).

The DEPI bioregion and EVC mapping are subject to inherently broad environmental and ecological parameters used in the mapping process. Where the observed EVC was not reflective of what would be expected from EVC mapping and classification, it was attributed to the most appropriate EVC based on combination of its floristic, life form and ecological characteristics, and particular environmental conditions.



3 Results

3.1 Previous Ecological Assessments

Mark Trengrove Ecological Services (2008; 2010; 2103) previously assessed part of the land within Seabreeze Estate. No listed threatened flora or fauna species were recorded within the site during these assessments. Remnant vegetation in the areas assessed by Trengrove (2008; 2010; 2103) was described as Plains Grassy Woodland.

3.2 Ecological Vegetation Classes

The Biodiversity Interactive Map modelling for the Otway Plain bioregion indicates that pre-1750 EVC mapping for the site and immediate surrounds would have been predominantly Grassy Woodland (EVC 175), with Coast Alkaline Scrub (EVC 858), Heathy Woodland (EVC 48) and Plains Grassy Woodland (EVC 55) in the surrounding area (DEPI 2014a). Extant (2005) EVC mapping shows a modified cover of Grassy Woodland across the site (DEPI 2014a).

Areas of remnant vegetation within the site were attributed to Plains Grassy Woodland, Grassy Woodland and Plains Freshwater Sedge Wetland (EVC 899) based on floristic, life form and ecological characteristics (Figure 2).

3.3 Site Overview

The site was characterised by open, cleared areas of exotic grassland to the north and west, interspersed by a wetland/woodland complex to the northwest that was contiguous with woodland through to the south of the site. The majority of the site has been modified from previous agricultural activities (i.e. grazing), land clearing and weed invasion.

The wetland/woodland complex is associated with an ephemeral creekline that runs south to north through the site, which influences the species composition and diversity, and structure of the woodland community. The wetland/woodland complex represents one of the few remaining examples of this vegetation type in the local area. The surrounding landscape was highly modified, comprised of mostly agricultural land and residential development.

3.4 Vegetation Condition

A description of the condition of each EVC is outlined below.

3.4.1 Plains Grassy Woodland



Plains Grassy Woodland (EVC 55) is described as *open, eucalypt woodland to 15 metres tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer* (DEPI 2014a).

Plains Grassy Woodland occurs as scattered trees and fragmented, modified patches in the northeastern section, and as open woodland in the centre and southern section of the site (Figure 2).

Plains Grassy Woodland in the northeastern section of the site (Plate 1) (Habitat Zones 1-3; Figure 2) was dominated by River Red-gum *Eucalyptus camaldulensis* to 20 metres tall, with a highly modified understorey subject to disturbance from regular management (mowing/slashing) and weed invasion. The ground layer contained exotic grasses and herbs such as Panic Veldgrass *Ehrharta erecta*, Perennial Veldgrass *Ehrharta calycina*, Perennial Ryegrass *Lolium perenne*, Sweet Vernal-grass *Anthoxanthum odoratum*, Brown-top Bent *Agrostis capillaris*, Onion Grass *Romulea rosea*, Yorkshire Fog-grass *Holcus lanatus*, Ribwort *Plantago lanceolata*, Cape Weed *Arctotheca calendula* and Cat's Ear *Hypochoeris radicata*. Native species cover was limited to a sparse cover (<5%) of Weeping Grass *Microlaena stipoides* var. *stipoides*, Common Wallaby-grass *Rytidosperma caespitosum* and Finger Rush *Juncus subsecundus*.

Plains Grassy Woodland in the centre (Habitat Zone 7; Figure 2) and southern section of the site (Habitat Zones 9-12; Figure 2) was dominated by River Red-gum over a modified understorey. The level of disturbance in each area was relative the cover and abundance of exotic weed species.

The understorey in Habitat Zones 7, 9 and 10 (Plate 2) (Figure 2) consisted of a dense cover (>70%) of the native Hollow Sedge *Carex tereticaulis*, with Common Tussock-grass *Poa labillardierei*, Common Grass-sedge *Carex breviculmis* and Tall Rush *Juncus procerus* also present. Exotic species generally consisted of Toowoomba Canary Grass *Phalaris aquatica*, Cocksfoot *Dactylis glomerata*, Perennial Veld-grass and Yorkshire Fog-grass.

Plains Grassy Woodland on the southern margins of the site (Habitat Zones 11 & 12; Figure 2), were general drier and comprised a modified shrub layer of Hedge Wattle *Acacia paradoxa* and Boobialla *Myoporum insulare*, with the exotic Flax-leaf Broom *Genista linifolia* and Boneseed *Chrysanthemoides monilifera* present in several areas. The native understorey included a modified cover of Common Tussock-grass, Black-anther Flax-lily *Dianella admixta*, Cotton Fireweed *Senecio quadridentatus*, Bower Spinach *Tetragonia implexicoma* and Kangaroo Grass *Themeda triandra*.

Several scattered River Red-gum trees are present throughout the site, which ranged from very large old trees to small trees (compared to the EVC benchmark DBH) with an exotic dominated understorey (Figure 2).



3.4.2 Grassy Woodland

Grassy Woodland (EVC 175) is described as *open eucalypt woodland to 15 metres tall or occasionally Sheoak woodland to 10 metres tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies* (DEPI 2014a).

Open areas in the western section of the site (Habitat Zone 8; Figure 2), were dominated by Austral Bracken *Pteridium esculentum* (50-80% cover) (Plate 3), with scattered Golden Wattle *Acacia pycnantha* shrubs also present on sandy rises. This vegetation was attributed to Grassy Woodland; however, these areas have been previously cleared of native vegetation and these species have colonised the site. Exotic species present included Perennial Veld-grass, Yorkshire Fog Grass, Cocksfoot, Ribwort and Capeweed.

3.4.3 Plains Freshwater Sedge Wetland

Plains Freshwater Sedge Wetland occurs in *seasonally wet depressions on volcanic and sedimentary plains, typically associated with fertile, silty, peaty or heavy clay soils. Primarily sedgy-herbaceous vegetation, sometimes with scattered or fringing eucalypts or tea-tree/paperbark shrubs in higher rainfall areas. A range of aquatic herbs can be present, and species-richness is mostly relatively low to moderate, but higher towards drier margins* (DEPI 2014a).

Plains Freshwater Sedge Wetland was located in the northwestern corner of the site (Habitat Zone 5; Figure 2), and as two small patches between exotic dominated grassland (Habitat Zone 6a & 6b; Figure 2). Standing water was present during the survey. River Red-gum trees occur on along the fringes of the wetland, and as scattered individuals in the wetland itself.

Habitat Zone 5 (Plate 4) contained several native sedges, grasses and aquatic herbaceous species such as Hollow Sedge, Southern Swamp Wallaby-grass *Amphibromus neesii*, Common Blown-grass *Lachnagrostis filiformis*, Common Spike-sedge *Eleocharis acuta*, Loose-flower Rush *Juncus pauciflorus*, Swamp Crassula *Crassula helmsii*, White Purslane *Neopaxia australasica* and Small Loosestrife *Lythrum hyssopifolia*. Habitat Zone 6a and 6b consisted of Common Spike-sedge, Common Blown-grass, Hollow Sedge and Finger Rush (Figure 2). Exotic species cover within the wetland was generally low (~5%), although Yorkshire Fog-grass, Toowoomba Canary Grass, Water Couch *Paspalum distichum* and Curled Dock *Rumex crispus* dominated the wetland margin.

Two areas of Plains Freshwater Sedge Wetland (Habitat Zones 5 & 6a; Figure 2) meet the criteria for the EPBC Act listed ecological community: *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (hereafter referred to as Seasonal Herbaceous Wetlands). The description, key diagnostic characteristics and condition thresholds for Seasonal Herbaceous Wetlands is outlined in Section 3.7.



3.4.4 Modified Vegetation

Areas of open grassland in the northeastern (Plate 5) and western section (Plate 6) of the site were highly modified and dominated by exotic grasses and herbs (>95% cover) such as Perennial Veld-grass, Perennial Ryegrass, Yorkshire Fog Grass, Cocksfoot, Ribwort and Capeweed. Scattered Golden Wattle and Black Wattle *Acacia mearnsii* shrubs (to three metres tall) were also present in these areas; however, Golden Wattle and Black Wattle are understorey species and do not meet the scattered tree classification (DEPI 2013b). These areas have been mapped as Predominantly Introduced Vegetation (Figure 2).

3.5 Flora

One hundred and eight flora species, comprising 42 indigenous, 64 exotic and two native alien (non-indigenous) species were recorded during the field assessment (Appendix 2).

3.6 Threatened Flora Records

No listed threatened flora species have previously been recorded on the site. The VBA (DEPI 2014b) contains records of three listed threatened flora species in local area (within a five kilometre radius of the site) (Appendix 3). The PMST (DOE 2014a) identified five EPBC Act listed flora species or species habitats as likely to occur within the local area. There is a low likelihood of occurrence for any listed threatened flora species due to the modified condition of habitat within the site.

3.7 Significant Ecological Communities

Review of the PMST (DOE 2014a) identified that three EPBC Act listed ecological communities may occur within the local area, including:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered).
- Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered).
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered).

One EPBC Act listed ecological community; *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (Critically Endangered) (Seasonal Herbaceous Wetlands) was recorded within the site (Figure 2).

Seasonal Herbaceous Wetlands are characterised by a particular hydrology, geography and vegetation structure. They are isolated, freshwater wetlands, inundated on a



seasonal basis through rainfall, then dry out; so surface water is not permanently present. The vegetation structure is open, with a sparse to absent woody cover; with a ground layer is dominated by grasses, sedges and forbs adapted to seasonally wet or waterlogged conditions (TSSC 2012).

Two areas of Plains Freshwater Sedge Wetland (Habitat Zones 5 & 6a; Figure 2) meet the description, key diagnostic characteristics and condition thresholds for Seasonal Herbaceous Wetlands, as described under the listing advice (TSSC 2012). Habitat Zone 6b (Figure 2) does not meet the criteria for Seasonal Herbaceous Wetlands. The key diagnostic characteristics are outlined in Table 1 and the condition thresholds identified under the listing advice (TSSC 2012) is outlined in Table 2.

Table 1: Key Diagnostic Characteristics for Seasonal Herbaceous Wetlands

Key Diagnostic Characteristics	Requirement	Response
Landscape	<ul style="list-style-type: none"> Limited to the temperate zone of mainland south-eastern Australia The wetland is on flat plains grading into slopes, below 500 m asl; On poorly draining clay soils; In a rainfall zone with a winter seasonal rainfall pattern (400-800mm/year) 	Meets each requirement
Hydrology	<ul style="list-style-type: none"> On isolated drainage lines or depressions which are seasonally inundated; Rainfall is the main water source; Salinity of the water is fresh. 	Meets each requirement
Biota	<ul style="list-style-type: none"> Trees and shrubs are sparse to absent; Vegetative cover is dominated by a ground layer of native wetland graminoids and forbs; A range of graminoids is present and typically includes <i>Carex tereticaulis</i>, <i>Lachnagrostis filiformis</i> and <i>Poa labillardierei</i>. At least one native wetland forb species must be present. Freshwater algae often are present when the wetland is, or recently has been, wet. 	Meets each requirement

Table 2: Condition Thresholds for Seasonal Herbaceous Wetlands

Condition Thresholds	Requirement	Response
Part A) Condition during 'typical' wet cycles:	Step A1). Is the wetland consistent with the key diagnostic characteristics.	Yes
	Step A2). Is 50% or more of the total cover of plants in the ground layer of the wetland dominated by native species characteristic of the Seasonal Herbaceous Wetlands ecological community?	Yes
Part B). For dry conditions (e.g. drought):	N/A.	N/A.
Part C) Minimum	If an individual wetland or wetland cluster is	i) The actual area of the wetland



Condition Thresholds	Requirement	Response
wetland size:	smaller than 0.5 ha, it may be included as part of the national ecological community if: i) The actual wetland or wetland cluster is 0.1 ha or more in size; AND ii) The wetland is contiguous with a native vegetation remnant; AND iii) The total area of the wetland plus other native vegetation remnant or type of natural wetland is 1 ha or more.	cluster is 0.14 hectares. ii) The wetland is contiguous with remnant areas of Creekline Grassy Woodland and Plains Grassy Woodland to the north and south (Figure 2). iii) The total area of the wetland and other remnant vegetation is >1 ha.

3.8 Fauna

Forty fauna species were recorded during the field assessment, comprising 38 birds (32 native and six exotic) and two frogs (both native) (Appendix 4).

3.9 Threatened Fauna Records

No listed threatened fauna species have previously been recorded on the site. The VBA (DEPI 2014b) contains records of 41 listed threatened fauna species in the local area (within a five kilometre radius of the site) (Appendix 5). The PMST (DOE 2014a) identified 25 EPBC Act listed fauna species (terrestrial) or species habitats as likely to occur within the local area.

One listed threatened fauna species, Latham's Snipe *Gallinago hardwickii*, was recorded within the open, freshwater wetland habitat during the field assessment (Figure 2). Latham's Snipe is a listed Migratory Wetland Species under the EPBC Act, and is listed as Near Threatened in Victoria (DSE 2013). The Biodiversity Interactive Map contains records of this species in surrounding area (DEPI 2014a).

No additional listed threatened fauna species are considered likely to occur within the site due to the absence of suitable habitat.

3.10 Fauna Habitat

The site supports three main habitat types: woodland, ephemeral wetland and exotic grassland. A description of each habitat is outlined below.

3.10.1 Woodland Habitat

Areas of woodland (Plains Grassy Woodland) are of moderate to high habitat value for fauna. The overstorey trees (predominantly River Red-gum), provides suitable perching, roosting and foraging habitat for a range of woodland bird species, including Brown Thornbill *Acanthiza pusilla*, Eastern Spinebill *Acanthorhynchus tenuirostris*, Grey Shrike-thrush *Colluricincla harmonica*, Grey Butcherbird *Cracticus torquatus*, New Holland Honeyeater *Phylidonyris novaehollandiae*, Eastern Rosella *Platycercus eximius*



and Sulphur-crested Cockatoo *Cacatua galerita*. A number of large old trees in woodland habitat contained hollows, which were used by birds such as Rainbow Lorikeet *Trichoglossus haematodus* and Eastern Rosella *Platycercus eximius*. The dense grassy/sedgy groundcover supports suitable habitat for reptiles (i.e. common skinks, lizards and snakes).

3.10.2 Wetland Habitat

Wetland habitat provides moderate to high habitat value for a range of terrestrial and aquatic fauna species (i.e. waterbirds, frogs, reptiles and aquatic invertebrates) that rely on standing water. During the wetter months the waterbody would provide suitable habitat for common frog species such as Spotted Marsh Frog *Limnodynastes tasmaniensis* and Common Froglet *Crinia signifera* (recorded during the survey). Waterbirds such as Latham's Snipe, Chestnut Teal *Anas castanea*, Straw-necked Ibis *Threskiornis spinicollis* and White-faced Heron *Egretta novaehollandiae* are likely to use this habitat during periods of inundation with water. River Red-gums along the wetland margins would also provide perching, roosting and foraging habitat for diurnal and nocturnal raptors.

3.10.3 Exotic Grassland Habitat

Areas of exotic dominated grassland are generally of poor habitat quality. Common species present were those typically associated with modified habitats, including Willie Wagtail *Rhipidura leucophrys*, Welcome Swallow *Petrochelidon neoxena* and Australian Magpie *Gymnorhina tibicen*. Exotic grassland also provides refuge and dispersal habitat for ground dwelling reptiles.

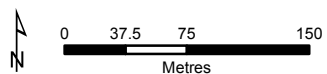
Figure 2

Ecological Features

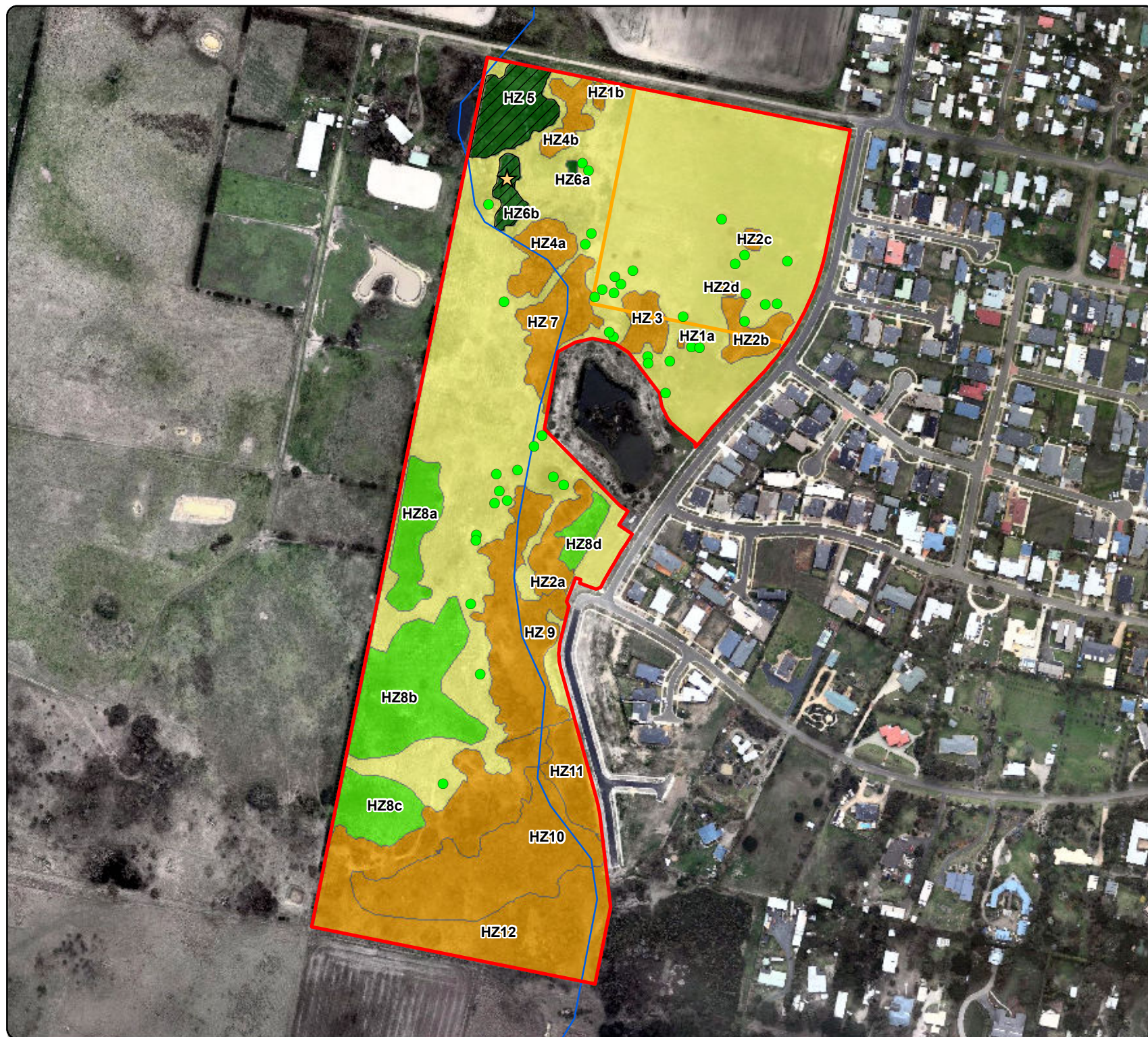
690 Batman Road and
Glenrana Drive,
Indented Head

Legend

-  Subject Site - Freehold land (PS64962)
-  Council Land (LP210545)
-  Grassy Woodland
-  Plains Freshwater Sedge Wetland
-  Plains Grassy Woodland
-  Predominantly Introduced Vegetation
-  EPBC Act listed Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
-  Scattered Trees
-  Latham's Snipe
-  Watercourse



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4 Assessment of Ecological Values

4.1 Assessment of Land Values

An assessment of land values was undertaken to determine the areas of ecological value and developable land within the site. The criteria for determining the key ecological values and developable land within the site are outlined in Table 3. The location of key ecological values and developable land is shown in Figure 3.

Table 3: Description of Key Ecological Values

Ecological Value	Criteria	Habitat Zone/Area
Very High Ecological Value	<ul style="list-style-type: none"> Supports a listed threatened* ecological community, flora or fauna species or species habitat. Vegetation species diversity, structure and cover dominated by indigenous species consistent with the EVC benchmark description. Supports a number of very large or large old trees**. Meets the criteria of a remnant patch and may include scattered trees. Less than 5% weed cover present. Provides, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape. The presence of a natural watercourse and its associated unique flora and fauna values. Strategic Biodiversity Score 0.61-0.80 	<p>Habitat Zones: 4, 5, 6,</p> <p>Area: 1.15 hectares</p>
High Ecological Value	<ul style="list-style-type: none"> Vegetation species diversity, structure and cover dominated by indigenous species consistent with the EVC benchmark description. Supports habitat for a range of indigenous flora and fauna species. Supports a number of very large or large old trees**. Meets the criteria of a remnant patch and may include scattered trees. Less than 25% weed cover present. Provides, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape. The presence of a natural watercourse and its associated unique flora and fauna values. Strategic Biodiversity Score 0.41-0.60 	<p>Habitat Zones: 7, 10 & 12</p> <p>Area: 4.65 hectares</p>
Moderate Ecological Value	<ul style="list-style-type: none"> Vegetation contains a modified species diversity, structure and cover compared to the EVC benchmark description. Supports some habitat values for indigenous flora and fauna species. 	<p>Habitat Zones: 2, 3, 9 & 11</p> <p>Area: 3.07 hectares</p>



Ecological Value	Criteria	Habitat Zone/Area
	<ul style="list-style-type: none"> Supports a number of very large or large old trees**. Meets the criteria of a remnant patch and may include scattered trees. Between 25% and 50% weed cover present. Provides, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape. The presence of a natural watercourse and its associated unique flora and fauna values. Strategic Biodiversity Score 0.21-0.40 	
Low Ecological Value	<ul style="list-style-type: none"> Meets criteria of a remnant patch or scattered tree. Highly simplified/modified species diversity, cover and structure compared to the EVC benchmark description. Does not support habitat for listed threatened flora or fauna species. Greater than 50% weed cover present. Strategic Biodiversity Score 0.01-0.20 	Habitat Zone: 8 Area: 4.16 hectares
Very Low Ecological Value (Developable Land)	<ul style="list-style-type: none"> Dominated by exotic vegetation (>95% cover) but may contain some scattered indigenous trees Native vegetation limited to a sparse cover (<5%) or no native cover present. No listed threatened flora or fauna species or habitat present. 	Area: 6.27 hectares

Notes: *The criteria for threatened species and communities is outlined in Section 2.1; **Compared to the EVC benchmark DBH (DEPI 2014a).

4.2 Vegetation Quality Assessment

The results of the Vegetation Quality Assessment for each habitat zone are outlined in Tables 8-10 (Appendix 6).

4.3 Biodiversity Impact Report

The Vegetation Quality Assessment results and vegetation mapping data outputs was provided to DEPI to produce a Biodiversity Impact and Offset Requirement Report (DEPI 2014c) for the site.

The BIOR report (DEPI 2014c) identified that the site supports:



- A total extent of 12.197 hectares of marked native vegetation, comprising 9.178 hectares of remnant patches and 43 scattered trees³.
- The strategic biodiversity score of all marked native vegetation was 0.440.

The BIOR report (DEPI 2014c) identified the majority of habitat zones within the site provides habitat for Purple Blown-grass *Lachnagrostis punicea* subsp. *filifolia* (listed as Rare in Victoria, DSE 2005) and Orange-bellied Parrot *Neophema chrysogaster* (listed as Critically Endangered in Victoria, DSE 2013) (Table 11; Appendix 7).

The presence of habitat for these species results in a specific offset amount of:

- 5.160 specific units of habitat for Purple Blown-grass.
- 5.037 specific units of habitat for Orange-bellied Parrot (Table 12; Appendix 7).

A proposal to remove native vegetation (habitat zones) within the site might not result in impacts on rare or threatened species habitat being above the specific offset threshold for these species. However, when the proportional impact is above the specific offset threshold a specific offset for that species habitat is required (DEPI 2014c).

It should be noted the results of the BIOR report (DEPI 2014c) do not reflect the habitat conditions on site for Orange-bellied Parrot and Purple Blown-grass and is based on DEPI modelling, which has limitations in terms of its accuracy (see Section 2.5).

The site does not support any suitable habitat for Orange-bellied Parrot, which includes sheltered coastal habitats (bays, lagoons and estuaries) and coastal saltmarsh communities (i.e. low samphire herbland) (DOE 2014b). Purple Blown-grass was not recorded within the site, and the VBA contains one record of this species (in 2002) within 10 kilometres of the site (DEPI 2014b). There is a low likelihood of occurrence for this species in the site due to the modified condition of habitat.

The BIOR report results (threatened species data) were not included in the criteria for determining the areas of ecological value and developable land due the limitations of the accuracy of this data.








³ Each scattered tree is converted to hectares using a standard area calculation of 0.071 hectares per tree (DEPI 2014c).

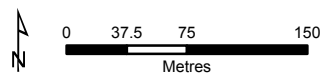
Figure 3

Description of Ecological Values

690 Batman Road and
Glenrana Drive,
Indented Head

Legend

-  Subject Site - Freehold land (PS64962)
-  Council Land (LP210545)
-  High Ecological Value
-  Moderate Ecological Value
-  Low Ecological Value
-  Developable Land
-  Watercourse



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5 Environmental Legislation and Policy Implications

5.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a process for assessment of proposed actions that may have a significant impact on a matter of National Environmental Significance, which includes listed threatened species and ecological communities.

The EPBC Act affects any group or individual (including companies) whose actions are assessed for environmental impacts under the EPBC Act. An action is broadly defined under the Act, and includes 'a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things' (Commonwealth of Australia 2009).

An action will require approval from the Commonwealth Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of National Environmental Significance.

Implications

No EPBC Act listed threatened flora species were recorded within the site during the field survey, and none are considered likely to occur as no suitable habitat is present.

One EPBC Act listed Migratory Wetland Species, Latham's Snipe, was recorded in freshwater wetland habitat during the field assessment (Figure 2). The site also supports the listed ecological community, *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (Critically Endangered) occurs within the (Figure 2). No additional EPBC Act listed fauna species are considered likely to occur on the site due to the absence of suitable habitat.

Any future proposal to remove areas of *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* ecological community or Latham's Snipe habitat will require a referral to the Commonwealth Environment Minister, as matter of National Environmental Significance.

5.2 Flora and Fauna Guarantee Act 1988

The FFG Act is the main Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. The FFG Act contains a list of threatened flora and fauna species and vegetation communities in accordance with Section 10 of the Act. In addition, 'Protected Flora' are species identified for protection under the Act, and includes species from three sources:

- Flora declared to be protected under section 46 of the FFG Act.



- Flora (species, subspecies or varieties) listed as threatened under section 10 the FFG Act.
- Flora belonging to communities listed as threatened under section 10 the FFG Act.

A permit is required from DSE to 'take' (kill, injure, disturb or collect) listed flora species, flora species that are members of listed communities or protected flora from public land. This includes any of the Asteraceae (Daisies), all orchids, ferns (excluding Bracken) and Acacia species (excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon* and *Acacia paradoxa*).

Implications

No FFG Act listed threatened flora species or communities were recorded during the field survey. The site contains two FFG Act listed protected flora species (Golden Wattle and Black Wattle) (Appendix 2). An FFG Act permit is generally not required for removal of protected flora species on private land.

5.3 Planning and Environment Act 1987

The purpose of the *Planning and Environment Act 1987* is to establish a framework for planning the use, development and protection of land in Victoria. Native vegetation clearance is managed under the Act and through municipal planning schemes (DSE 2010).

Under Clause 52.17 Native Vegetation, a permit is required to remove, destroy or lop native vegetation, including dead vegetation (on a site of more than 0.4 hectares) but this does not apply if the application is exempt under the schedule to Clause 52.17.

Planning schemes may contain other provisions in relation to the removal of native vegetation. For example several environment and land management overlays include requirements to obtain a planning permit to remove, destroy or lop any vegetation that are separate to the permit requirements in Clause 52.17 (DSE 2010).

The impact on Victoria's biodiversity associated with removal of native vegetation requires consideration under the Guidelines, when applying for a permit under Clause 52.17. An application is classified under the low, medium or high risk-based pathway as defined in the Guidelines (DEPI 2013a). Each risk pathway has specific application requirements and decision guidelines that must be considered (DEPI 2013a).

Clause 66.02-2 requires that the following applications to remove native vegetation, triggered under Clause 52.17, be referred to DEPI for assessment:



- Applications in the low risk-based pathway where the native vegetation to be remove is 0.5 hectares or more;
- All applications in the moderate risk-based pathway;
- All applications in the high risk-based pathway;
- Applications where a property vegetation plan applies to the site; and,
- Applications on Crown land that is occupied or managed by the responsible authority (DEPI 2013a).

Implications

Any proposed removal, destruction or lopping of native vegetation requires a permit application under Clause 52.17 of the City of Greater Geelong planning scheme (DTPLI 2014).

If future development of the site requires removal of any remnant patches or scattered trees, an assessment under the Guidelines will be required to determine the relevant risk-based pathway of the application. The BIOR report shows specific offsets may be required for threatened species habitat depending on the area and location of vegetation removal within the site to be removed.

5.4 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) is the main legislation covering noxious weed and pest animal management in Victoria. Under this Act species of plants and animals can be declared as noxious weeds and pest animals.

Under the CaLP Act all landowners have legal obligations regarding the management of declared noxious weeds and pest animals on their land. In relation to his or her land a landowner must take all reasonable steps to:

- Eradicate regionally prohibited weeds.
- Prevent the growth and spread of regionally controlled weeds.
- Prevent the spread of regionally controlled weeds and established pest animals on a roadside that adjoins the landowner's land (DPI 2010).

Implications

The site contains several regionally controlled weeds (Appendix 2). To meet land management requirements under the CaLP Act, land managers are required to take all reasonable steps to prevent the growth and spread of regionally controlled weeds (DPI 2010).



6 Key Threats and Management Issues

6.1 Key Threats

The key threats to ecological values within the site are invasive weeds (noxious and environmental), unauthorised access in areas of woodland and a change in land use. A description of these threats is outlined below.

6.1.1 Invasive Weeds

The site contains several listed noxious weeds, including Flax-leaf Broom, Boneseed, African Boxthorn *Lycium ferocissimum*, Spear Thistle *Cirsium vulgare*, Winged Slender Thistle *Carduus tenuiflorus*, Gorse *Ulex europaeus*, Bridal Creeper *Asparagus asparagoides*, Briar Rose *Rosa rubignosa* and Blackberry *Rubus fruticosus* spp. agg. These species are highly invasive and pose a serious threat to woodland values. Flax-leaf Broom is the most prevalent woody weed in the understorey of Plains Grassy Woodland in the southern section of the site. Previous management measures have been undertaken to control this species through use of a forest mower (CoGG pers. comm.).

Environmental weed species also present a threat to ecological values within the site. Species such as Toowoombah Canary Grass, Yorkshire Fog-grass, Water Couch and Curled Dock are invasive species of wetlands, and were observed around areas of Plains Freshwater Sedge Wetland. These species have the potential to impact wetland values within the site (Seasonal Herbaceous Wetlands).

6.1.2 Unauthorised Access

There was evidence of unauthorised vehicle access through areas of Plains Grassy Woodland. Several River Red-gum trees have been cut-down and collected for firewood. Dead trees and logs are important habitat for a range of fauna species (woodland birds, reptiles and mammals). The loss of dead trees and logs will reduce available fauna habitat and unauthorised access may damage the woodland understorey and introduce weeds onto the site.

6.1.3 Change in Land Use

The change in land use of the site from agriculture (i.e. grazing) to vacant land has impacted the biomass cover in the understorey of woodland. It is expected that grazing of the woodland understorey had taken place during agricultural use of the site. Removal of grazing has resulted in an extensive buildup of biomass cover (grasses and sedges) in the understorey, which prevents the establishment of herbaceous species in the ground layer. The increase of woody weed species such as Flax-leaf Broom and Boneseed can also be attributed to a change in land management practices,



and left unchecked these species can rapidly spread and impact areas of woodland. The build up of understorey biomass cover and exotic woody weeds can increase the fuel loads and subsequent fire risk in woodland vegetation.

6.2 Management Recommendations

It is recommended that an Environment Management Plan is prepared, which outlines active management actions, with the aim of protecting/enhancing ecological values in the site. The Environment Management Plan would include:

- A Weed Management Plan that outlines the target weed species, methods of control, implementation schedule and timeframes, monitoring, compliance and reporting requirements.
- Measures to prevent unauthorised vehicle access to the site (such as bollards or fencing).
- Biomass control measure such as slashing or crash grazing to reduce biomass cover in the woodland understorey.



7 Plates



Plate 1: Plains Grassy Woodland in the northeast of the site



Plate 2: Plains Grassy Woodland in the northwest of the site



Plate 3: Modified Grassy Woodland dominated by Austral Bracken



Plate 4: Plains Freshwater Sedge Wetland



Plate 5: Exotic dominated grassland in the northeast of the site



Plate 6: Exotic dominated grassland in the western section of the site



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9 Appendices

Appendix 1 – Likelihood of Occurrence

One or more of the following criteria was used to establish the likelihood of occurrence for threatened flora and fauna species within the subject site:

High likelihood:

- Previously recorded in the site.
- Likely to visit the site during seasonal movements.
- Frequently recorded within the local area.
- Known or likely to maintain resident populations in the local area.
- Presence of preferred habitat within the site.

Moderate likelihood:

- May regularly move through or visit the site as a seasonal visitor.
- Previous records within the local area.
- Some characteristics of a species preferred habitat is present although in a modified condition.
- Unlikely to maintain a population within the site.

Low Likelihood:

- Species likely to occur as a rare or opportunistic visitor.
- Few previous records within the local area.
- Habitat within the site is highly modified and does represent the species preferred habitat.

Unlikely:

- No suitable habitat present on the site or in the surrounding area.
- No species records in the local area.
- Beyond the species natural distribution or considered locally extinct.



Appendix 2 – Flora Survey Results

Table 4: Recorded flora species

Scientific Name	Common Name	Origin
<i>Acacia longifolia</i> subsp. <i>sophorae</i>	Coast Wattle	Native alien
<i>Acacia mearnsii</i>	Black Wattle	
<i>Acacia paradoxa</i>	Hedge Wattle	
<i>Acacia pycnantha</i>	Golden Wattle	
<i>Acaena novae-zelandiae</i>	Bidgee-widgee	
<i>Acetosella vulgaris</i>	Sheep Sorrel	Introduced
<i>Agrostis capillaris</i>	Brown-top Bent	Introduced
<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	Silvery Hair-grass	Introduced
<i>Aira cupaniana</i>	Quicksilver Grass	Introduced
<i>Allocasuarina verticillata</i>	Drooping Sheoak	
<i>Alisma plantago-aquatica</i>	Water Plantain	
<i>Amphibromus neesii</i>	Southern Swamp Wallaby-grass	
<i>Amyema preissii</i>	Wire-leaf Mistletoe	
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Introduced
<i>Arctotheca calendula</i>	Cape weed	Introduced
<i>Arthropodium strictum</i> s.l.	Chocolate Lily	
<i>Asparagus asparaquoides</i>	Bridal Creeper*	Introduced
<i>Aster subulatus</i>	Aster-weed	Introduced
<i>Austrostipa scabra</i> subsp. <i>falcata</i>	Rough Spear-grass	
<i>Avena barbata</i>	Bearded Oat	Introduced
<i>Avena fatua</i>	Wild Oat	Introduced
<i>Baumea juncea</i>	Bare Twig-sedge	
<i>Brassica fruticulosa</i>	Twiggy Turnip	Introduced
<i>Briza maxima</i>	Large Quaking-grass	Introduced
<i>Bromus catharticus</i>	Prairie Grass	Introduced
<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome	Introduced
<i>Carduus tenuiflorus</i>	Winged Slender-thistle*	Introduced
<i>Carex breviculmis</i>	Common Grass-sedge	
<i>Carex tereticaulis</i>	Rush-sedge	
<i>Cenchrus clandestinus</i>	Kikuyu	Introduced
<i>Centaurium erythraea</i>	Common Centaury	Introduced
<i>Chenopodium murale</i>	Sowbane	Introduced
<i>Chrysanthemoides monilifera</i>	Boneseed*	Introduced
<i>Cirsium vulgare</i>	Spear Thistle*	Introduced
<i>Crassula helmsii</i>	Swamp Crassula	
<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch	Introduced
<i>Dactylis glomerata</i>	Cocksfoot	Introduced
<i>Dianella admixta</i>	Black-anther Flax-lily	



Scientific Name	Common Name	Origin
<i>Distichlis distichophylla</i>	Australian Salt-grass	
<i>Ehrharta calycina</i>	Perennial Veldt-grass	Introduced
<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	Introduced
<i>Ehrharta longiflora</i>	Annual Veldt-grass	Introduced
<i>Eleocharis acuta</i>	Common Spike-sedge	
<i>Eucalyptus camaldulensis</i>	River Red-gum	
<i>Euchiton involucratus</i> s.l.	Common Cudweed	
<i>Fumaria muralis</i> subsp. <i>muralis</i>	Wall Fumitory	Introduced
<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia	Introduced
<i>Galium aparine</i>	Cleavers	Introduced
<i>Genista linifolia</i>	Flax-leaf Broom*	Introduced
<i>Helminthotheca echioides</i>	Ox-tongue	Introduced
<i>Holcus lanatus</i>	Yorkshire Fog	Introduced
<i>Hordeum leporinum</i>	Barley-grass	Introduced
<i>Hypochaeris glabra</i>	Smooth Cat's-ear	Introduced
<i>Hypochaeris radicata</i>	Flatweed	Introduced
<i>Isolepis hookeriana</i>	Club-sedge	
<i>Juncus caespiticius</i>	Grassy Rush	
<i>Juncus holoschoenus</i>	Joint-leaf Rush	
<i>Juncus pallidus</i>	Pale Rush	
<i>Juncus pauciflorus</i>	Loose-flower Rush	
<i>Juncus subsecundus</i>	Finger Rush	
<i>Lachnagrostis filiformis</i>	Common Blown-grass	
<i>Lolium perenne</i>	Perennial Rye-grass	Introduced
<i>Lolium rigidum</i>	Wimmera Rye-grass	Introduced
<i>Lycium ferocissimum</i>	African Box-thorn*	Introduced
<i>Lysimachia arvensis</i>	Pimpernel	Introduced
<i>Lythrum hyssopifolia</i>	Small Loosestrife	
<i>Malva parviflora</i>	Small-flower Mallow	Introduced
<i>Medicago polymorpha</i>	Burr Medic	Introduced
<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	
<i>Myoporum insulare</i>	Common Boobialla	Native alien
<i>Neopaxia australasica</i>	White Purslane	
<i>Oxalis perennans</i>	Grassland Wood-sorrel	
<i>Paspalum dilatatum</i>	Paspalum	Introduced
<i>Paspalum distichum</i>	Water Couch	Introduced
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	Introduced
<i>Phalaris minor</i>	Lesser Canary-grass	Introduced
<i>Phragmites australis</i>	Common Reed	
<i>Plantago coronopus</i>	Buck's-horn Plantain	Introduced
<i>Plantago lanceolata</i>	Ribwort	Introduced



Scientific Name	Common Name	Origin
<i>Poa labillardierei</i>	Common Tussock-grass	
<i>Polygonum aviculare</i> s.l.	Prostrate Knotweed	Introduced
<i>Polypogon maritimus</i> var. <i>subspathaceus</i>	Coast Beard-grass	Introduced
<i>Pteridium esculentum</i>	Austral Bracken	
<i>Romulea rosea</i>	Onion Grass	Introduced
<i>Rosa rubiginosa</i>	Briar Rose*	Introduced
<i>Rubus fruticosus</i> spp. agg.	Blackberry*	Introduced
<i>Rumex conglomeratus</i>	Clustered Dock	Introduced
<i>Rumex crispus</i>	Curled Dock	Introduced
<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass	
<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass	
<i>Schoenus apogon</i>	Common Bog-sedge	
<i>Senecio hispidulus</i> s.s.	Rough Fireweed	
<i>Senecio quadridentatus</i>	Cotton Fireweed	
<i>Sonchus asper</i> s.l.	Rough Sow-thistle	Introduced
<i>Sonchus oleraceus</i>	Common Sow-thistle	Introduced
<i>Sporobolus africanus</i>	Rat-tail Grass	Introduced
<i>Sporobolus virginicus</i>	Salt Couch	
<i>Stellaria media</i>	Chickweed	Introduced
<i>Stenotaphrum secundatum</i>	Buffalo Grass	Introduced
<i>Tetragonia implexicoma</i>	Bower Spinach	
<i>Thelymitra pauciflora</i> s.l.	Slender Sun-orchid	
<i>Themeda triandra</i>	Kangaroo Grass	
<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover	Introduced
<i>Trifolium repens</i> var. <i>repens</i>	White Clover	Introduced
<i>Trifolium subterraneum</i>	Subterranean Clover	Introduced
<i>Ulex europaeus</i>	Gorse*	Introduced
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	Introduced
<i>Vulpia myuros</i>	Rat's-tail Fescue	Introduced

Notes: *Listed noxious weed under the CaLP Act



Appendix 3 – Threatened Flora Records

Table 5. Threatened flora records

Scientific Name	Common Name	Records	EPBC	FFG	DEPI	Likely Occurrence
<i>Lachnagrostis robusta</i>	Salt Blown-grass	1	-	-	r	U
<i>Boronia anemonifolia</i> subsp. <i>variabilis</i>	Coast Boronia	1	-	-	v	U
<i>Salsola tragus</i> subsp. <i>pontica</i>	Coast Saltwort	1	-	-	r	U
<i>Carex tasmanica</i>	Curly Sedge	#	V	L	v	U
<i>Glycine latrobeana</i>	Clover Glycine	#	V	L	v	U
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	#	Cr	L	v	U
<i>Prasophyllum frenchii</i>	Maroon Leak-orchid	#	E	L	e	U
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	#	E	L	e	U

Notes: Records sourced from the VBA (DEPI 2014b) within a five km radius of the site. # Records from the PMST (DOE 2014).

EPBC Act listed species (DOE 2013)

Cr Critically Endangered

E Endangered

V Vulnerable

FFG Act listed species (DSE 2005)

L Listed as Threatened

DEPI listed species (DSE 2005)

cr Critically Endangered

e Endangered

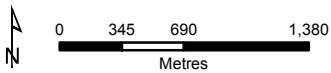
v Vulnerable

r Rare

Likelihood of occurrence: H = High likelihood; M = Moderate likelihood; L = Low likelihood; U = Unlikely to occur (Appendix 1).

Figure 4
*Threatened Flora from the 5
Km VBA search*
690 Batman Road and
Glenrana Drive,
Indented Head

- Legend**
- Subject Site
 - Coast Boronia
 - Coast Saltwort
 - Salt Blown-grass





Appendix 4 –Fauna Species Results

Table 6. Recorded fauna species

Scientific Name	Common Name	Origin
<i>Acanthiza nana</i>	Yellow Thornbill	
<i>Acanthiza pusilla</i>	Brown Thornbill	
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	
<i>Acridotheres tristis</i>	Common Myna	Introduced
<i>Alauda arvensis</i>	European Skylark	Introduced
<i>Anas castanea</i>	Chestnut Teal	
<i>Anthochaera carunculata</i>	Red Wattlebird	
<i>Anthus novaeseelandiae</i>	Australasian Pipit	
<i>Artamus personatus</i>	Masked Woodswallow	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	
<i>Cincloramphus cruralis</i>	Brown Songlark	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	
<i>Corvus coronoides</i>	Australian Raven	
<i>Coturnix pectoralis</i>	Stubble Quail	
<i>Cracticus torquatus</i>	Grey Butcherbird	
<i>Crinia signifera</i>	Common Froglet	
<i>Egretta novaehollandiae</i>	White-faced Heron	
<i>Elanus axillaris</i>	Black-shouldered Kite	
<i>Eolophus roseicapilla</i>	Galah	
<i>Falco berigora</i>	Brown Falcon	
<i>Gallinago hardwickii</i>	Latham's Snipe#	
<i>Grallina cyanoleuca</i>	Magpie-lark	
<i>Gymnorhina tibicen</i>	Australian Magpie	
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	
<i>Malurus cyaneus</i>	Superb Fairy-wren	
<i>Pardalotus punctatus</i>	Spotted Pardalote	
<i>Passer domesticus</i>	House Sparrow	Introduced
<i>Petrochelidon neoxena</i>	Welcome Swallow	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	
<i>Platycercus eximius</i>	Eastern Rosella	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	
<i>Rhipidura albiscarpa</i>	Grey Fantail	
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Streptopelia chinensis</i>	Spotted Turtle-Dove	Introduced
<i>Sturnus vulgaris</i>	Common Starling	Introduced
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	



Scientific Name	Common Name	Origin
<i>Turdus merula</i>	Common Blackbird	Introduced
<i>Zosterops lateralis</i>	Silvereye	

Notes: *Exotic species; #Listed as Near Threatened in Victoria and Migratory Wetland Species under the EPBC Act



Appendix 5 – Threatened Fauna Records

Table 7. Threatened fauna records

Scientific Name	Common Name	EPBC	FFG	DEPI	Records	Likely Occurrence
<i>Porzana pusilla palustris</i>	Baillons Crake	-	L	v	1	U
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	Cr	L	cr	6	U
<i>Neophema elegans</i>	Elegant Parrot	-	-	v	1	U
<i>Aythya australis</i>	Hardhead	-	-	v	13	L
<i>Oxyura australis</i>	Blue-billed Duck	-	L	e	9	L
<i>Biziura lobata</i>	Musk Duck	-	-	v	24	L
<i>Sternula albifrons sinensis</i>	Little Tern	-	L	v	2	U
<i>Sternula nereis nereis</i>	Fairy Tern	V	L	e	6	U
<i>Arenaria interpres</i>	Ruddy Turnstone	-	-	v	9	U
<i>Pluvialis squatarola</i>	Grey Plover	-	-	e	2	U
<i>Pluvialis fulva</i>	Pacific Golden Plover	-	-	v	5	U
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	-	cr	5	U
<i>Charadrius leschenaultii</i>	Greater Sand Plover	-	-	cr	1	U
<i>Numenius madagascariensis</i>	Eastern Curlew	-	-	v	7	U
<i>Numenius phaeopus</i>	Whimbrel	-	-	v	2	U
<i>Tringa glareola</i>	Wood Sandpiper	-	-	v	2	U
<i>Tringa nebularia</i>	Common Greenshank	-	-	v	12	U
<i>Tringa stagnatilis</i>	Marsh Sandpiper	-	-	v	1	U
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	-	e	21	U
<i>Calidris canutus</i>	Red Knot	-	-	e	7	U
<i>Calidris tenuirostris</i>	Great Knot	-	L	e	3	U
<i>Egretta garzetta nigripes</i>	Little Egret	-	L	e	2	U
<i>Ardea intermedia</i>	Intermediate Egret	-	L	e	1	U
<i>Anas rhynchos</i>	Australasian Shoveler	-	-	v	10	U
<i>Falco subniger</i>	Black Falcon	-	-	v	2	U
<i>Chthonicola sagittatus</i>	Speckled Warbler	-	L	v	1	U
<i>Limosa limosa</i>	Black-tailed Godwit	-	-	v	2	U

Notes: Threatened species records were sourced from the VBA (DEPI 2013), within a 5 km radius of the site.

EPBC Act listed species (DOE 2014)

Cr Critically Endangered

En Endangered

V Vulnerable

Mm Migratory Marine

Mt Migratory Terrestrial

FFG Act listed species (DSE 2005; 2013)

L Listed as Threatened

DEPI listed species (DSE 2005; 2013):

cr Critically endangered

e Endangered

v Vulnerable

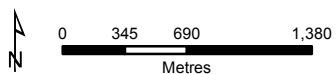
r Rare

Likelihood of occurrence: H = High likelihood; M = Moderate likelihood; L = Low likelihood; U = Unlikely to occur (Appendix 1).

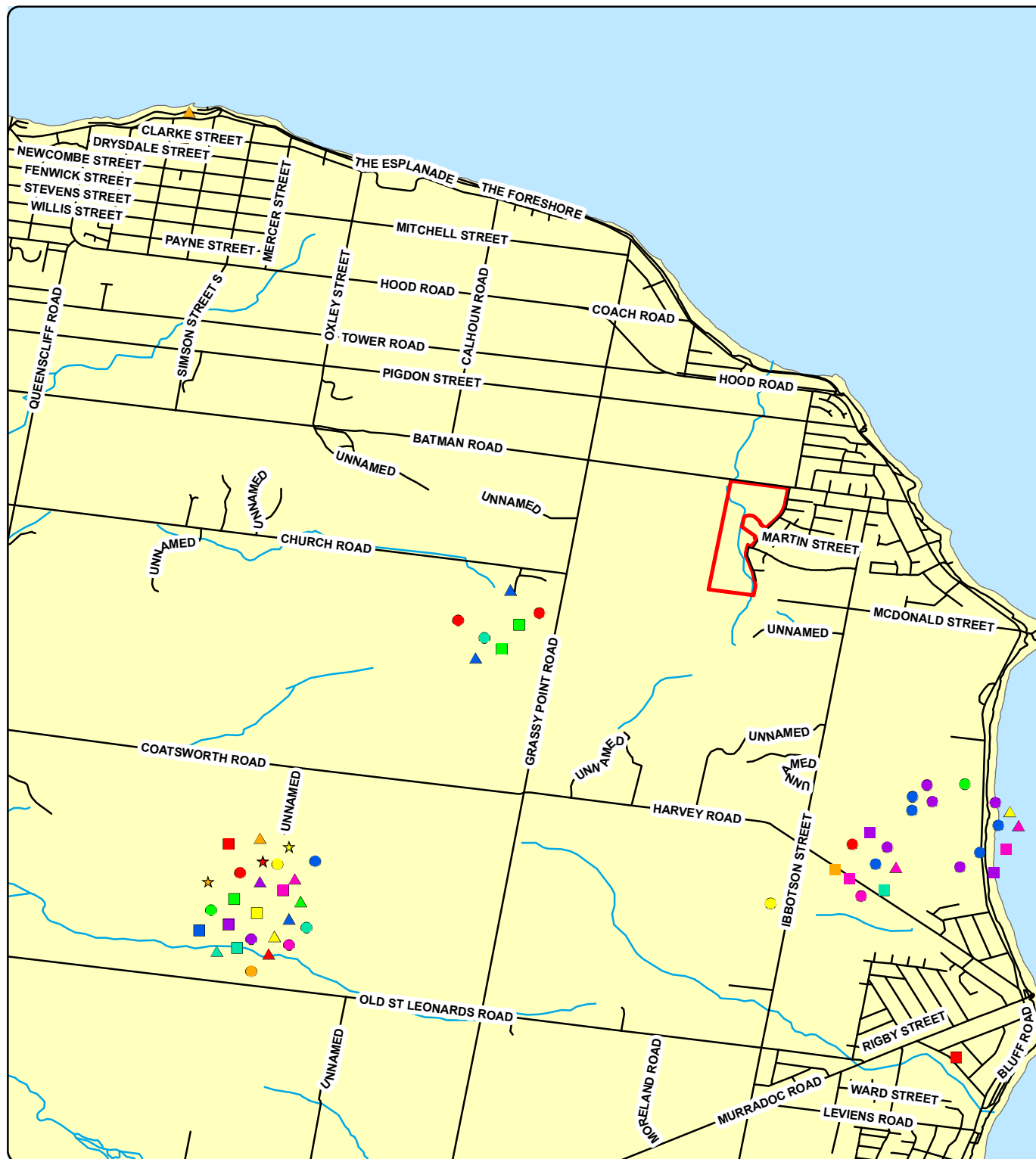
Figure 5
Threatened Fauna from the
 5 Km VBA search
 690 Batman Road and
 Glenrana Drive,
 Indented Head

Legend

- | | |
|--|---|
| Subject Site | ▲ Intermediate Egret |
| ● Australasian Shoveler | ▲ Lesser Sand Plover |
| ● Baillon's Crake | ■ Little Egret |
| ● Black Falcon | ■ Little Tern |
| ● Black-tailed Godwit | ■ Marsh Sandpiper |
| ● Blue-billed Duck | ■ Musk Duck |
| ● Common Greenshank | ■ Orange-bell... Parrot |
| ● Curlew Sandpiper | ■ Pacific Golden Plover |
| ● Eastern Curlew | ■ Red Knot |
| ▲ Elegant Parrot | ■ Ruddy Turnstone |
| ▲ Fairy Tern | ★ Speckled Warbler |
| ▲ Great Knot | ★ Whimbrel |
| ▲ Greater Sand Plover | ★ Wood Sandpiper |
| ▲ Grey Plover | |
| ▲ Hardhead | |



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Appendix 6 – Vegetation Quality Assessment Results

Table 8: Vegetation Quality Assessment Results

Habitat Zone			HZ1a	HZ1b	HZ2a	HZ2b	HZ2c	HZ2d
Bioregion			OP	OP	OP	OP	OP	OP
EVC Name			PGW	PGW	PGW	PGW	PGW	PGW
EVC Number			55	55	55	55	55	55
		Max Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	2	2	2	0	2
	Canopy Cover	5	2	2	2	2	2	2
	Under storey	25	5	5	5	5	5	5
	Lack of Weeds	15	4	4	4	4	4	4
	Recruitment	10	0	1	1	1	1	1
	Organic Matter	5	4	4	4	4	4	4
	Logs	5	0	0	0	0	0	0
EVC Standardiser		Multiplier	1	1	1	1	1	1
		Subtotal	10	10	14	14	14	14
Landscape value	Patch Size	10	1	1	1	1	1	1
	Neighbourhood	10	2	2	2	2	2	2
	Distance to Core	5	3	3	3	3	3	3
Habitat score (out of 100)		100	16	16	20	20	20	20
Habitat points (habitat points/100)			0.16	0.16	0.20	0.20	0.20	0.20
Habitat Zone Area (ha)			0.027	0.006	0.25	0.205	0.032	0.02
Habitat Hectares			0.00	0.00	0.05	0.04	0.01	0.00

Notes: PGW = Plains Grassy Woodland; OP = Otway Plain bioregion



Table 9: Vegetation Quality Assessment Results

Habitat Zone			HZ3	HZ4a	HZ4b	HZ5	HZ6a	HZ6b	HZ7
Bioregion			OP	OP	OP	OP	OP	OP	OP
EVC Name			PGW	PGW	PGW	PFSW	PFSW	PFSW	PGW
EVC Number			55	55	55	68	68	68	55
		Max Score	Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	8	6	10	0	0	0	0
	Canopy Cover	5	5	5	5	5	0	0	2
	Under storey	25	5	5	5	5	5	5	15
	Lack of Weeds	15	2	2	2	2	6	6	9
	Recruitment	10	0	0	1	1	0	0	3
	Organic Matter	5	4	4	5	5	5	5	5
	Logs	5	0	0	3	3	0	0	0
EVC Standardiser		Multiplier	1	1	1.36	1	1.36	1.36	1
		Subtotal	24	34	46	34	21	21	23
Landscape value	Patch Size	10	1	1	1	1	1	1	1
	Neighbourhood	10	2	2	2	2	2	2	2
	Distance to Core	5	3	3	3	3	3	3	3
Habitat score (out of 100)		100	30	40	52	40	27	27	29
Habitat points (habitat points/100)			0.30	0.40	0.40	0.52	0.27	0.27	0.29
Habitat Zone Area (ha)			0.180	0.270	0.180	0.444	0.02	0.131	0.460
Habitat Hectares			0.05	0.11	0.07	0.23	0.01	0.04	0.13

Notes: CGW = Creekline Grassy Woodland; PGW = Plains Grassy Woodland; Plains Freshwater Sedge Wetland; OP = Otway Plain bioregion



Table 10: Vegetation Quality Assessment Results

Habitat Zone			HZ8a	HZ8b	HZ8c	HZ8d	HZ9	HZ10	HZ11	HZ12
Bioregion			OP	OP	OP	OP	OP	OP	OP	OP
EVC Name			GW	GW	GW	GW	PGW	PGW	PGW	PGW
EVC Number			55	55	55	55	55	55	55	55
			Max Score	Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	3	8	8	6	8	8	8
	Canopy Cover	5	5	4	5	5	5	5	5	5
	Under storey	25	5	5	5	5	5	5	5	5
	Lack of Weeds	15	0	0	0	0	6	6	0	0
	Recruitment	10	0	0	1	1	1	1	1	1
	Organic Matter	5	4	4	4	4	5	5	4	4
	Logs	5	0	0	2	2	3	3	2	2
EVC Standardiser		Multiplier	1	1	1	1	1	1	1	1
		Subtotal	25	25	22	25	30	33	14	25
Landscape value	Patch Size	10	2	2	2	2	2	2	2	2
	Neighbourhood	10	2	2	2	2	2	2	2	2
	Distance to Core	5	4	4	4	4	4	4	4	4
Habitat score (out of 100)		100	33	33	30	33	38	41	22	33
Habitat points (habitat points/100)			0.33	0.33	0.33	0.33	0.38	0.41	0.22	0.30
Habitat Zone Area (ha)			0.41	0.102	0.41	0.15	1.02	1.35	0.31	2.31
Habitat Hectares			0.13	0.03	0.13	0.05	0.39	0.55	0.07	0.69

Notes: PGW = Plains Grassy Woodland; GW = Grassy Woodland; OP = Otway Plain bioregion



Appendix 7 – DEPI Biodiversity Report Results

Table 11: Specific Biodiversity Equivalence Score Results

Habitat zone	Habitat hectares	Species number	Species common name	Species scientific name	Habitat importance score	Specific biodiversity equivalence score (SBES)
4_HZ4a	0.108	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.702	0.076
4_HZ4a	0.108	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.692	0.074
5_HZ5	0.231	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.711	0.164
5_HZ5	0.231	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.704	0.163
7_HZ7	0.132	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.709	0.094
7_HZ7	0.132	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.692	0.092
9_HZ9	0.386	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.693	0.267
9_HZ9	0.386	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.690	0.266
2_HZ2a	0.050	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.694	0.035
2_HZ2a	0.050	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.680	0.034
10_HZ10	0.553	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.753	0.417
10_HZ10	0.553	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.744	0.412
12_HZ12	0.692	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.758	0.525
12_HZ12	0.692	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.735	0.509
11_HZ11	0.069	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.720	0.050
11_HZ11	0.069	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.729	0.050
2_HZ2b	0.041	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.026
2_HZ2b	0.041	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.026
2_HZ2c	0.006	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.004
2_HZ2c	0.006	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.004
2_HZ2d	0.003	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.002
2_HZ2d	0.003	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.002
4_HZ4b	0.070	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.696	0.049



Habitat zone	Habitat hectares	Species number	Species common name	Species scientific name	Habitat importance score	Specific biodiversity equivalence score (SBES)
4_HZ4b	0.070	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.686	0.048
8_HZ8d	0.049	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.683	0.033
8_HZ8d	0.049	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.667	0.033
6_HZ6a	0.004	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.690	0.003
6_HZ6a	0.004	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.680	0.003
6_HZ6b	0.035	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.697	0.025
6_HZ6b	0.035	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.693	0.024
1_HZ1a	0.004	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.700	0.003
1_HZ1a	0.004	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.690	0.003
1_HZ1b	0.001	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.680	0.001
1_HZ1b	0.001	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.670	0.001
3_HZ3	0.053	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.679	0.036
3_HZ3	0.053	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.670	0.035
14_HZ14	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.717	0.010
14_HZ14	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.700	0.010
15_HZ15	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.709	0.010
15_HZ15	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.696	0.010
16_HZ16	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.691	0.010
16_HZ16	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.680	0.010
17_HZ17	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.671	0.009
17_HZ17	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.666	0.009
18_HZ18	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.680	0.010
18_HZ18	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.675	0.009
19_HZ19	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.650	0.009
19_HZ19	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.650	0.009
20_HZ20	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.677	0.010
20_HZ20	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.667	0.009
21_HZ21	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009



Habitat zone	Habitat hectares	Species number	Species common name	Species scientific name	Habitat importance score	Specific biodiversity equivalence score (SBES)
21_HZ21	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
22_HZ22	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
22_HZ22	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
23_HZ23	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
23_HZ23	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
24_HZ24	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
24_HZ24	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
25_HZ25	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
25_HZ25	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
26_HZ26	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
26_HZ26	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
27_HZ27	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
27_HZ27	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
28_HZ28	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.640	0.009
28_HZ28	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.630	0.009
29_HZ29	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.680	0.010
29_HZ29	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.670	0.009
30_HZ30	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.677	0.010
30_HZ30	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.667	0.009
31_HZ31	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.680	0.010
31_HZ31	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.670	0.009
32_HZ32	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.664	0.009
32_HZ32	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.654	0.009
33_HZ33	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.652	0.009
33_HZ33	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.642	0.009
34_HZ34	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.697	0.010
34_HZ34	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.683	0.010
35_HZ35	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.704	0.010



Habitat zone	Habitat hectares	Species number	Species common name	Species scientific name	Habitat importance score	Specific biodiversity equivalence score (SBES)
35_HZ35	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.688	0.010
36_HZ36	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.630	0.009
36_HZ36	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.620	0.009
37_HZ37	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.690	0.010
37_HZ37	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.680	0.010
38_HZ38	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.690	0.010
38_HZ38	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.680	0.010
39_HZ39	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.694	0.010
39_HZ39	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.689	0.010
40_HZ40	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.670	0.009
40_HZ40	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.650	0.009
41_HZ41	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.710	0.010
41_HZ41	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.700	0.010
42_HZ42	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.710	0.010
42_HZ42	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.700	0.010
43_HZ43	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.670	0.009
43_HZ43	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.660	0.009
44_HZ44	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.666	0.009
44_HZ44	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.652	0.009
45_HZ45	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.663	0.009
45_HZ45	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.643	0.009
46_HZ46	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.660	0.009
46_HZ46	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.640	0.009
47_HZ47	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.681	0.010
47_HZ47	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.666	0.009
48_HZ48	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.689	0.010
48_HZ48	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.676	0.009
49_HZ49	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.660	0.009



Habitat zone	Habitat hectares	Species number	Species common name	Species scientific name	Habitat importance score	Specific biodiversity equivalence score (SBES)
49_HZ49	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.640	0.009
50_HZ50	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.660	0.009
50_HZ50	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.640	0.009
51_HZ51	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.660	0.009
51_HZ51	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.640	0.009
52_HZ52	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.670	0.009
52_HZ52	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.650	0.009
53_HZ53	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.670	0.009
53_HZ53	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.650	0.009
54_HZ54	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.670	0.009
55_HZ55	0.014	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.700	0.010
55_HZ55	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.689	0.010
13_HZ13	0.014	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.709	0.010
8_HZ8a	0.136	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.644	0.088
8_HZ8a	0.136	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.629	0.086
8_HZ8b	0.336	10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	0.700	0.235
8_HZ8b	0.336	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.654	0.220
8_HZ8c	0.135	504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	0.717	0.096

Table 12: Proportional Impacts on Threatened Species

Species number	Species common name	Species scientific name	Species type	Area of mapped habitat	Proportional impact
10305	Orange-bellied Parrot	<i>Neophema chrysogaster</i>	Dispersed	11.649	0.014
504222	Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>	Dispersed	12.197	0.022



Appendix 8 – Biodiversity Impact Report

Biodiversity impact and offset requirements report

This report provides additional biodiversity information for moderate and high risk-based pathway applications for permits to remove native vegetation under clause 52.16 or 52.17 of the planning schemes in Victoria

Date of issue: 7/11/2014

DEPI ref: OKC_0006

Time of issue: 2:45 PM

Project ID	Indented_Head
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Summary of marked native vegetation

Risk-based pathway	Moderate
Total extent	12.197 ha
Remnant patches	9.178 ha
Scattered trees	43 trees
Location risk	A
Strategic biodiversity score of all marked native vegetation	0.440

Offset requirements if a permit is granted

If a permit is granted to remove the marked native vegetation, a requirement to obtain a native vegetation offset will be included in the permit conditions. The offset must meet the following requirements:

Offset type	Specific offset(s)
Specific offset amount (specific biodiversity equivalence units) and attributes	5.037 specific units of habitat for Orange-bellied Parrot 5.160 specific units of habitat for Purple Blown-grass

See Appendices 1 and 2 for details in how offset requirements were determined.

NB: values presented in tables throughout this document may not add to totals due to rounding

Biodiversity impact and offset requirements report

Next steps

This proposal to remove native vegetation must meet the application requirements of the moderate risk-based pathway and it will be assessed under the moderate risk-based pathway.

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council. The biodiversity assessment report from NVIM and this biodiversity impact and offset report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

The Biodiversity assessment report generated by the tool within NVIM provides the following information:

- The location of the site where native vegetation is to be removed.
- The area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*
- The risk-based pathway of the application for a permit to remove native vegetation

This report provides the following information to meet application requirements for a permit to remove native vegetation:

- Confirmation of the risk-based pathway of the application for a permit to remove native vegetation
- The strategic biodiversity score of the native vegetation to be removed
- Information to inform the assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.
- The offset requirements should a permit be granted to remove native vegetation.

Additional application requirements must be provided with an application for a permit to remove native vegetation in the moderate or high risk-based pathways. These include:

- A habitat hectare assessment report of the native vegetation that is to be removed
- A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised
- An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.

Refer to the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* and for a full list and details of application requirements.

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Obtaining this publication does not guarantee that an application will meet the requirements of clauses 52.16 or 52.17 of the Victoria Planning Provisions or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of clauses 52.16 or 52.17 of the Victoria Planning Provisions.

Biodiversity impact and offset requirements report

Appendix 1 – Biodiversity impact of removal of native vegetation

Habitat hectares

Habitat hectares are calculated for each habitat zone within your proposal using the extent and condition scores in the GIS data you provided.

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
XX	XXXXXX	XXXXXX	X.XXX
XX	See excel spreadsheet – ‘Habitat hectares’ tab		X.XXX
TOTAL			X.XXX

Impacts on rare or threatened species habitat above specific offset threshold

The specific-general offset test was applied to your proposal. The test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the specific offset threshold. The threshold is set at 0.005 per cent of the total habitat for a species. When the proportional impact is above the specific offset threshold a specific offset for that species' habitat is required.

The specific-general offset test found your proposal has a proportional impact above the specific offset threshold for the following rare or threatened species' habitats.

Species number	Species common name	Species scientific name	Species type	Area of mapped habitat (ha)	Proportional impact (%)
XXXXXXX	XXXXXXX	See excel spreadsheet – ‘Impacts on VROTS’ tab		X.XXX	X.XXX
XXXXXXX	XXXXXXX	XXXXXXXX	XXXXXXXX	X.XXX	X.XXX

Clearing site biodiversity equivalence score(s)

Where a habitat zone requires specific offset(s), the specific biodiversity equivalence score(s) for each species in that habitat zone is calculated by multiplying the habitat hectares of the habitat zone by the habitat importance score for each species impacted in the habitat zone.

Habitat zone	Habitat hectares	Habitat for rare or threatened species				Specific biodiversity equivalence score (SBES)
		Species number	Species common name	Species scientific name	Habitat importance score	
XX	X.XXX	XXXXXXX	XXXXXXX	XXXXXXX	X.XXX	X.XXX
XX	X.XXX	XXXXXXX	XXXXXXX	XXXXXXX	X.XXX	X.XXX

Biodiversity impact and offset requirements report

Mapped rare or threatened species' habitats on site

This table sets out the list of rare or threatened species' habitats mapped at the site beyond those species for which the impact is above the specific offset threshold. These species habitats do not require a specific offset according to the specific-general offset test.

Species number	Species common name	Species scientific name
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXX <i>See excel spreadsheet – 'Mapped VROTS habitat'</i> XXXXX	XXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX
XXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX

Biodiversity impact and offset requirements report

Appendix 2 – Offset requirements detail

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset.

To calculate the required offset amount required the biodiversity equivalence scores are aggregated to the proposal level and multiplied by the relevant risk multiplier.

Offsets also have required attributes:

- Specific offsets must be located in the same species habitat as that being removed, as determined by the habitat importance map for that species.

The offset requirements for your proposal are as follows:

Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
Specific	2.518 SBES	2	5.037 specific units	Offset must provide habitat for 10305, Orange-bellied Parrot, <i>Neophema chrysogaster</i>
Specific	2.580 SBES	2	5.160 specific units	Offset must provide habitat for 504222, Purple Blown-grass, <i>Lachnagrostis punicea</i> subsp. <i>filifolia</i>

Biodiversity impact and offset requirements report

Appendix 3 – Images of marked native vegetation

Image 1. Native vegetation location risk map

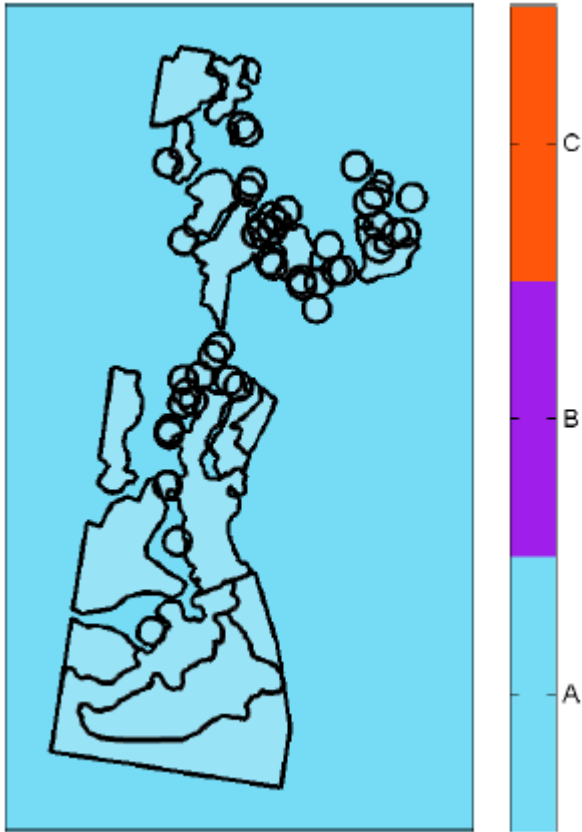
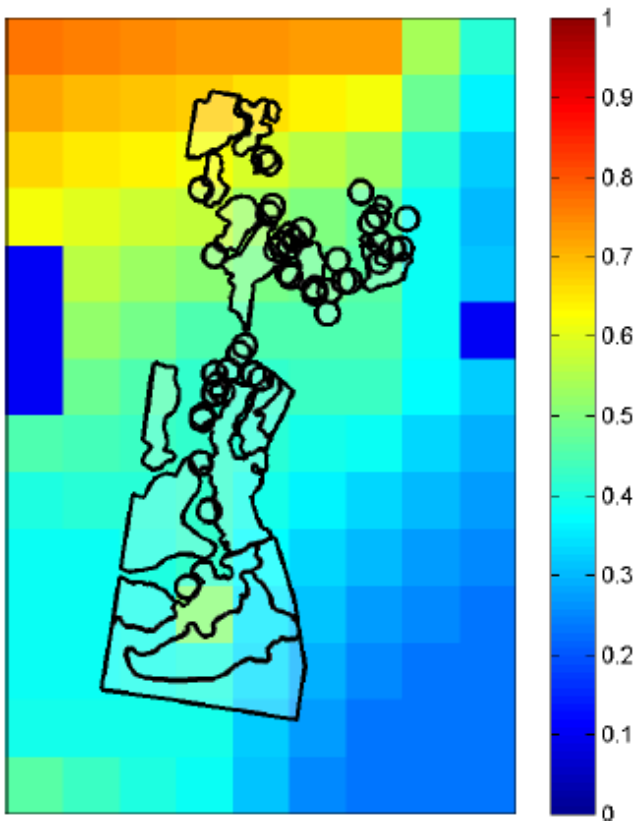
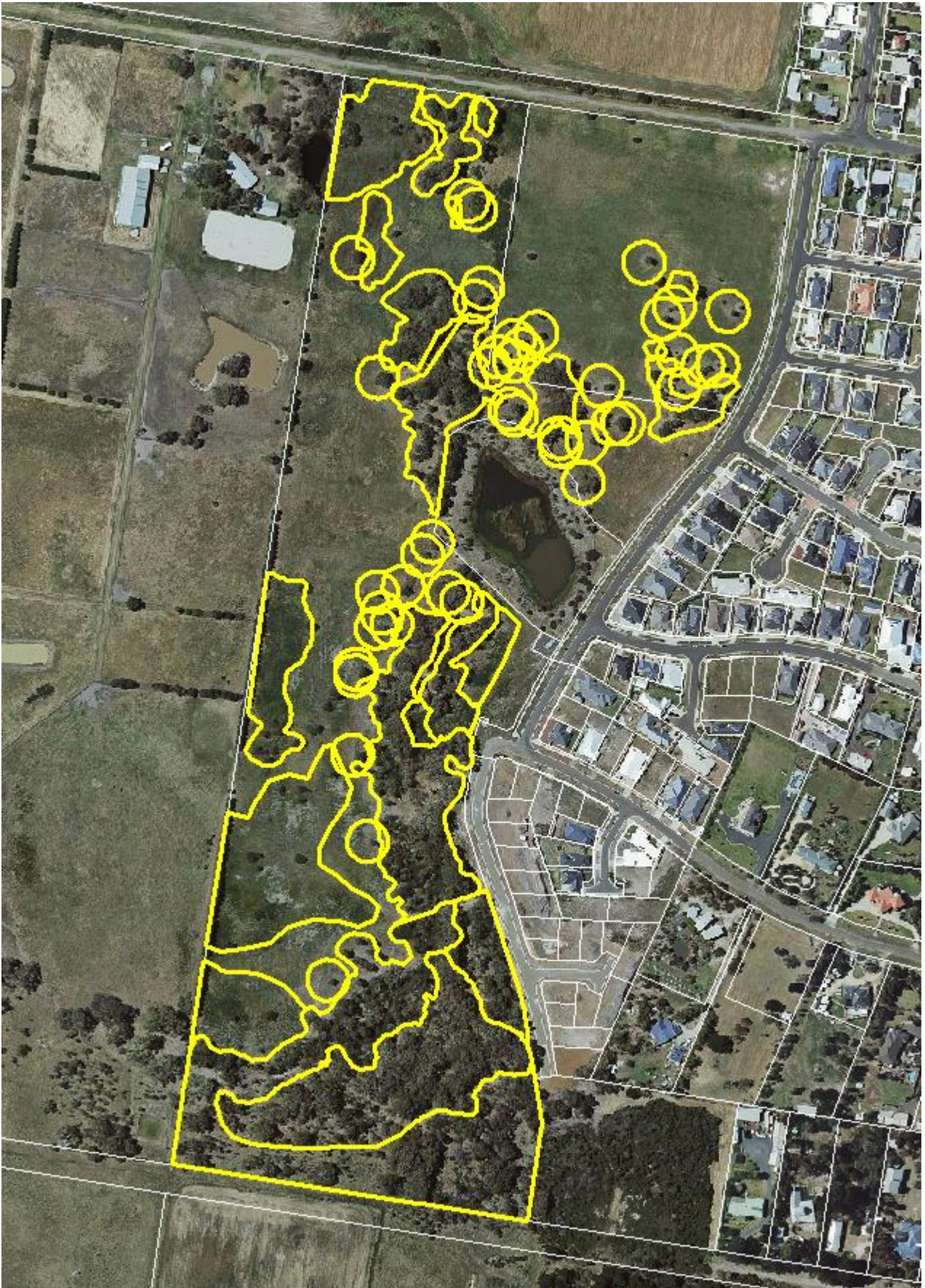


Image 2. Strategic biodiversity score map



Biodiversity impact and offset requirements report

Image 3. Aerial photograph showing marked native vegetation



Biodiversity impact and offset requirements report

Image 4. Habitat importance map – 10305, Orange-bellied Parrot, *Neophema chrysogaster*

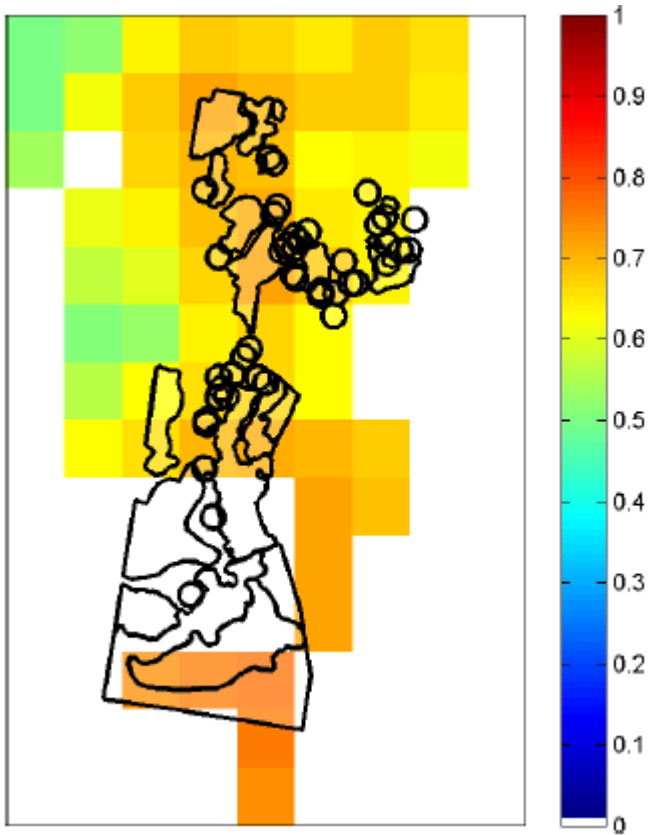
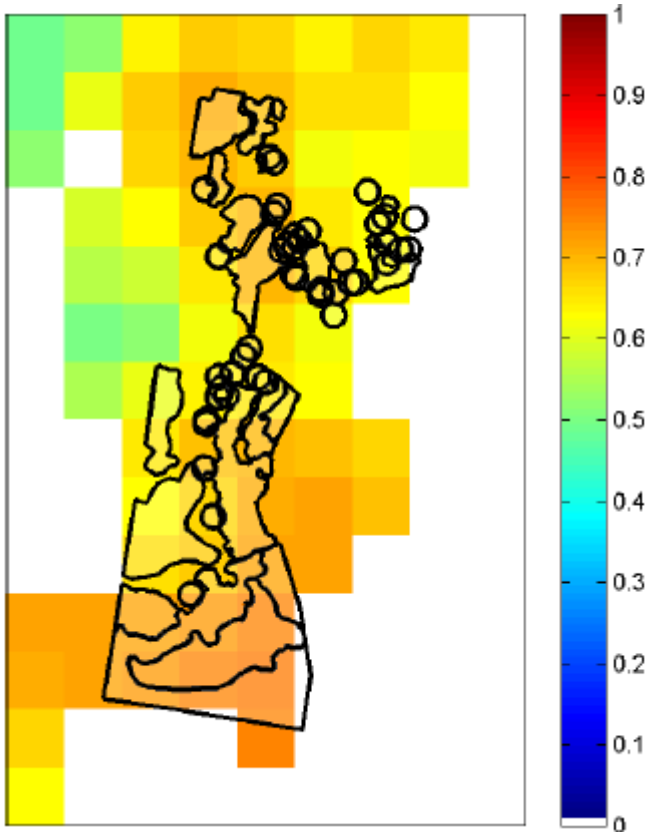


Image 5. Habitat importance map – 504222, Purple Blown-grass, *Lachnagrostis punicea* subsp. *filifolia*



Biodiversity impact and offset requirements report

Glossary

Condition score This is the site-assessed condition score for the native vegetation. Each habitat zone in the clearing proposal is assigned a condition score according to the habitat hectare assessment method. This information has been provided by or on behalf of the applicant in the GIS file.

Dispersed habitat A dispersed species habitat is a habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area greater than 2,000 hectares.

General biodiversity equivalence score The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to Victoria's biodiversity. The general biodiversity equivalence score is calculated as follows:

$$\text{General biodiversity equivalence score} = \text{habitat hectares} \times \text{strategic biodiversity score}$$

General offset amount This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\text{Risk adjusted general biodiversity equivalence score} = \text{general biodiversity equivalence score clearing} \times 1.5$$

General offset attributes General offset must be located in the same Catchment Management Authority boundary or Municipal District (local council) as the clearing site. They must also have a strategic biodiversity score that is at least 80 per cent of the score of the clearing site.

Habitat hectares Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares can be calculated for a remnant patch or for scattered trees or a combination of these two vegetation types. This value is calculated for each habitat zone using the following formula:

$$\text{Habitat hectares} = \text{total extent (hectares)} \times \text{condition score}$$

Habitat importance score The habitat importance score is a measure of the importance of the habitat located on a site for a particular rare or threatened species. The habitat importance score for a species is a weighted average value calculated from the habitat importance map for that species. The habitat importance score is calculated for each habitat zone where the habitat importance map indicates that species habitat occurs.

Habitat zone Habitat zone is a discrete contiguous area of native vegetation that:

- is of a single Ecological Vegetation Class
- has the same measured condition.

Biodiversity impact and offset requirements report

Highly localised habitat	<p>A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.</p>
Minimum strategic biodiversity score	<p>The minimum strategic biodiversity score is an attribute for a general offset.</p> <p>The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.</p>
Offset risk factor	<p>There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.</p> <p>To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.</p> <p style="text-align: center;"><i>Risk factor for general offsets = 1.5</i></p> <p style="text-align: center;"><i>Risk factor for specific offset = 2</i></p>
Offset type	<p>The specific-general offset test determines the offset type required.</p> <p>When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.</p> <p>A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.</p>
Proportional impact on species	<p>This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.</p>
Specific offset amount	<p>The specific offset amount is calculated by multiplying the specific biodiversity equivalence score of the native vegetation to be removed by the risk factor for specific offsets. This number is expressed in specific biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.</p> <p style="text-align: center;"><i>Risk adjusted specific biodiversity equivalence score</i> <i>= specific biodiversity equivalence score clearing × 2</i></p>

Biodiversity impact and offset requirements report

Specific offset attributes Specific offsets must be located in the modelled habitat for the species that has triggered the specific offset requirement.

Specific biodiversity equivalence score The specific biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to the habitat of the relevant rare or threatened species. It is calculated for each habitat zone where one or more species habitats require a specific offset as a result of the specific-general offset test as follows:

$$\text{Specific biodiversity equivalence score} = \text{habitat hectares} \times \text{habitat importance score}$$

Strategic biodiversity score This is the weighted average strategic biodiversity score of the marked native vegetation. The strategic biodiversity score has been calculated from the *Strategic biodiversity map* for each habitat zone.

The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

Total extent (hectares) for calculating habitat hectares This is the total area of the marked native vegetation in hectares.

The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree. This information has been provided by or on behalf of the applicant in the GIS file.

Vicinity The vicinity is an attribute for a general offset.

The offset site must be located within the same Catchment Management Authority boundary or Local Municipal District as the native vegetation to be removed.