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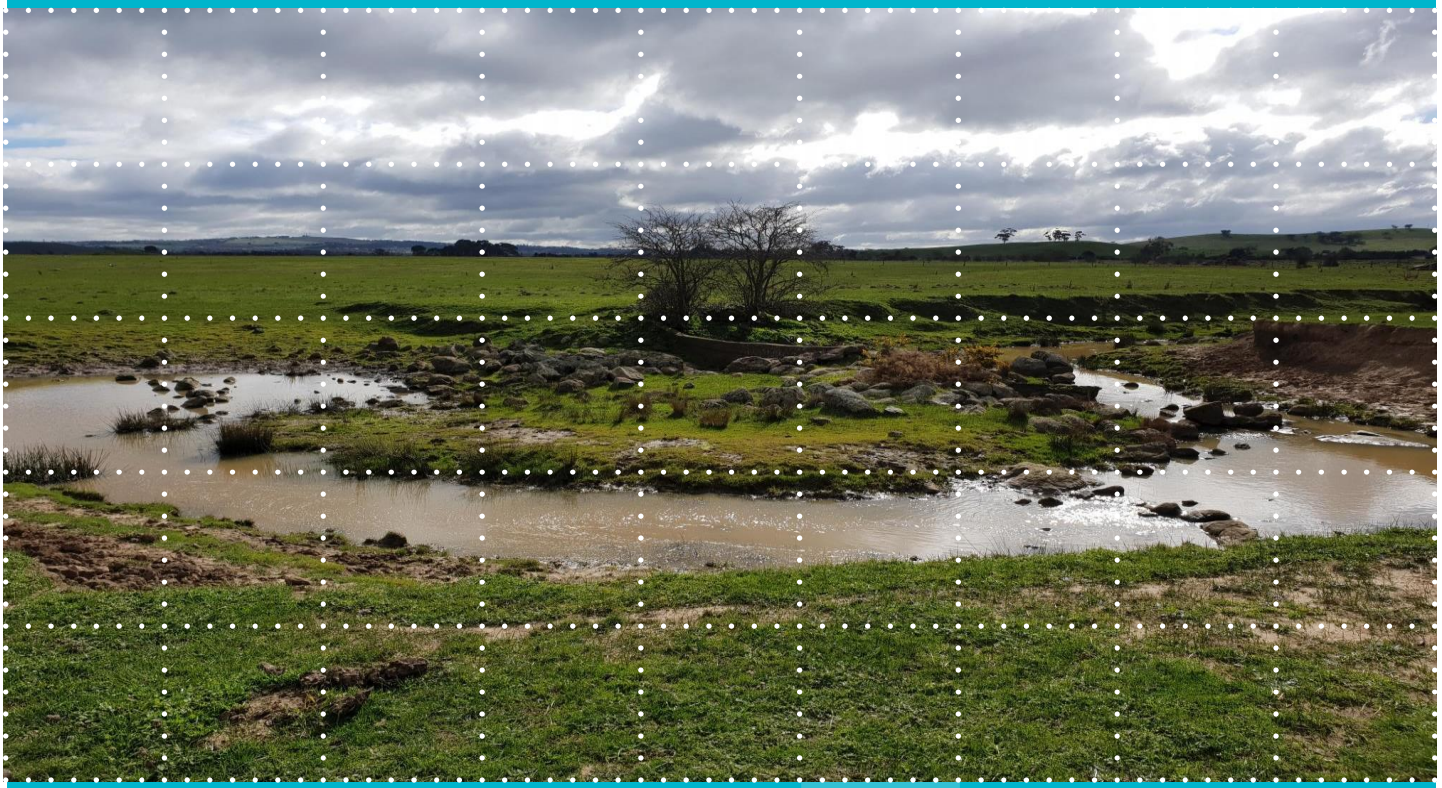
Final Report

Biodiversity Assessment for the Proposed Beveridge Intermodal Freight Terminal, Beveridge Road, Beveridge, Victoria

Prepared for

Beveridge Property Management Services Pty Ltd

March 2020



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DOCUMENT CONTROL

Assessment	Biodiversity Assessment
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Project number	12159
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File name	EHP_12159_BA_BerveridgeIntermodalFreightTerminal-Beveridge_Final_18032020_v2
Client	Beveridge Property Management Services Pty Ltd
Bioregion	Victorian Volcanic Plain and Highlands – Southern Fall
CMA	Port Philip and Westernport
Council	City of Whittlesea

VERSION CONTROL

Report versions	Comments	Comments updated by	Date submitted
Draft	Report sent to the client	CS	05/09/2019
Draft v2	Client name changed. Report sent to the client	CS	12/09/2019
Draft v3	Incorporating the methodology, results and discussions of the targeted surveys into this report and updating the legislative implications. Report sent to the client	CS	19/02/2020
Final	Updated Environmental Effect Act section. Report sent to the client	CS	24/02/2020
Final v2	Updated the Methodology, Environment Protection and Biodiversity Conservation Act section and Environmental Effect Act section. Report sent to the client	CS	18/03/2020

Summary

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Beveridge Property Management Services Pty Ltd to conduct a Biodiversity Assessment at Beveridge Road, Beveridge, Victoria for the proposed Beveridge Intermodal Freight Terminal. The purpose of the assessment was to identify the extent and type of remnant native vegetation present within the study area and to determine the likely presence of significant flora and fauna species and/or ecological communities, which included targeted surveys for the Growling Grass Frog, Golden Sun Moth and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. This report presents the results of the assessment and discusses the potential ecological and legislative implications associated with the proposed action.

The study area is located at Beveridge Road, Beveridge, Victoria, approximately 40 kilometres north of Melbourne's CBD. It covers approximately 1,100 hectares and is bound by agricultural land to the north and south, Merriang Road to the east and the rail corridor to the west. Four parcels are included within the study area, being 125 Beveridge Road (SPI 1\PS328947), 165 Beveridge Road (SPI 2\PS328947), 2025 Merriang Road (SPI 1\TP95683) and 2025 Merriang Road, (SPI 1\TP710781).

Methods

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

Initial Biodiversity Assessment

A field assessment was undertaken on 23 July 2019 to obtain information on flora values within the study area. The study area was walked, with all commonly observed vascular flora species recorded, significant records mapped and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions. Where remnant vegetation was identified, a habitat hectare assessment was undertaken following methodology described in the Vegetation Quality Assessment Manual.

A fauna habitat suitability assessment was undertaken concurrently with the flora field assessment to obtain information on terrestrial fauna values within the study area. The study area was visually assessed and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with an emphasis on waterbodies and other habitats that may provide shelter, food or other resources for significant species.

Growling Grass Frog Targeted Survey

Nocturnal targeted surveys for Growling Grass Frog were completed during warm (over 15°C) conditions on three separate occasions (8, 9 and 17 December 2019) within the study area by ecologists experienced in amphibian surveys.

Targeted surveys included quiet listening for 15 minutes prior to undertaking call-playback and active searching. Active searching focused on the margins of the waterbody and nearby drainage lines and areas providing potential habitat in the form of terrestrial, aquatic and refuge habitat(s).

The targeted surveys for Growling Grass Frog surveys were undertaken in accordance with the methods outlined in the Significant Impact Guidelines for the Vulnerable Growling Grass Frog.

Golden Sun Moth Targeted Survey

Targeted Golden Sun Moth surveys were undertaken on five separate occasions (20 and 27 November, 9, 17 and December 2019, and 9 January 2020) during optimal conditions suitable for detecting species. The male generally flies on calm, warm (over 20°C), sunny days, throughout the warmest part of the day between 10am and 3pm, with the species emerging between October and December.

Areas of potentially suitable habitat were traversed by ecologists experienced in the detection and identification of the species. Surveys were conducted in accordance with approved methodology identified within the Biodiversity Precinct Planning Kit (DSE 2010) and the Commonwealth's Significant Impact Guidelines (DSEWPC 2013a) for the species.

Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains Targeted Survey

This pre-defined potential ecological community type and a 200-metre buffer around it was walked on 12 November 2019 and all flora species recorded.

Results

Initial Biodiversity Assessment – Flora

A large majority of the study area contains pasture, with some scattered native trees and planted vegetation also present. Fourteen indigenous and 33 non-indigenous flora species were recorded within the study area, with no national significant flora recorded on site. Remnant native vegetation in the study area is representative of one EVC: Tall Marsh (TM1) (EVC 821). A total of 15 scattered trees were recorded in the study area, which consist of seven River Red-gums, six Swamp Gums and one dead eucalypt stag. These trees are found across the study area and are all set amongst the pastures. Thirteen of the 15 trees are large trees as per the minimum EVC benchmark threshold for a large tree.

No targeted surveys were recommended for specific flora species.

Initial Biodiversity Assessment – Fauna

Fauna observed using suitable habitat throughout the study area during field surveys included the Eastern Grey Kangaroo, 21 birds, the Common Eastern Froglet and European Rabbit. Five broad habitat types are present within the study area; exotic grassland, scattered native and planted trees, Merri Creek, Hearnes Swamp and adjoining drainage lines and constructed waterbodies. All of these habitats provide different levels of quality habitat for native fauna. No significant fauna species were observed during the field survey.

Of the 75 significant fauna species recorded or predicted to occur in the study area locality, only Growling Grass Frog was considered to have a moderate to high likelihood of occurring within the study area because the species has been recorded within 800 metres of the site within the last 20 years. There is also suitable habitat throughout the study area, particularly along Merri Creek, as it contains high coverage of fringing and floating vegetation and rocky ledges and banks.

Given the presence of grassland and recent records of the nationally significant Golden Sun Moth in the surrounding area (approximately 1.3 kilometres south and three kilometres west of the study area), a habitat assessment was conducted to ascertain the likelihood or presence of suitable habitat for the species within the study area. It was found during filed surveys that there is a distinct lack of key host grass species. It was

therefore considered unlikely that Golden Sun Moth would be present within the study area, or likely to be impacted by the proposed development. However, the field assessment was undertaken during a sub-optimal season for the identification of many flora species, and the site shows signs of historical grazing and associated land use, which impeded the detectability of this species.

Targeted surveys were therefore recommended for Growling Grass Frog and Golden Sun Moth during an optimal time of the year.

Initial Biodiversity Assessment – Ecological Communities

Five nationally (EPBC Act) listed ecological communities are predicted to occur within 10 kilometres of the study area. Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains is listed as critically endangered under the EPBC Act and is predicted to occur in the north-western corner of the site, which is known as Hearnes Swamp. It was uncertain whether this ecological community was present, as flora species associated with this community were not visible.

A targeted survey was therefore recommended for this ecological community during an optimal time of the year.

Targeted Survey Recommendation and Results

Given the presence of suitable habitat within the study area, proximity of recent records in the surrounding area and/or sub-optimal time to determine their presence during the initial Biodiversity Assessment, targeted surveys were recommended to ascertain the presence/absence of Growling Grass Frog, Golden Sun Moth and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community within the study area. All three targeted surveys resulted in no observations of Growling Grass Frog or Golden Sun Moth and no evidence of the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community in term of flora composition.

Removal of Native Vegetation (the Guidelines)

The study area is within Location 2, with 21.493 hectares of native vegetation assumed to be lost under the scenario of total removal within the area covered by the Guidelines, i.e. east of Merri Creek. As such, the permit application would fall under the Detailed assessment pathway.

The offset requirement under the scenario of total removal within the area covered by the Guidelines is 6.505 General Habitat Units (HU) and 8 Large Trees.

As a guide for the 6.505 General Habitat Units that would be lost if all native vegetation east of Merri Creek was removed, the estimated cost to purchase offsets through a third-party trade would be between **$650,500.00** and **$975,750.00** (GST inclusive). This is a very approximate value based on the average current General Habitat Units price of between $100,000.00 and $150,000.00 (GST inclusive), respectively.

Biodiversity Conservation Strategy

Based on DELWPs interactive NVIM tool that calculates the total habitat compensation obligation fee for areas in the BCS, i.e. west of Merri Creek, a total of **$6,210,773.92** (GST inclusive) would apply to the study area if all vegetation within the BCS is impacted/cleared.

This value is very indicative, as the NVIM tool does not exclude Hearnes Swamp and the 200-metre buffer around it from the fee (which must be calculated separately). Furthermore, subject to DELWP approval, the habitat compensation obligation fee could also be restricted to the development footprint and not assume total land parcel impacts.

Legislative and Policy Implications

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act - Commonwealth)

There is suitable habitat within the study area for one fauna species (Growling Grass Frog), the potential occurrence of one fauna species (Golden Sun Moth) and the potential occurrence of one ecological community (Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains) listed under the EPBC Act. However, there was no evidence of the Growling Grass Frog, Golden Sun Moth or a listed ecological community within the study area.

Habitat Compensation Obligation fees for species listed under the EPBC Act within the MSA/BCS (and outside Hearnes Swamp and the 200-metre buffer around it) will apply. However, the introduction of the *Melbourne Strategic Assessment (Environment Mitigation Levy) Bill 2019* on 1 July 2020 will increase the fees that need to be paid by between 1% and 26% depending on the ecological category.

Flora and Fauna Guarantee Act 1988 (FFG Act - Victoria)

Salt Paperbark exists in the planted strip along the study area's eastern boundary, which is listed as threatened and protected under the FFG Act. The study area is however privately owned and the species is planted, as such a permit under the FFG Act is not required.

Environment Effects Act 1978 (Victoria)

There is a potential, albeit unlikely, for the development to impact on the environment as set out in the EE Act referral criteria based on the categories in which a response can be provided in this Biodiversity Assessment. However, if the development's design can reduce/mitigate the following impacts in response to the referral criteria, the development is unlikely to trigger an Environment Effects Statement under the EE Act from a biodiversity perspective:

- Ensure there is no extensive or major effects on waterbodies and their associated fauna. This can be achieved by designing and constructing the development in a way that does not adversely impact Merri Creek, e.g. increase the sedimentation or release chemicals/pollutants into it, which can be undertaken by a hydrological engineer;
- Ensure the impact area is less than 10 hectares within the Current Wetlands layer outside the MSA/BCS, which can be undertaken be referring to the Current Wetlands layer on the figures within this report and designing the development accordingly; and
- Retain remnant River Red-gums, which can be undertaken be referring to the tree points on the figures and appendices within this report and designing the development accordingly.

It should also be noted that several referral criteria cannot be answered as part of this report given they are outside the scope of this assessment.

Planning and Environment Act 1987

A Planning Permit from City of Whittlesea is required to remove, destroy or lop any native vegetation under Clause 52.17 and 42.02 (ESO3 and ESO4). The application will only be referred to DELWP if the amount of amount of native vegetation to be removed within the area subject to these clauses falls under the Detailed assessment pathway.

Other Legislation and Policy

Implications relating to other local and State policy (e.g. *Wildlife Act 1975*, *Catchment and Land Protection Act 1994*, local government authorities) as well as additional studies or reporting that may be required (e.g. Conservation Management Plan, Weed Management Plan, Construction Environment Managements Plan) are provided in Section 6.

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1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Beveridge Property Management Services Pty Ltd to conduct a Biodiversity Assessment at Beveridge Road, Beveridge, Victoria for the proposed Beveridge Intermodal Freight Terminal. The purpose of the assessment was to identify the extent and type of remnant native vegetation present within the study area and to determine the likely presence of significant flora and fauna species and/or ecological communities, which included targeted surveys for the Growling Grass Frog, Golden Sun Moth and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community. This report presents the results of the assessment and discusses the potential ecological and legislative implications associated with the proposed action.

2 Study Area

The study area is located at Beveridge Road, Beveridge, Victoria, approximately 40 kilometres north of Melbourne's CBD (Figure 1). It covers approximately 1,100 hectares and is bound by agricultural land to the north and south, Merriang Road to the east and the rail corridor to the west. Four parcels are included within the study area, being 125 Beveridge Road (SPI 1\PS328947), 165 Beveridge Road (SPI 2\PS328947), 2025 Merriang Road (SPI 1\TP95683) and 2025 Merriang Road (SPI 1\TP710781).

The study area is used entirely for agricultural purposes, being currently used for grazing. It contains hilly topography as well as flatter areas. Low depressions exist along the study area's northern boundary across its entire width and towards the south-eastern corner of the study area north of Beveridge Road. Merri Creek runs generally north-south through the centre of the study area north of Beveridge Road. There are several dams and shallow drainage lines located across the study area (Figure 2; Figure 3).

According to the Department of Environment, Land, Water and Planning (DELWP) NatureKit Map (DELWP 2019a), the study area occurs within the Victorian Volcanic Plain and Highlands – Southern Fall bioregions. It is located within the jurisdiction of the Port Philip and Westernport Catchment Management Authority (CMA) and the City of Whittlesea municipality.

The proportion of land within the study area east of Merri Creek is subject to Clause 52.17 of the Whittlesea Planning Scheme (Figure 3), in which the native vegetation removal process follows the Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines) (DELWP 2017a). A planning permit from Whittlesea City Council is required to remove, destroy or lop native vegetation under this clause. Land west of Merri Creek falls within the Melbourne Strategic Assessment (MSA) program area and Biodiversity Conservation Strategy (BCS), which provide predetermined habitat compensation obligation fees for the removal of actual and potential habitat for matters of National Environmental Significance (NES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and provided measures to mitigate environmental impacts. The MSA does not apply to Hearnes Swamp and a 200-metre buffer around it, which must undergo the normal EPBC Act referral process.

3 Methods

3.1 Desktop Assessment

3.1.1 Initial Biodiversity Assessment

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

- The DELWP NatureKit Map (DELWP 2019a) and Native Vegetation Information Management (NVIM) Tool (DELWP 2019b) for:
    - Modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species; and,
    - The extent of historic and current EVCs.
- EVC benchmarks (DELWP 2019c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2018a);
- The Illustrated Flora Information System of Victoria (IFLISV) (Gullan 2017) for assistance with the distribution and identification of flora species;
- The Commonwealth Department of the Environment (DoEE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoEE 2019);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected Lists (DELWP 2017b; DELWP 2018b);
- The online VicPlan Map (DELWP 2019d) to ascertain current zoning and environmental overlays in the study area;
- Aerial photography of the study area; and,
- Previous ecological assessments relevant to the study area; including;
    - Options Analysis - Beveridge Intermodal and Bulk Handling Facility, Arcadis 2018; and
    - An Ecological Assessment of Beveridge Road, Beveridge, Victoria, ERM 2008.

3.1.2 Growling Grass Frog Targeted Survey

The DELWP NatureKit tool (DELWP 2019a) contains 117 Growling Grass Frog records within a 10-kilometre radius of the study area. Given the connectivity of Merri Creek, it is likely that the species could disperse freely along the creek and into the site. This suggests a moderate to high likelihood of the study area supporting a population of Growling Grass Frog.

3.1.3 Golden Sun Moth Targeted Survey

The DELWP NatureKit tool (DELWP 2019a) contains153 Golden Sun Moth records within a 10-kilometre radius of the study area. As there is no barrier impeding the movement of Golden Sun Moth between the study area and the study area, it is likely that the species could disperse freely between the two sites.

3.2 Field Assessment

3.2.1 Initial Biodiversity Assessment

A field assessment was undertaken on 23 July 2019 to obtain information on flora values within the entire study area (Figure 2). The study area was walked and driven, with all commonly observed vascular flora species recorded, significant records mapped and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping (DELWP 2019a) and their published descriptions (DELWP 2019c). Where remnant vegetation was identified, a habitat hectare assessment was undertaken following methodology described in the Vegetation Quality Assessment Manual (DSE 2004).

A fauna habitat suitability assessment was undertaken concurrently with the flora field assessment to obtain information on terrestrial fauna values within the study area. The study area was visually assessed and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with an emphasis on waterbodies and other habitats that may provide shelter, food or other resources for significant species.

3.2.2 Growling Grass Frog Targeted Survey

The objectives of the targeted surveys are to:

- Determine the presence/absence of Growling Grass Frog recorded or considered likely to occur within the study area;
- Provide information in relation to any implications of Commonwealth and State environmental legislation and Government policy associated with the proposed development;
- Determine any potential impacts on the Growling Grass Frog and their habitats at a National and State level associated with the proposed development; and,
- Provide advice on mitigation measures that may be undertaken to avoid and/or mitigate potential adverse impacts on significant ecological values.

The targeted surveys for Growling Grass Frog surveys must be undertaken in accordance with the methods outlined in the Significant Impact Guidelines for the Vulnerable Growling Grass Frog (DEWHA 2009a) and are outlined below:

- Survey sites within 30 metres of the primary water body and adjoining drainage lines will be chosen based on the presence of supporting suitable habitat for Growling Grass Frog (i.e. moderate to good water quality, moderate to good percentage cover of fringing, emergent and floating vegetation, presence of other refuge);

- Each survey site must be visited on at least two occasions over four nights during weather conditions considered suitable for Growling Grass Frog activity (night time air temperatures greater than 12 degrees, with moderate to no wind), which is generally between October and March (calling takes place primarily between November and December, however the frogs may still be active until March);
- Two qualified zoologists, experienced in Growling Grass Frog detection, must systematically walk along (or around) each watercourse (or waterbody);
- Zoologists must search fringing, emergent and floating vegetation within and adjacent to the watercourse/waterbody with 50W 12V hand-held spotlights and use call-playback to initiate a response from any males that may be present; and
- Surveys include quiet listening for 15 minutes prior to undertaking call-playback and active searching. Active searching focuses on the margins of the waterbody and nearby drainage lines and areas providing potential habitat in the form of terrestrial, aquatic and refuge habitat(s).
- All frog species heard or seen should be recorded and several site-specific habitat variables documented including a visual assessment of water quality, flow and depth, and records of fringing, emergent, floating and submerged vegetation cover. The presence of fish (specifically Mosquito Fish *Gambusia holbrooki*) should also be considered and recorded.

Nocturnal targeted surveys for Growling Grass Frog were completed during warm (over 15°C) conditions on three separate occasions (8, 9 and 17 December 2019) within and adjoining Merri Creek and the dams (Figure 2) by ecologists experienced in amphibian surveys.

3.2.3 Golden Sun Moth Targeted Survey

The aim of these targeted surveys is to confirm the presence or absence of the species, and to determine the potential regulatory and legislative implications associated with the proposed action.

Survey procedures must follow those outlined in the Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (DEWHA 2009b). The following must be undertaken:

- Surveys must be conducted by ecologists experienced in the detection and identification of Golden Sun Moth.
- Surveys must focus on all potential habitat within property boundary;
- The study area must be surveyed up to four separate occasions (if the species is not recorded prior), with at least one week between surveys.
- Surveys must take place during the species' flight season (early November to mid-late December 2019). Confirmation should be made that moths are active on the day of assessment by verifying moths are flying at a reference site where the species is known to be present.
- Surveys must be undertaken during weather conditions suitable for detecting the species. Male moths generally fly between 10am and 3pm on warm (over 20˚C by 10am) days with minimal cloud cover and still conditions. However, if males are observed flying on site after 3pm or during moderately windy conditions surveys can continue until males are no longer observed flying.

- Surveys must be conducted using 50 metre wide parallel transects with observers walking or, if terrain permits, driving in a car at < 10 km / hour (flying male moths can be readily seen from a vehicle) until moths are observed. Tracks (transects) must be recorded with a GPS to show where survey has been undertaken; and,
- A habitat assessment should be completed detailing information on habitat quality, biomass levels, presence of weeds and floristic diversity.

Targeted Golden Sun Moth surveys were undertaken on five separate occasions (20 and 27 November, 9, 17 and December 2019, and 9 January 2020) during optimal conditions suitable for detecting species east of Merri Creek and within the area west of Merri Creek excluded from the BCS (Figure 2). The male generally flies on calm, warm (over 20°C), sunny days, throughout the warmest part of the day between 10am and 3pm, with the species emerging between October and December.

Areas of potentially suitable habitat were traversed by ecologists experienced in the detection and identification of the species. Surveys were conducted in accordance with approved methodology identified within the Biodiversity Precinct Planning Kit (DSE 2010) and the Commonwealth's Significant Impact Guidelines (DEWHA 2009b) for the species.

3.2.4 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains Targeted Survey

This pre-defined potential ecological community type known as Hearnes Swamp and a 200-metre buffer around it (Figure 2) was walked on 12 November 2019 and all flora species recorded, with the appropriate seasonal timeframe being mid-October to early November to undertake this assessment.

3.3 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

Under the *Planning and Environment Act 1987,* Clause 52.17 of the Whittlesea Planning Scheme requires a planning permit from Whittlesea City Council to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the Guidelines (DELWP 2017b). The '*Assessor's handbook – Applications to remove, destroy or lop native vegetation'* (the Handbook) provides clarification regarding the application of the Guidelines (DELWP 2018c).

3.3.1 Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using an assessment-based approach. Two factors – extent risk and location category – are used to determine the risk associated with an application for a permit to remove native vegetation. The location category (1, 2 or 3) has been determined for all areas in Victoria and is available on DELWP's NVIM Tool (DELWP 2019b). Determination of assessment pathway is summarised in Table 1.

Table 1. Assessment pathways for applications to remove native vegetation (DELWP2017a).

Extent		Location		
		1	2	3
Native Vegetation	< 0.5 hectares, and not including any large trees	Basic	Intermediate	Detailed
	Less than 0.5 hectares, and including one or more large trees	Intermediate	Intermediate	Detailed
	0.5 hectares or more	Detailed	Detailed	Detailed

Notes: For the purpose of determining the assessment pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

3.3.2 Vegetation Assessment

Native vegetation (as defined in Table 2) is assessed using two key parameters: extent (in hectares) and condition. For the purposes of this assessment, both condition and extent were determined as part of the habitat hectare assessment.

Table 2. Determination of a patch of native vegetation (DELWP 2017a).

Category	Definition	Extent	Condition
Remnant patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; OR An area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy; OR any mapped wetland included in the *Current Wetlands map*, available in DELWP systems and tools.	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004). Modelled condition for *Current Wetlands*.
Scattered tree	A native canopy tree that does not form part of a remnant patch.	Measured in hectares. Each Large scattered tree is assigned an extent of 0.071 hectares (30m diameter). Each Small scattered tree is assigned a default extent of 0.31 hectares (10 metre diameter)	Scattered trees are assigned a default condition score of 0.2 (outside a patch).

Notes: Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'.

3.3.3 Mapped Wetlands (DELWP)

Wetlands can be difficult to map and assess accurately as they respond quite quickly to changes in environmental condition, especially rainfall. After a period of no or low rainfall they can disappear or appear very degraded. They do, however, recover rapidly after periods of increased rainfall. As a result, under the

Guidelines (DELWP 2017a) all mapped wetlands (based on 'Current Wetlands' layer in the DELWP NatureKit Map) that are to be impacted must be included as native vegetation, with the modelled condition score assigned to them (DELWP 2019b).

Note that mapped wetlands do not apply if they are covered by a hardened, man-made surface, for example, a roadway. If covered by any vegetation including crops, bare soil, a mapped wetland must be treated as a remnant patch.

3.3.4 Impact Avoidance and Minimisation

All applications to remove native vegetation must demonstrate the three-step approach of avoid, minimise and offset. This is a precautionary approach that aims to ensure that the removal of native vegetation is restricted to what is reasonably necessary, and that biodiversity is appropriately compensated for any native vegetation removal that is approved.

3.3.5 Offsets

Biodiversity offsets are required to compensate for the permitted removal of native vegetation. Offsets are divided into two categories: General and Specific. Offset obligations and offset site criteria are determined in accordance with the Guidelines (DELWP 2017a).

The offset requirements for native vegetation removal are calculated by DELWP, based on the vegetation condition scores determined during the biodiversity assessment. A Native Vegetation Removal (NVR) Report has been produced by DELWP.

3.4 Melbourne Strategic Assessment and Biodiversity Conservation Strategy

In order to facilitate the planning approvals process for Melbourne's growth areas subject to the MSA and BCS, native vegetation information was 'time stamped' within the new urban growth areas, which is now used to calculate native vegetation offsets for future development within these areas. This data has been used to determine the indicative native vegetation removal offsets (known as habitat compensation obligations) for the study area west of Merri Creek.

3.5 Assessment Qualifications and Limitations

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and field assessments being undertaken.

Ecological values identified within the study area were recorded using a hand-held GPS or tablet with an accuracy of +/-5 metres. This level of accuracy is considered to provide an accurate assessment of the ecological values present within the study area; however, this data should not be used for detailed surveying purposes.

3.5.1 Initial Biodiversity Assessment

The initial field assessment for the Biodiversity Assessment was undertaken during a sub-optimal season for the identification of flora and fauna species (winter). The 'snapshot' nature of a standard biodiversity assessment, along with sub-optimal timing of the survey, meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers or only germinate

after flooding events may also be absent. A comprehensive list of all terrestrial flora and fauna present within the study area was not undertaken as this was not the objective of the assessment. Rather a list of commonly observed species was recorded to inform the habitat hectare assessment and assist in determining the broader biodiversity values present within the study area.

3.5.2 Targeted Surveys

Data and information held within the ecological databases and mapping programs reviewed as part of the desktop assessment are unlikely to represent all flora and fauna observations that have occurred within, and surrounding, the study area. Therefore, it is important to acknowledge that the number of documented records for the target species within and surrounding the study area is not necessarily a reflection of population size or density. Furthermore, a documented record may indicate a species' presence in an area at a given point in time, but it generally does not offer information about how a species is making use of an area (e.g. foraging, dispersing, reintroducing, etc.). This can be important information when determining the potential impact of a proposed action on a threatened species.

Targeted surveys were undertaken during optimal seasons for the identification of the targeted fauna species and ecological community. Based on available information the Golden Sun Moth flight season commenced at a majority of sites in early-mid November 2018, with moths expected to fly through to early-January 2019. It is considered that the survey effort, timing and results presented meet the objectives of the surveys and provide sufficient information to support the approvals processes.

Flora and fauna data collected during the field assessment, and information obtained from relevant sources (e.g. biological databases and relevant literature) are considered adequate to provide an accurate assessment of the ecological values within the study area.

Fauna surveys were conducted under the Ecology and Heritage Partners Pty Ltd research permit (#10005952) issued by DELWP under the *Wildlife Act 1975*.

4 Results for the Initial Biodiversity Assessment

4.1 Vegetation Condition

A large majority of the study area contains pasture, with some scattered native trees and planted vegetation also present. A complete flora species list is provided in Appendix 1.1.

4.1.1 Remnant Patches

Remnant native vegetation in the study area is representative of one EVC: Tall Marsh (TM1) (EVC 821). The presence of this EVC is generally consistent with the modelled pre-1750s native vegetation mapping (DELWP 2019a). Three small patches (approximately 29, 39 and 70 square metres) of TM1 are located along Merri Creek in the centre of the study area north of Beveridge Road next to the farm buildings (Figure 3). These patches contain a mixture of Broadleaf Cumbungi *Typha orientalis* and Common Reed *Phragmites australis*, with Water Ribbons *Cycnogeton procerum* also present in small numbers (Plate 1; Plate 2).

Finger Rush *Juncus subsecundus* is also present in the drainage lines (shown by the 'minor watercourses' layer connecting Trees 7-9 in Figure 3) (Plate 3) and in the low-lying areas surrounding these drainage lines (Plate 4). These areas do not however constitute native vegetation patches because their coverage is less than 25% of the ground cover present.

The study area contains approximately 104 rocky outcrops, which are largely concentrated in the western and southern sections of the study area (ERM 2008). While these outcrops contain many exotic pasture grasses (Plate 5), some native vegetation was also found here, likely due to the rocky conditions deterring cattle from accessing these areas. These species were Weeping Grass *Microlaena stipoides* var. *stipoides* and Bidgee-widgee *Acaena novae-zelandiae* (Plate 6). Given that the field assessment was undertaken during winter, a sub-optimal season for identifying flora species (particularly grasses), a full assessment of whether these areas constitute patches across all 104 rocky outcrops could not be undertaken.

Plate 1. Tall Marsh along Merri Creek with Crack Willows in the background immediately north of the farm track that crosses the creek (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 2. Tall Marsh along Merri Creek immediately south of the farm track that crosses the creek (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 3. Finger Rush in the drainage line in the north-east of the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 4. Small occurrences of Finger Rush amongst pasture grass in the low-lying area in the north-east of the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 5. Rocky outcrops contain largely pasture grass throughout the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 6. The rocky outcrops containing some native vegetation, such as this Bidgee-widgee (Ecology and Heritage Partners Pty Ltd 23/07/2019).

4.1.2 *Scattered Trees*

A total of 15 scattered trees were recorded in the study area (Figure 3), which consist of seven River Red-gums *Eucalyptus camaldulensis* (Plate 7), six Swamp Gums *Eucalyptus ovata* and one dead eucalypt stag (Plate 8). These trees are found across the study area and are all set amongst the pastures. Thirteen of the 15 trees are large trees as per the minimum EVC benchmark threshold for a large tree.

The species type and diameter at breast height (DBH) for all scattered trees are provided in Appendix 1.2.

Plate 7. A large River Red-gum near the northern boundary of the study area (Tree 3 on Figure 3) (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 8. A dead eucalypt stag on the eastern boundary of the study area (Tree 9 on Figure 3) (Ecology and Heritage Partners Pty Ltd 23/07/2019).

4.1.3 *Introduced and Planted Vegetation*

More than 99% of the study area contains pasture grass (Plate 9), typically consisting of Toowoomba Canary-grass *Phalaris aquatica*. The entire eastern boundary of the study area north of Beveridge Road and both sides of Beveridge Road within the study area are lined with a five to 10-metre wide strip of planted largely non-indigenous Australian species. These consist of a range of trees and shrubs including Sugar Gum *Eucalyptus cladocalyx*, Swamp Yate *Eucalyptus occidentalis*, Blackwood *Acacia melanoxylon*, Cootamundra Wattle *Acacia baileyana*, Giant Honey-myrtle *Melaleuca armillaris* subsp. *armillaris* and Salt Paperbark *Melaleuca halmaturorum* (Plate 10). A small strip of planted River Red-gums also exists along the study area's northern boundary near Merri Creek (Plate 11). These strips are fenced off within the study area north of Beveridge Road.

Exotic trees commonly planted around farm buildings and dwellings are found within the study area around the existing buildings (Plate 12). These consist of Radiata Pines *Pinus radiata* and Monterey Cypress *Cupressus macrocarpa*. Crack Willow *Salix fragilis* is also distributed along Merri Creek within the study area, with denser occurrences towards the northern boundary and around the farm buildings (Plate 1).

Ten noxious weeds are present throughout the study area, being found as individual plants or in small clumps (Plate 13). These are Spear Thistle *Cirsium vulgare*, Hawthorn *Cretaegus monogyna*, Artichoke Thistle *Cynara cardunculus* subsp. *flavescens*, Soursob *Oxalis pes-caprae*, Sweet Briar *Rosa rubiginosa*, Variegated Thistle *Silybum marianum*, Blackberry *Rubus fruticosus* spp. agg., African Box-thorn *Lycium ferocissimum*, Serrated Tussock *Nassella trichotoma*, Gorse *Ulex europaeus* and Crack Willow *Salix fragilis*. The latter five are also Weeds of National Significance (WoNS).

Plate 9. Pasture grasses dominate the study area, with pugging evident in this location at Hearnes Swamp (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 10. Planted native vegetation along the eastern boundary of the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 11. Planted River Red-gums along the northern boundary of the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 12. Monterey Cypress around the farm buildings in the study area north of Beveridge Road (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 13. Gorse persisting near the northern boundary of the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019).

4.2 Fauna Habitat

Fauna observed using suitable habitat throughout the study area during field surveys included; Eastern Grey Kangaroos *Macropus giganteus*, Eurasian Skylark *Alauda arvensis*, Eastern Rosella *Platycercus eximius*, Little Raven *Corvus mellori*, Red-rumped Parrot *Psephotus haematonotus*, Australian Magpie *Cracticus tibicen*, Common Blackbird *Turdus merula*, Magpie-lark *Grallina cyanoleuca*, House Sparrow *Passer domesticus*, Willie Wagtail *Rhipidura leucophrys*, White-faced Heron *Egretta novaehollandiae*, Galah *Eolophus roseicapilla,* Australian Wooduck *Chenonetta jubata*, Wedge-tailed Eagle *Aquila audax*, Common Starling *Sturnus vulgaris*, Grey Butcherbird *Cracticus torquatus*, Welcome Swallow *Hirundo neoxena*, Superb Fairy-wren *Malurus cyaneus*, Australasian Darter *Anhinga novaehollandiae*, Swamp Harrier *Circus approximans*, Masked Lapwing *Vanellus miles*, Common Eastern Froglet *Crinia signifera* and European Rabbit *Oryctolagus cuniculus*.

Five broad habitat types are present within the study area; Merri Creek, Hearnes Swamp and adjoining drainage lines, constructed waterbodies, scattered native and planted trees, and exotic grassland. A description of each habitat type identified within the study area and the fauna species likely to occur within them is given below.

4.2.1 Merri Creek

Merri Creek flows through the centre of the study area, which is likely to provide habitat for a range of common wetland bird species. Based on several previous targeted surveys along sections of Merri Creek adjacent to the study area and in the local vicinity, the area has been determined to support an important population of Growling Grass Frog and is identified as Conservation Area 34 (Merri Creek corridor) under the Growling Grass Frog Sub-regional Species Strategy (DEPI 2013a) (Figure 3).

Habitat variables were assessed within the study area during the field assessment, such as water quality, the presence and cover of fringing, floating, submerged and emergent vegetation, the availability of refuge sites (e.g. rock piles, native vegetation), and key threats such as predatory fish (e.g. Plague Minnow *Gambusia holbrooki*).

Merri Creek was found to support high-quality Growling Grass Frog breeding habitat. Some sections of the Creek contained a high percentage cover of emergent, floating and submerged vegetation [primarily Water Ribbons, Finger Rush and Pale Rush Juncus pallidus (Plate 14 and 15)], and a variable cover of fringing vegetation in isolated locations (e.g. Cumbungi and Common Reed) (Plate 1 and 2). Rocky ledges and banks provide suitable microhabitats for the species (likely to be used for thermoregulation and overwintering) (Plate 14 and 16), while deeper semi-permanent pools along the Creek provide suitable breeding and refuge sites. Extensive areas of submerged vegetation provide high quality habitat for tadpoles, and floating vegetation provides suitable habitat for calling males. Areas adjacent to Merri Creek are dominated by open areas supporting pasture/introduced grasses, which provide suitable foraging habitat for the species.

Throughout the alignment of the creek there is evidence of pugging in the riparian zone and within the waterbody itself due to the presence of cattle (Plate 17), which occurs when the soil is very wet, and the penetration of animal hooves remoulds the soil's surface into a series of holes and mounds. This process can destroy a soil's structure by removing large soil pores and can kill plants or push propagules further down the soil profile. This has caused minor erosion to the banks, and increased turbidity levels within the creek.

4.2.2 *Hearnes Swamp and Adjoining Drainage Lines*

There are numerous drainage lines which run throughout the study area, some of which have smaller offshoots (Plate 3; Figure 3). The area referred to as Hearnes Swamp and the associated drainage lines have been prone to disturbance through pugging due to the presence of cattle (Plate 9). Cattle were present on-site during field assessments and the site shows signs of historical grazing and associated land use.

The drainage lines provide habitat for the nationally significant Growling Grass Frog and are likely to be used as a habitat corridor for the species. A variety of common frogs and birds, such as Common Eastern Froglet, Superb Fairy-wren and White-faced Heron, were recorded using this habitat during field assessments.

4.2.3 *Constructed Waterbodies*

There are several constructed waterbodies throughout the study area in the form of farm dams (Plate 18; Figure 3). These may provide a water resource to a range of common fauna species such as Eastern Grey Kangaroo, as well as suitable foraging for numerous common aquatic birds. These dams appear to be highly impacted by cattle and contained little to no fringing vegetation. Exotic grasses are present within modified paddocks surrounding these dams. The proximity of these dams to nearby Merri Creek makes them a potential breeding resources for Growling Grass Frog, with nearby drainage lines offering further accessibility between the dams and suitable habitat within the creek line.

4.2.4 *Scattered Native Trees and Planted Trees*

Scattered native large trees occur throughout the study area (Figure 3), which provide an important resource for arboreal fauna. Many of these trees are mature, providing an array of small hollows, bark fissures and crevices (Plate 7 and 8). These are likely to be used for shelter and nesting by a range of hollow-dependent fauna species including parrots, microbats and possums. Scattered trees provide habitat for more mobile fauna species, vantage points and nesting areas for diurnal and nocturnal raptors, as well as stepping stones for more mobile fauna moving through the study area, enhancing landscape permeability for native fauna.

Planted vegetation is located throughout the study area as windrows or as ornamental plantings, particularly along the eastern boundary north of Beveridge Road and around the buildings (Plate 10 and 12; Figure 3). These areas provide foraging, roosting and nesting habitat for mobile generalist fauna including locally common birds and microbats. Species observed using this habitat during field surveys were Superb Fairy-wren, Common Starling, Australian Magpie, Galah, Common Blackbird and Eastern Rosella.

4.2.5 *Exotic Grassland*

Introduced, modified grassland is the dominant fauna habitat present within the study area. This habitat occurs where native vegetation has been cleared or modified as a result of agricultural practices. Introduced grassland supports relatively few native fauna species, none of which are solely dependent on such habitat. Given the extent of the modification of grassland habitat within the study area, and the number of introduced species, the value of this habitat for native fauna within the study area is considered low.

Large populations of Eastern Grey Kangaroos were observed throughout the study area during the field assessment, and there was extensive evidence of Eastern Grey Kangaroos frequenting the site such as tracks, scats and fence crossings (Plate 19). Eastern Grey Kangaroos home range is likely to encompass the entire site, due to the presence of water sources, suitable protective habitat and palatable grassland throughout most of the study area. Three individuals observed during the assessment were in poor condition and appeared to show signs of phalaris (Toowoomba Canary-grass) poisoning, which causes severe neurological damage and can lead to death.

Plate 14. Suitable Growling Grass Frog habitat with fringing and submerged vegetation and rocky ledges (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 15. Floating and submerged vegetation in Merri Creek (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 16. Section of Merri Creek containing fringing vegetation, rocky ledges and rock piles (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 17. Evidence of pugging and impacts to Merri Creek caused by cattle (Ecology and Heritage Partners Pty Ltd 23/07/2019).

Plate 18. Constructed farm dam in the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019)

Plate 19. Evidence of Eastern Grey Kangaroos moving through the study area (Ecology and Heritage Partners Pty Ltd 23/07/2019)

4.3 Removal of Native Vegetation within the area covered by Clause 52.17 Native Vegetation (the Guidelines)

The below clearing scenario is based on the removal of Trees 4-9 and Trees 12-14 and Current Wetlands east of Merri Creek, i.e. within the area covered by the Guidelines (DELWP 2017a) (Figure 3). While is it unlikely that most (if any) of these trees or wetland areas would be removed/impacted given they are outside the expected development area, the offset requirements have been calculated as a guide for their loss through the production of an EnSym Report. An EnSym Report generates the same (or very rarely slightly different) offset requirements as a DELWP NVR Report, however it has been generated by Ecology and Heritage Partners and accesses the same DELWP database used to generate an NVR Report.

It is important to note that the primary goals of Clause 52.17 are to avoid native vegetation loss, and where it cannot be avoided, minimise the amount of native vegetation being removed. These are the key criteria Council and DELWP use when making their decision to approve a planning application or not.

4.3.1 Vegetation proposed to be removed

The study area is within Location 2, with 21.493 hectares of native vegetation assumed to be lost under the scenario of total removal within the area covered by the Guidelines, i.e. east of Merri Creek. As such, the permit application would fall under the Detailed assessment pathway.

Condition scores for vegetation proposed to be removed are based on modelled scores available on the NVIM system (DELWP 2019b).

A summary of proposed vegetation losses and associated offset requirements is presented in Table 3.

Table 3. Removal of Native Vegetation under the Guidelines (DELWP 2017a).

Assessment pathway	Detailed
Total Extent (past and proposed) (ha)	21.493
Extent of past removal (ha)	0.00
Extent of proposed removal (ha)	21.493
EVC Conservation Status of vegetation to be removed	Endangered (Plains Grassy Woodland and Swampy Riparian Woodland)
Large Trees (no.)	8
Location Category	2

4.3.2 Offset Targets

The offset requirement under the scenario of total removal within the area covered by the Guidelines is 6.505 General Habitat Units (HU) and 8 Large Trees. A summary of assumed vegetation losses and associated offset requirements is presented in Table 4 and the EnSym Report is presented in Appendix 3.

Table 4. Offset targets.

General Offsets Required	6.505 General Habitat Units
Large Trees	8
Vicinity (catchment / LGA)	Port Philip and Westernport CMA / City of Whittlesea
Minimum Strategic Biodiversity Value*	0.299

* The minimum Strategic Biodiversity Value is 80% of the weighted average score across habitat zones where a General offset is required.

Ecology and Heritage Partners are a DELWP accredited over-the-counter offset broker. We are therefore able to search for and secure any offset obligations if scattered trees and/or Current Wetlands subject to the Guidelines [i.e. all land east of Merri Creek (Figure 3)] will be removed/lost.

A fee proposal will be provided to the client to secure the offset obligations (if required) once the impact area is known. As a guide for the 6.505 General Habitat Units that would be lost if all native vegetation east of Merri Creek was removed, the estimated cost to purchase offsets through a third-party trade would be between **$650,500.00** and **$975,750.00** (GST inclusive). This is a very approximate value based on the average current General Habitat Units price of between $100,000.00 and $150,000.00 (GST inclusive), respectively. Given that the offsets market is dynamic and the value of one unit depends on offset site availability, purchaser demand and other market forces, the exact cost to purchase offsets can only be determined once the impact area is known and inquiries are made with specific offset credit owners.

4.4 Removal of Native Vegetation within the Melbourne Strategic Assessment and Biodiversity Conservation Strategy

The Melbourne Strategic Assessment (MSA) evaluated the Victorian Government's impact of their urban development program on matters of National Environmental Significance (NES) listed under the EPBC Act and provided measures to mitigate the impacts. The MSA applies to a large area of outer Greater Melbourne, including the proportion of land west of Merri Creek within the study area (Figure 3).

The Biodiversity Conservation Strategy (BCS) (DEPI 2013b) is the overarching strategy designed to protect biodiversity within Melbourne's growth corridors and applies to a subset of the area covered by the MSA, including all the area within the study area covered by the MSA. The BCS was informed by the subregional species strategies for the Growling Grass Frog, Golden Sun Moth and Southern Brown Bandicoot (DEPI 2013a; 2013c; DSE 2009a), which identify conservation outcomes and offset consolidation strategies (i.e. habitat compensation obligations) for Victoria's native vegetation and matters of NES, including mechanisms for how these outcomes will be delivered (e.g. whether there are fauna salvage and translocations requirements for certain parcels) (DEPI 2013d).

A decision was made on 5 September 2013 under section 146B of the EPBC Act to approve classes of actions associated with development in Melbourne's Northern Growth Corridor undertaken in accordance with the BCS (DSEWPC 2013b). Actions approved under Annexure 1 of this decision in accordance with the BCS would therefore not require a separate referral, assessment or approval under the EPBC Act in order to be taken (DSEWPC 2013b).

4.4.1 Habitat Compensation Obligations

The study area is located within the Northern Freight Precinct Structure Plan (PSP) area of Melbourne's Northern Growth Corridor of the BCS (DEPI 2013b). Offsets and habitat compensation fees associated with

removal of native vegetation and fauna habitat under the BCS are based on the Draft Habitat Compensation under the Biodiversity Conservation Strategy (DEPI 2013d), and are calculated with the following considerations:

Native vegetation (DEPI 2013b):

- Offsets for patches of native vegetation will be based on the extent of Time Stamping data, with all native vegetation considered to be Very High conservation significance.
- Clearance of native vegetation will invoke an offset fee of **$104,582.50** (GST inclusive) per hectare cleared.

Scattered Tree (DEPI 2013b):

- One scattered tree is shown to occur within the study area (identified as Tree 1 on Figure 3) based on the MSA program's habitat compensation layer and will invoke a compensatory habitat fee of **$14,539.80** (GST inclusive) if removed.

Matted Flax-lily (DEPI 2013b):

- All native vegetation patches within the western and north-western growth areas and the Outer Metropolitan Ring Transport Corridor will invoke a compensatory habitat fee of **$12,315.60** (GST inclusive) to cover the cost of securing and managing conservation reserves for Matted Flax-lily. This is additional to the abovementioned offset for clearance of native vegetation.

Golden Sun Moth (DEPI 2013c):

- All habitat within the northern, north-western and western growth areas and the Outer Metropolitan Ring Transport Corridor (native and non-native grassland and woodlands) and excluding any areas identified as Growling Grass Frog habitat will be deemed to be "confirmed habitat". However only non-native habitat will invoke a compensatory habitat fee as fees for native habitat have been built into the price of native vegetation offsets. All non-native habitat cleared will invoke a compensatory habitat fee of **$8,705.40** (GST inclusive) per hectare cleared.

Growling Grass Frog (DEPI 2013a):

- All land within the northern, north-western, western and south-eastern growth areas and the Outer Metropolitan Ring Transport Corridor mapped as Category 1 or 2 habitat will invoke a compensatory habitat fee of **$8,281.90** (GST inclusive) per hectare cleared to cover the cost of establishing and managing the Growling Grass Frog corridors as set out in the Sub-regional Species Strategy.

The study area is not labelled as 'Potential Salvage Operations' and salvage is therefore not required.

Based on DELWPs interactive NVIM tool (DELWP 2019b) that calculates the total habitat compensation obligation fee for areas in the BCS, a total of **$6,210,773.92** (GST inclusive) would apply to the study area if all vegetation within the BCS is impacted/cleared. A summary of the habitat compensation fees associated with removal of flora and fauna habitat within the study area are summarised in Table 5. The full habitat compensation obligations for each land parcel are provided in Appendix 4. These values do not however reflect the omission of Hearnes Swamp and a 200-metre buffer around it from the BCS program (Figure 3), which means that the total fee shown in Table 5 will actually be lower to reflect those parts of the study area covered by the BCS program. Habitat compensation fees may still apply to Hearnes Swamp and a 200-metre buffer around it, however these are determined through the normal EPBC Act process (refer to Section 4.4.2).

Furthermore, any form of development within a land parcel, no matter how small or large the development, assumes a total loss of biodiversity values within that parcel, and hence the payment of habitat compensation obligations for the whole parcel(s), as shown in Table 5. Large infrastructure projects that include more than one parcel in their development footprint are typically able to obtain habitat compensation obligation fees that only cover the development footprint, however this needs to be confirmed with DELWP. The habitat compensation obligation fees for the development may therefore likely be less than that shown in Table 5, however the exact fee cannot be determined until the development footprint is known. This fee can only be determined by DELWP, in which the proponent submits the development footprint to their internal MSA Team for assessment.

Table 5. Habitat compensation obligation fees for the study area within the Biodiversity Conservation Strategy.

Matter of NES	Number of hectares/trees covered by matters of NES within the study area	Costs under the BCS per hectare (GST inclusive)	Habitat compensation fee (GST inclusive)
Native Vegetation	0.082 ha	$104,582.50	$8,575.77
Scattered Tree	1 tree	$14.539.80	$14,539.80
Mattered Flax-lily	0.082 ha	$12,315.60	$1,009.88
Golden Sun Moth	526.900 ha	$8,705.40	$4,586,875.26
Growling Grass Frog	193.165 ha	$8,281.90	$1,599,773.21
		Total (GST inclusive)	**$6,210,773.92**

4.4.2 Hearnes Swamp and the 200-metre Buffer

While Annexure 1 of the document approves development in Melbourne's Northern Growth Corridor without the further need for a referral, assessment or approval under the EPBC Act (DSEWPC 2013b), Annexure 2 of the same document excludes Hearnes Swamp and an area 200-metres around it from this approval (Figure 3). Any development in this excluded area must therefore meet the normal requirements of the EPBC Act and may be referred and considered in accordance with the requirements of Parts 7, 8 and 9 of the EPBC Act.

Hearnes Swamp is identified as containing potential occurrences of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains, which is an ecological community listed as critically endangered under the EPBC Act. Further discussion and the implications of this potential ecological community are provided in Section 5.1.

4.4.3 Biodiversity Conservation Strategy Conservation Area 34

Conservation Area 34 exists within the study area along Merri Creek, running along the creek and extending out to the west by approximately 90-120 metres along its length (Figure 3). This conservation area is categorised as 'Growling Grass Frog conservation, floodplain and open space' (DEPI 2015). If there is a proposed adjustment to/encroachment into this conservation area boundary, DELWP will assess the impact and determine whether it requires Commonwealth Government approval. In general, if there is no net loss in area, DELWP may approve/not approve the action themselves, but if there will be a net loss in area and they endorse the proposal, the Commonwealth Government will make the final decision as to whether the proposal is approved or not. The process and full set of criteria when considering adjustments to Conservation Area 34 are provided in DEPI 2015 (pp 11-13).

4.4.4 *Melbourne Strategic Assessment (Environment Mitigation Levy) Bill 2019*

On 16 October 2019, the *Melbourne Strategic Assessment (Environment Mitigation Levy) Bill 2019* was introduced to the Victorian Parliament and passed on 11 February 2020. The Bill provides for a legislative framework to support the collection of the Environment Mitigation Levy that will be in effect by 1 July 2020. This is in accordance with the Melbourne Strategic Assessment (MSA) Report and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The Environment Mitigation Levy scheme will replace the current BCS Habitat Compensation fee system and sees increases in the levies applied to relevant habitats.

Offsets and Habitat Compensation fees associated with the removal of native vegetation and fauna habitat under the Environment Mitigation Levy are as follows:

- Native vegetation area: Increase of 19% on the current fee
- Matted Flax-lily habitat area: Increase of 1% on the current fee
- Golden Sun Moth habitat area: Increase of 26% on the current fee
- Growling Grass Frog habitat area: Increase of 4% on the current fee
- Scattered tree location: Increase of 19% on the current fee

The introduction of this levy will only apply to the BCS area and any applicable fees within Hearnes Swamp and the 200-metre buffer around it are still subject to the normal EPBC Act process.

4.5 Significance Assessment

4.5.1 *Flora*

Fifteen indigenous and 33 non-indigenous flora species were recorded within the study area (Appendix 1.1). The VBA contains records of 5 nationally significant and 34 State significant flora species previously recorded within 10 kilometres of the study area (DELWP 2018a) (Figure 4; Appendix 1.3). The PMST nominated an additional 11 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoEE 2019).

No nationally significant flora was recorded during the site assessment. One State significant species was observed, being the Salt Paperbark, which was recorded within the planted vegetation strip along the study area's eastern boundary. This species is not indigenous, being found in the drier regions of Victoria's west. Based on the modified nature of the study area, landscape context and the proximity of previous records, significant indigenous flora species are considered unlikely to occur within the study area due to the high levels of disturbance and absence of suitable habitat.

4.5.2 *Fauna*

No significant fauna species were observed during the field survey.

The VBA contains records of 18 nationally significant, 34 State and 13 regionally significant fauna species previously recorded within 10 kilometres of the study area (DELWP 2018a) (Figure 5; Appendix 2). The PMST nominated an additional 10 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoEE 2019).

Growling Grass Frog

Of the 75 significant fauna species recorded or predicted to occur in the study area locality, only Growling Grass Frog was considered to have a moderate to high likelihood of occurring within the study area because the species has been recorded within 800 metres of the site within the last 20 years (Figure 5). There is also suitable habitat throughout the study area, particularly along Merri Creek, as it contains high coverage of fringing and floating vegetation and rocky ledges and banks. The species is listed as vulnerable under the EPBC Act. Targeted surveys were recommended for the Growling Grass Frog to ascertain the presence/absence of the species within the study area.

A description and habitat features of the Growling Grass Frog are provided in Appendix 5.1.

Golden Sun Moth

Given the presence of grassland, and recent records of the nationally significant Golden Sun Moth *Synemon plana* in the surrounding area (approximately 1.3 kilometres south and three kilometres west of the study area), a habitat assessment was conducted to ascertain the likelihood or presence of suitable habitat for the species within the study area. Golden Sun Moth is listed as critically endangered under the Commonwealth EPBC Act, threatened under the Victorian FFG Act and critically endangered on the Advisory List for Threatened Invertebrate Fauna in Victoria (DSE 2009b). The species typically occurs in native grassland and grassy woodland dominated by wallaby–grass *Rytidosperma spp*., spear grass *Austrostipa spp*. and Kangaroo Grass *Themeda triandra*, as well as in degraded grasslands dominated by the exotic Chilean Needle-grass (*Nassella nessiana*) which is a noxious weed. These grass species are intrinsically linked to the presence of Golden Sun Moth and integral to the viability of a population of the species.

It was found during filed surveys that there is a distinct lack of key host grass species. It is therefore considered unlikely that Golden Sun Moth are present within the study area, or likely to be impacted by the proposed development. However, the field assessment was undertaken during a sub-optimal season for the identification of many flora species, and the site shows signs of historical grazing and associated land use, which impeded the detectability of this species. Therefore, given the proximity of previous records and the fact that the species has been recorded in the surrounding area within the last five years, targeted surveys were recommended to ascertain the presence/absence of the species within the study area.

A description and habitat features of the Golden Sun Moth are provided in Appendix 5.2.

4.5.3 Communities

Five nationally (EPBC Act) listed ecological communities are predicted to occur within 10 kilometres of the study area (DoEE 2019):

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia;
- Natural Damp Grassland of the Victorian Coastal Plains;
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains is listed as critically endangered under the EPBC Act and is predicted to occur in the north-western corner of the site, which is

known as Hearnes Swamp (Figure 3). A description of this ecological community is provided in Appendix 5.3. A summary of this community, key criteria and observations during the field assessment are given below.

Native vegetation found within the study area does not meet the condition thresholds that defines the other four nationally listed communities or any State-significant communities.

Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

The characteristics of this community type are described as:

> *'temporary freshwater wetlands that are inundated on a seasonal basis, typically filling after winter-spring rains, and then drying out. The vegetation is generally treeless and dominated by a herbaceous ground layer, often with a considerable graminoid component and with forbs present. The herbaceous species present are characteristic of wetter locations and are typically absent or uncommon in any adjoining dryland grasslands and woodlands. The dominant plants present are subject to seasonal and site conditions, and the diversity of the flora may range from relatively species-poor to species-rich composition*' (DSEWPC 2012, p 1).
>
> '*this wetland ecological community includes flora, fauna and micro-organisms and remains present in both wet and dry periods. When standing water is present, wetland plants are clearly evident, however during drought or seasonal dry periods plants may not be visible above ground. During dry periods aquatic and amphibious species persist as desiccated shoots, underground rootstocks or propagules (seeds, spores and eggs) in the ground. The ecological community rapidly reverts to its wet form upon inundation if the hydrological and biological characteristics of the wetland are relatively intact.*' (TSSC 2012, p 1)

The following details the criteria for the classification of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (TSSC 2012):

- Limited to the temperate zone of mainland south-eastern Australia;
- On flat plains grading into slopes, 500 m above sea level;
- Associated soils are generally fertile but poorly draining clays;
- In rainfall zones with a winter seasonal rainfall pattern, mean annual rainfall usually 400 to 800 mm/year;
- On isolated drainage lines or depressions with are seasonally inundated during winter-spring and subsequently dry by late summer;
- Rainfall is the main water source;
- Salinity is fresh to slightly brackish;
- Trees are sparse to absent;
- Vegetation cover is dominated by a range of native wetland graminoids and/or forbs; and,
- At least one native wetland forb species is present.

The process to determine whether Hearnes Swamp is consistent with the description and key diagnostic features for the national ecological community follows those described in Part A (Condition during 'typical' wet/dry cycles, i.e. not drought) (TSSC 2012):

- Step A1 - Is the wetland consistent with the key diagnostic characteristics above?
    - If Yes, go to Step A2.
    - If No, the wetland is of a different type to the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

While most of the criteria for this ecological community are met (e.g. annual rainfall, hydrology, treeless), no native vegetation, including wetland graminoids or forbs, were observed within the area identified under this ecological community type. The area is comprised largely of Toowoomba Canary-grass, with other exotic pasture species also present. This area was also highly disturbed, with pugging evident throughout (Plate 7).

Given that the vegetative elements of wetland communities are typically hidden when not fully inundated, the presence of native vegetation that meet the condition thresholds of this ecological community cannot be completely ruled out and thus a targeted survey was recommended. Given the presence of pugging (which may be a frequent occurrence during winter), the likelihood of presence is however considered very low.

4.5.4 Targeted Survey Recommendation

Given the presence of suitable habitat within the study area, proximity of recent records in the surrounding area and/or sub-optimal time to determine their presence during the initial Biodiversity Assessment, targeted surveys were recommended to ascertain the presence/absence of Growling Grass Frog, Golden Sun Moth and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community within the study area.

5 Results for the Targeted Surveys

5.1 Growling Grass Frog

5.1.1 Habitat Assessment

Remnant patches of Tall Marsh (EVC 821) were identified along the creek alignment in close proximity to the farmhouse, in the centre of the study area (Figure 3). These patches contain a mixture of Broadleaf Cumbungi *Typha orientalis* and Common Reed *Phragmites australis*, with Water Ribbons *Cycnogeton procerum* also present in small numbers (Plate 20). Hawthorn *Crataegus monogyna* was also distributed along Merri Creek within the study area, with denser occurrences towards the northern boundary (Plate 21). Emergent, floating and submerged vegetation occurred mostly within the northern portion of the creek line (i.e. north of the farmhouse). This vegetation consisted primarily of Water Ribbons, Finger Rush and Pale Rush Juncus pallidus and a variable cover of fringing vegetation in isolated locations (e.g. Cumbungi and Common Reed). The combination of riparian vegetation and floating vegetation provides ideal conditions for Growling Grass Frog to persist.

It was observed that between June and December 2019 the water level of Merri Creek reduced by approximately 85% (Plate 22; Plate 23). The ephemeral nature of the creek may impact the ability for Growling Grass Frogs to establish a viable breeding population as permanent water sites with a high amount of fringing and floating vegetation are preferred egg-laying sites (Hamer and Organ 2006). Where pooling did occur, high densities of Plague Minnow *Gambusia holbrooki* were recorded, which may have adverse effects on Growling Grass Frog tadpole populations via predation.

The turbidity of the water was high, and pugging provided evidence of cattle usage within the riparian zone and throughout the water body (Plate 24). The penetration of animal hooves on the wet soil has largely destroyed the soil structure and may have increased the erosion rate of the banks and the turbidity of the water. Cattle were observed grazing close to the water line, which reduces the availability of streamside vegetation, and therefore Growling Grass Frog habitat and movement corridors (DSE 2010). Furthermore, this incursion of cattle into the riparian zone may have resulted in trampling of breeding habitat that may be present along the creek line as well as pollution throughout the creek (DSE 2010).

Rocky outcrops were observed at regular intervals along the creek line, providing adequate opportunities for Growling Grass Frog basking. However, these outcrops also provide crossing opportunities for cattle and kangaroo and trampling was evident throughout these areas. The water quality was greatly reduced due to the presence of cattle and kangaroo utilising the creek line, while there were several deceased animals found near the water. A deceased kangaroo was observed during the final survey event in the water body (Plate 25).

Plate 20. Emergent vegetation within Merri Creek, north of the farmhouse (Ecology and Heritage Partners 17/12/2019).

Plate 21. Vegetation along the creek line (Ecology and Heritage Partners 09/12/2019).

Plate 22. Merri Creek in July (Ecology and Heritage Partners 23/07/2019).

Plate 23. Merri Creek in December (Ecology and Heritage Partners 17/12/2019).

Plate 24. Floating vegetation and pugging located along Merri Creek (Ecology and Heritage Partners 23/07/2019).

Plate 25. Deceased Eastern Grey Kangaroo found north of the farmhouse (Ecology and Heritage Partners 17/12/2019).

5.1.2 *Results*

Although suitable habitat for Growling Grass Frog was identified within the study area, no Growling Grass Frogs were detected during the targeted surveys despite appropriate weather conditions (Table 6). Common Froglet *Crinia signifera*, Eastern Banjo Frog *Limnodynastes dumerilii* and Southern Brown Tree Frog *Litoria ewingii* were heard calling during each survey event, however, frog activity was relatively low throughout the survey period with approximately less than 10 individual frogs heard calling on each occasion. The culmination of disruptive processes such as low water quality, the presence of cattle, and the increase potential for predation may have provided enough pressure to prevent the establishment of a viable population, thereby excluding the Growling Grass Frog from the study area.

Table 6. Results of the Nocturnal Growling Grass Frog Targeted Survey.

Survey Date	Weather conditions						Number of Growling Grass Frog observed
	Survey Temp C° (max/min)	Wind direction	Wind speed (km/hr)	Relative Humidity (%)	Cloud Cover (%)	Rain (mm)	
08/12/2019	20/14	NW	11	10	20	0	0
09/12/2019	23/15	S	17	6	30	0	0
17/12/2019	24/16	SSW	9	30	25	0	0

Note: Bureau of Meteorology (BOM) weather for Wallan (Kilmore Gap) (Station 088162 –December 2019), Australian Government, ACT.

5.2 Golden Sun Moth

5.2.1 *Habitat Assessment*

The study area has a long history of cattle grazing, and as a result the vegetation is highly modified from its original state (Plate 26; Plate 27) (MWH 2009). Cattle grazing still occurs throughout the study area, with majority of the are supporting pasture grass, such as Squirrel-tailed Fescue *Vulpis bromoides* and Toowoomba Canary-grass *Phalaris aquatica* (Plate28; Plate 29). Areas of native grass, including Weeping Grass *Microlaena stipoides* var. *stipoides* and Bidgee-widgee *Acaena novae-zelandiae,* are typically associated with rocky areas.

Plate 26. Exotic pasture grass within the study area in July (Ecology and Heritage Partners 23/07/2019).

Plate 27. Exotic pasture grass within the study area between November and January (Ecology and Heritage Partners 17/12/2019).

Plate 28. Exotic grasses in the rail reserve to the west of the study area (Ecology and Heritage Partners 23/07/2019).

Plate 29. Exotic pasture grass along Merri Creek (Ecology and Heritage Partners 17/12/2019).

5.2.2 Results

While Golden Sun Moth were observed at reference sites prior to each assessment, no individuals were recorded within the study area during the targeted surveys (Table 7). Cattle grazing is likely to have impacted the suitability of the site as Golden Sun Moth habitat.

Table 7 Results of the Golden Sun Moth Targeted Survey.

Survey Date	Survey times	Reference Site	Temperature (°C) (9am and 3pm)	Wind (km/hr)	Cloud cover (%)	No. of days since rain	Number of Golden Sun Moth observed
20/11/2019	11:15 – 16:00	Craigieburn	35.6	20	0	>2	0
27/11/2019	10:30 – 17:00	Craigieburn	27.3	11	20	>2	0
09/12/2019	9:00 – 17:00	Geelong	38.9	18	5	>2	0
17/12/2019	9:00 – 17:00	Craigieburn	32.5	15	30	>2	0
09/01/2020	9:45 – 17:00	Geelong	31.6	27	20*	>2	0

5.3 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

The following details *the criteria for the classification of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (TSSC 2012):

- Limited to the temperate zone of mainland south-eastern Australia;
- On flat plains grading into slopes, 500 m asl;
- Associated soils are generally fertile but poorly draining clays;
- In rainfall zones with a winter seasonal rainfall pattern, mean annual rainfall usually 400 to 800 mm/year;
- On isolated drainage lines or depressions with are seasonally inundated during winter-spring and subsequently dry by late summer;
- Rainfall is the main water source;
- Salinity is fresh to slightly brackish;
- Trees are sparse to absent;
- Vegetation cover is dominated by a range of native wetland graminoids and/or forbs; and,
- At least one native wetland forb species is present.

Condition thresholds: following Part A – 'typical' wet/dry cycle (i.e.) not drought):

A1: Is the wetland consistent with the key diagnostic characteristics above? **No**

The area identified as potentially containing this ecological community type and the 200-metre buffer around it are dominated (>99% cover) by exotic grasses and other scattered herbaceous weeds, with Toowoomba Canary-grass *Phalaris aquatica* dominating the low-lying areas [i.e. generally within the areas defined as potentially containing this ecological community and to the north and east within the 200-metre buffer (Plate 30) and Squirrel-tail Fescue *Vulpia bromoides* completely covering the slopes and higher ground generally to the south within the 200-metre buffer (Plate 31; Figure 1).

The two most common native species recorded within the pre-defined ecological community and the 200-metre buffer were Bidgee-widgee *Acaena novae-zelandiae* and Pale Rush *Juncus pallidus*, in which less than ten individuals were observed for each species.

Plate 30. Low-lying areas dominated by the exotic Toowoomba Canary-grass. The brown 'clumps' in this photo are the result of pugging (Ecology and Heritage Partners 12/11/2019).

Plate 31. The exotic Squirrel-tail grass covers the slopes and higher elevation areas (Ecology and Heritage Partners 12/11/2019).

6 Legislative and Policy Implications

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

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environment Significance (NES), being described in Table 8.

Table 8. Potential impacts to matters of National Environmental Significance (NES).

Matter of NES	Potential Impacts
World Heritage properties	The proposed action will not impact any properties listed for World Heritage.
National heritage places	The proposed action will not impact any places listed for national heritage.
Ramsar wetlands of international significance	There are no Ramsar wetlands within 10 kilometres of the study area (DoEE 2019).
Threatened species and ecological communities	There is suitable habitat within the study area for the Growling Grass Frog and the potential for occurrence of the Golden Sun Moth and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community. These are listed species' and an ecological community under the EPBC Act. No species or ecological communities are likely to be impacted by the proposed action.
Migratory and marine species	The study area would not be classed as an 'important habitat' as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013).
Commonwealth marine area	The proposed action will not impact any Commonwealth marine areas.
Nuclear actions (including uranium mining)	The proposed action is not a nuclear action.
Great Barrier Reef Marine Park	The proposed action will not impact the Great Barrier Reef Marine Park.
Water resources impacted by coal seam gas or mining development	The proposed action is not a coal seam gas or mining development.

6.1.1 Implications

There is suitable habitat within the study area for one fauna species (Growling Grass Frog), the potential occurrence of one fauna species (Golden Sun Moth) and the potential occurrence of one ecological community (Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains) listed under the EPBC Act. However, there was no evidence of the Growling Grass Frog, Golden Sun Moth or a listed ecological community within the study area.

Habitat Compensation Obligation fees for species listed under the EPBC Act within the MSA/BCS (and outside Hearnes Swamp and the 200-metre buffer around it) will apply. However, the introduction of the *Melbourne Strategic Assessment (Environment Mitigation Levy) Bill 2019* on 1 July 2020 will increase the fees that need to be paid by between 1% and 26% depending on the ecological category.

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

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' listed and/or

protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

6.2.1 Implications

Salt Paperbark exists in the planted strip along the study area's eastern boundary, which is listed as threatened and protected under the FFG Act. The study area is however privately owned and the species is planted, as such a permit under the FFG Act is not required.

6.3 Environment Effects Act 1978 (Victoria)

The *Environment Effects Act 1978* provides for assessment of proposed actions that are capable of having a significant effect on the environment via the preparation of an Environment Effects Statement (EES). A project with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred. Actions that may be referred for an EES decision are discussed in Table 9.

Table 9. Referral criteria under the Environment Effects Act.

Referral criteria:	Potential Impacts
Individual potential environmental effects Individual types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	
Potential clearing of 10 hectares or more of native vegetation from an area that: • is of an EVC identified as endangered by DELWP; • is of Very High conservation significance; or, • is not authorised under an approved Forest Management Plan or Fire Protection Plan	Unlikely. The EVCs modelled to occur within the study area are all identified as endangered by DELWP, however it is unlikely that EVC native vegetation patches (if any) within the study area would total 10 hectares. Furthermore, if patches of native vegetation were found, it is very unlikely that many of them would be considered of Very High conservation status given the historic agricultural practices.
Potential long-term loss of a significant proportion (1-5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria	Unlikely. The agricultural use of the study area for cropping and animals over many decades has greatly modified the landscape to the point where there is relatively little habitat value for native flora and fauna.
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Dictionary of Important Wetlands in Australia'	No. Hearnes Swamp is not listed under the Ramsar Convention or in 'A Dictionary of Important Wetlands in Australia'.
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long time	Potentially. The development has the potential to impact on Merri Creek. This will depend on the development's design and activities/processes of the facility when being constructed and operational.
Potential extensive or major effect on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residents	Unknown. Outside the scope of this report

Referral criteria:	Potential Impacts
Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility	Unknown. Outside the scope of this report
A combination of potential environmental effects A combination or two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	
Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan	Potentially. The Current Wetlands layer in Figure 3 that is outside the BCS (i.e. Hearnes Swamp and other Current Wetlands east of Merri Creek) is considered native vegetation for the purposes of the EES. The removal of more than 10 hectares of these areas will meet this referral criteria, however there is ample space to design the development footprint so this criterion is not triggered.
Matters listed under the FFG Act: • Potential loss of a significant area of a listed ecological community; • Potential loss of a genetically important population of an endangered or threatened species; • Potential loss of critical habitat; or, • Potential significant effects on habitat values of a wetland supporting migratory birds.	Unlikely. Growling Grass Frog is listed as threatened under the FFG Act and Merri Creek in general is known to provide important habitat, however the section of Merri creek within the study area is in poor condition due to cattle movements. Golden Sun Moth is also listed as threatened under the FFG Act, with the study area providing potential habitat. No observations were however made during the targeted surveys for these species and thus they are considered unlikely to occupy the study area.
Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoining land reserved under the *National Parks Act 1975*	Potentially. The River Red-gums within the study area are recognised as important landmarks in the municipal landscape under Clause 22.10 of the Whittlesea planning scheme. Their removal may impact on the landscape values as identified in the planning scheme.
Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short of long term	Unknown - outside the scope of this report
Potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, streamflows or regional groundwater levels	Unknown - outside the scope of this report
Potential extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities	Unknown - outside the scope of this report
Potential for extensive displacement of residences or severance or residential access to community resources due to infrastructure development	Unknown - outside the scope of this report
Potential significant effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions	Unknown - outside the scope of this report

Referral criteria:	Potential Impacts
Potential exposure of a human community to severe or chronic health or safety hazards over the short or long term, due to emissions to air or water or noise chemical hazards or associated transport	Unknown - outside the scope of this report
Potential extensive or major effects on Aboriginal cultural heritage	Unknown - outside the scope of this report. A separate cultural heritage assessment is being conducted by Ecology and Heritage Partners.
Potential extensive or major effects on cultural heritage places listed on the Heritage Register of the Archaeological Inventory under the *Heritage Act 1995*.	Unknown - outside the scope of this report. A separate cultural heritage assessment is being conducted by Ecology and Heritage Partners.

6.3.1 Implications

There is a potential, albeit unlikely, for the development to impact on the environment as set out in the EE Act referral criteria based on the categories in which a response can be provided in this Biodiversity Assessment. However, if the development's design can reduce/mitigate the following impacts in response to the referral criteria in Table 9, the development is unlikely to trigger an Environment Effects Statement under the EE Act from a biodiversity perspective:

- Ensure there is no extensive or major effects on waterbodies and their associated fauna. This can be achieved by designing and constructing the development in a way that does not adversely impact Merri Creek, e.g. increase the sedimentation or release chemicals/pollutants into it, which can be undertaken by a hydrological engineer;
- Ensure the impact area is less than 10 hectares within the Current Wetlands layer outside the MSA/BCS, which can be undertaken be referring to the Current Wetlands layer on the Figures 2 and 3 within this report and designing the development accordingly; and
- Retain remnant River Red-gums, which can be undertaken be referring to the tree points on Figure 3 and Appendix 1.2 within this report and designing the development accordingly.

It should also be noted that several referral criteria in Table 9 cannot be answered as part of this report given they are outside the scope of this assessment.

6.4 *Planning and Environment Act 1987* (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies.

6.4.1 Local Planning Schemes

The study area is located within the City of Whittlesea municipality. The following zoning and overlays apply, either partially or fully (DELWP 2019d):

- Farming Zone and Schedule (FZ);

- Green Wedge Zone and Schedule (GWZ);
- Public Use Zone – Transport and Schedule (PUZ4)
- Rural Conservation Zone – Schedule 1 (RCZ1);
- Urban Floodway Zone and Schedule (UFZ);
- Environmental Significance Overlay – Schedules 3 and 4 (ESO3, ESO4);
- Heritage Overlay Schedule (HO2);
- Public Acquisition Overlay 7 and 9 Schedule (PAO7, PAO9);
- Rural Floodway Overlay Schedule (RFO); and
- River Red Gum Protection Policy.

Several zones and overlays consider the impact of a development on flora, fauna and environmental factors. The FZ, GWZ and RCZ require a permit for any buildings within 100 metres of a waterway, wetlands or designated floodplain. Furthermore, environmental issues to be considered in the FZ, GWZ and RCZ decision guidelines include the need to protect and enhance biodiversity, including the retention of vegetation and fauna habitat and revegetating riparian buffers along waterways. The GWZ covers all land east of Merri Creek within the study area and the RCZ generally covers the area shown as Conservation Area 34 (Figure 3). The decision guidelines for both zones cite the need to decide on whether an integrated land management plan is required for development in these zones, which addresses the protection and enhancement of native vegetation and waterways, pest plant and animal control and soil stabilisation.

The ESO (including ESO3 and ESO4) apply to Merri Creek and a buffer either side ranging from approximately 120 metres to 500 metres. A permit is required to remove, destroy or lop any vegetation, including dead vegetation under the ESO, ESO3 and ESO4. ESO3 specifically discusses the importance of Merri Creek for preserving threatened flora and fauna and the habitat along the creek line. ESO4 discusses the importance of protecting native vegetation and habitats in areas being developed in greater Melbourne.

The River Red Gum Policy (Clause 22.10 of the Whittlesea Planning Scheme) recognises mature River Red-gums as one of the most important visual and environmental features in the municipality, with many of the trees estimated to be between 200-800 years old. The objective of this clause is to '*ensure that development of existing and future urban and rural areas takes into account the presence of and plans for the retention, enhancement and long-term viability of River Red Gum trees*' (p 1). Seven trees within the study area are River Red-gums, being Trees 2-3 and 10-14 on Figure 3. There are 11 policy points that must be followed, including undertaking a comprehensive arborist site assessment and report of the trees as part of the development, and prioritising the retention, protection and incorporation of mature trees into the design of any development.

6.4.2 The Guidelines

The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) and Clause 12.01 require Planning and Responsible Authorities to have regard for the 'Guidelines for the removal, destruction or lopping of native vegetation' (the Guidelines) (DELWP 2017a).

6.4.3 Implications

The study area is within Location 2, with 21.493 hectares of native vegetation assumed to be lost under the scenario of total removal within the area covered by the Guidelines, i.e. east of Merri Creek. As such, the permit application would fall under the Detailed assessment pathway.

The offset requirement under the scenario of total removal within the area covered by the Guidelines is 6.505 General Habitat Units (HU) and 8 Large Trees. A Planning Permit from City of Whittlesea is required to remove, destroy or lop any native vegetation under Clause 52.17 and 42.02 (ESO3 and ESO4). The application will only be referred to DELWP if the amount of amount of native vegetation to be removed within the area subject to these clauses falls under the Detailed assessment pathway.

6.5 *Wildlife Act 1975* and Wildlife Regulations 2013 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2013) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DELWP.

6.6 *Water Act 1989* (Victoria)

A 'works on waterways' permit from the Port Philip and Westernport CMA is likely to be required where any action impacts on waterways within the study area. Additionally, where structures are installed within or across waterways that potentially interfere with the passage of fish or the quality of aquatic habitat, these activities should be referred to DELWP with the Port Philip and Westernport CMA included for comment.

6.7 *Catchment and Land Protection Act 1994* (Victoria)

Weeds listed as noxious under the CaLP Act were recorded during the assessment (Spear Thistle, Hawthorn, Artichoke Thistle, Soursob, Sweet Briar, Variegated Thistle, Blackberry, African Box-thorn, Serrated Tussock, Gorse and Crack Willow). A Weed Management Plan may be required. Alternatively, weed management actions may be included in a Construction Environment Management Plan (CEMP) prepared for the project.

7 Mitigation Measures

7.1 Avoid and Minimise Statement

An avoid and minimise statement will be prepared once the development footprint is known. Direct and indirect impacts can be avoided and minimised during the planning process by referring to the best practice mitigation measures listed in Section 6.2.

7.2 Best Practice Mitigation Measures

While the development footprint is currently unknown, recommended measures to mitigate impacts upon terrestrial and aquatic values present within the study area may include:

- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed. Similarly, soil disturbance and sedimentation within wetlands should be avoided or kept to a minimum, to avoid, or minimise impacts to fauna habitats;
- All contractors should be aware of ecologically sensitive areas to minimise the likelihood of inadvertent disturbance to areas marked for retention. Native vegetation (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Tree Protection Zones (TPZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2011), which are shown in Appendix 1.2 for the native trees found on site. A TPZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the DBH. At a minimum standard a TPZ should consider the following:
    - A TPZ of trees should be a radius no less than two metres or greater than 15 metres;
    - Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TPZ;
    - Where encroachment exceeds 10% of the total area of the TPZ, the tree should be considered as lost and offset accordingly;
    - Directional drilling may be used for works within the TPZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
    - The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained and no offset would be required; and,
    - Where the minimum standard for a TPZ has not been met an offset may be required.
- Where possible, construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation, Large Trees and/or wetlands;
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Authority guidelines (EPA 1991; EPA 1996; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,

- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

8 Further Requirements

Further requirements associated with development of the study area, as well as additional studies or reporting that may be required, are provided in Table 10.

Table 10. Further requirements associated with development of the study area

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	There is suitable habitat within the study area for one fauna species (Growling Grass Frog), the potential occurrence of one fauna species (Golden Sun Moth) and the potential occurrence of one ecological community (Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains) listed under the EPBC Act. However, there was no evidence of the Growling Grass Frog, Golden Sun Moth or a listed ecological community within the study area. Habitat compensation obligation fees for species listed under the EPBC Act within the MSA/BCS (and outside Hearnes Swamp and the 200-metre buffer around it) will apply, however the introduction of the Environment Mitigation Levy on 1 July 2020 will increase the fees that need to be paid by between 1% and 26% depending on the flora or fauna category.	A referral under the EPBC Act may be undertaken.
Flora and Fauna Guarantee Act 1988	Salt Paperbark exists in the planted strip along the study area's eastern boundary, which is listed as threatened and protected under the FFG Act. The study area is however privately owned and the species is planted, as such a permit under the FFG Act is not required.	No further action required.
Environment Effects Act 1978	There is a potential, albeit unlikely, for the development to impact on the environment as set out in the EE Act referral criteria based on the categories in which a response can be provided in this Biodiversity Assessment. If the development's design can ensure there is no extensive or major effects on waterbodies and their associated fauna, ensure the impact area to less than 10 hectares within the Current Wetlands layer outside the MSA/BCS and/or retain remnant River Red-gums, then the potential to require a referral under the EE Act is lessened. It should also be noted that several referral criteria cannot be answered as part of this report given they are outside the scope of this assessment.	A referral under the *Environmental Effects Act* maybe required.

Relevant Legislation	Implications	Further Action
Planning and Environment Act 1987	The study area is within Location 2, with 21.493 hectares of native vegetation assumed to be lost under the scenario of total removal within the area covered by the Guidelines, i.e. east of Merri Creek. As such, the permit application would fall under the Detailed assessment pathway. The offset requirement under the scenario of total removal within the area covered by the Guidelines is 6.505 General Habitat Units (HU) and 8 Large Trees. A Planning Permit from City of Whittlesea is required to remove, destroy or lop any native vegetation under Clause 52.17 and 42.02 (ESO3 and ESO4). The application will only be referred to DELWP if the amount of amount of native vegetation to be removed within the area subject to these clauses falls under the Detailed assessment pathway.	Prepare and submit a Planning Permit application.
Biodiversity Conservation Strategy	Based on DELWPs interactive NVIM tool that calculates the total habitat compensation obligation fee for areas in the BCS, a total of $6,210,773.92 (GST inclusive) would apply to the study area if all vegetation within the BCS is impacted/cleared. This value is very indicative, as the NVIM tool does not exclude Hearnes Swamp and the 200-metre buffer around it from the fee (which has to be calculated separately). Furthermore, subject to DELWP approval, the habitat compensation obligation fee could also be restricted to the development footprint and not assume total land parcel impacts.	Offsets are payable to DELWP prior to removal of vegetation or habitats
Catchment and Land Protection Act 1994	Ten weed species listed under the CaLP Act were recorded within the study area. To meet requirements under the CaLP Act, listed noxious weeds should be appropriately controlled throughout the study area.	Planning Permit conditions are likely to include a requirement for a Weed Management Plan / weed management activities as part of a Construction Environment Management Plan
Water Act 1989	A 'works on waterways' permit is likely to be required from the Port Philip and Westernport CMA where any action impacts on waterways within the study area.	Obtain a 'works on waterways' permit from Port Philip and Westernport CMA if Merri Creek will be impacted.
Wildlife Act 1975	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation if fauna salvage and translocation activities are required.

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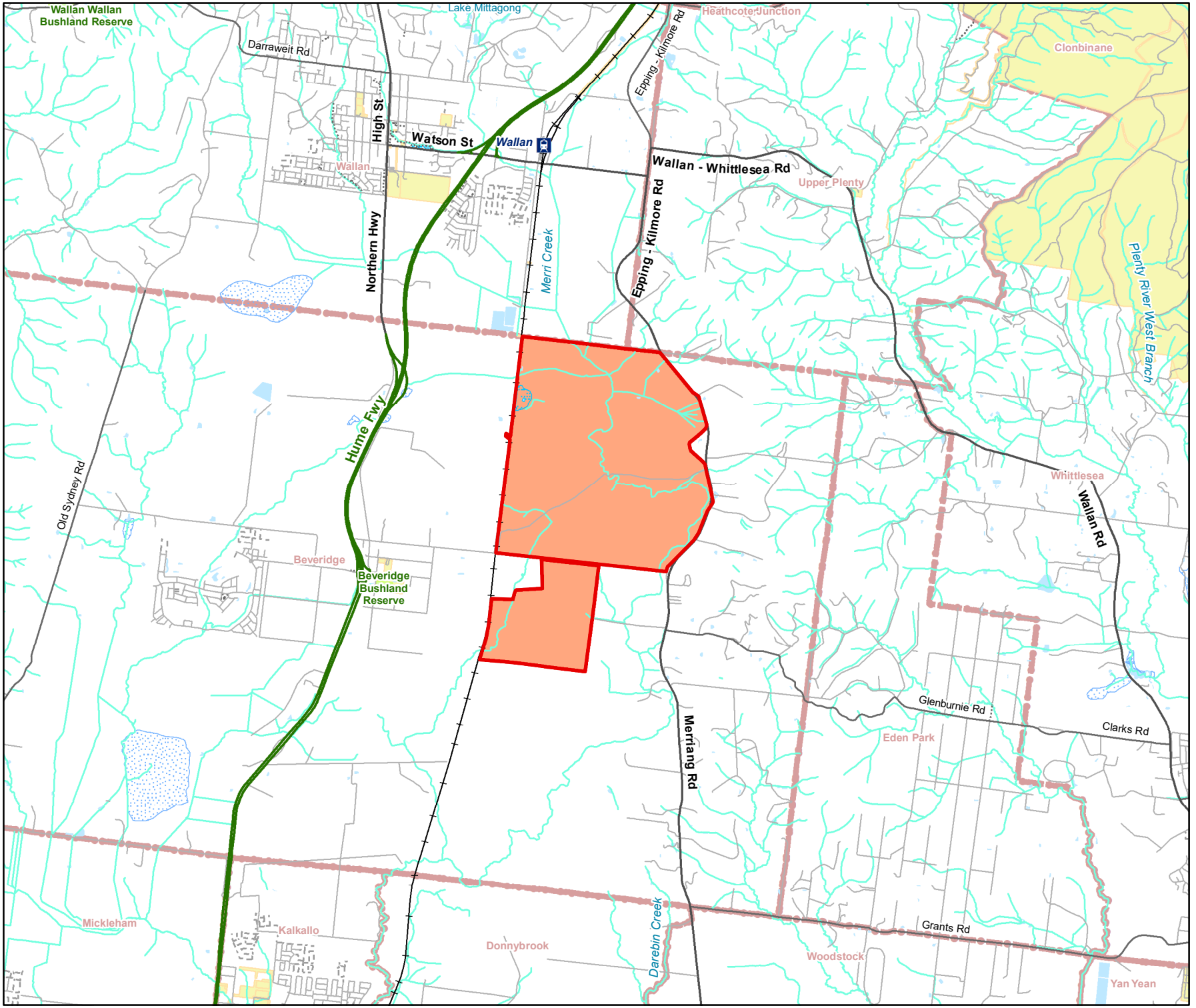
10 Figures



Legend

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

Figure 1

Location of the study area

Biodiversity Assessment for the Beveridge Intermodal Freight Terminal

N

0 1,000 2,000

Metres

ecology & heritage partners

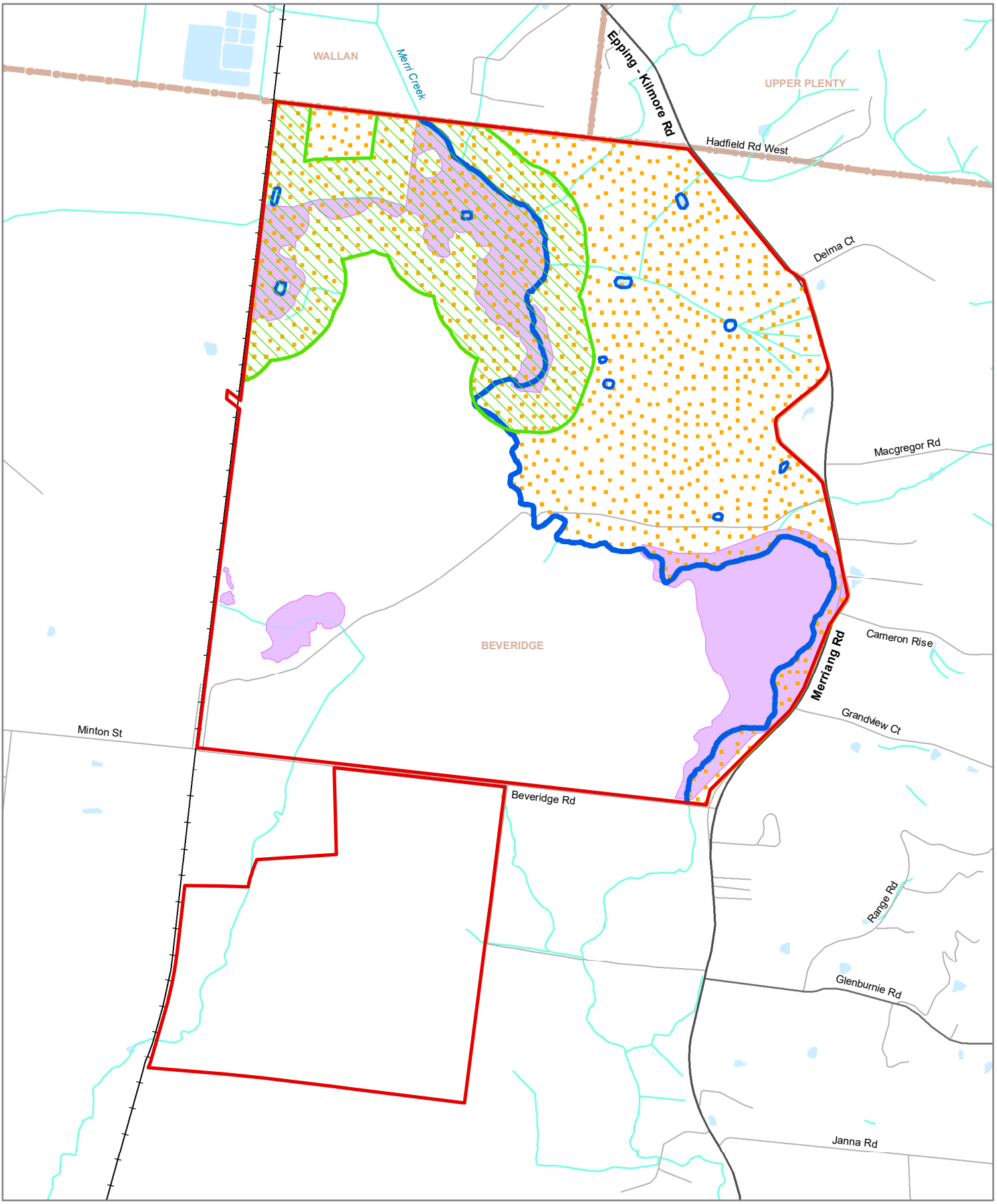


Figure 2
Location of the survey areas
Biodiversity Assessment for the Beveridge Intermodal Freight Terminal

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Legend

- Study Area
- Golden Sun Moth survey area
- Growling Grass Frog survey area
- Seasonal Herbaceous Wetlands (Fresh Water) of the Temperate Lowland Plains survey area
- Current Wetlands
- Railway
- Major Road
- Collector Road
- Minor Road
- Minor Watercourse
- Permanent Waterbody
- Localities

N

0 250 500
Metres

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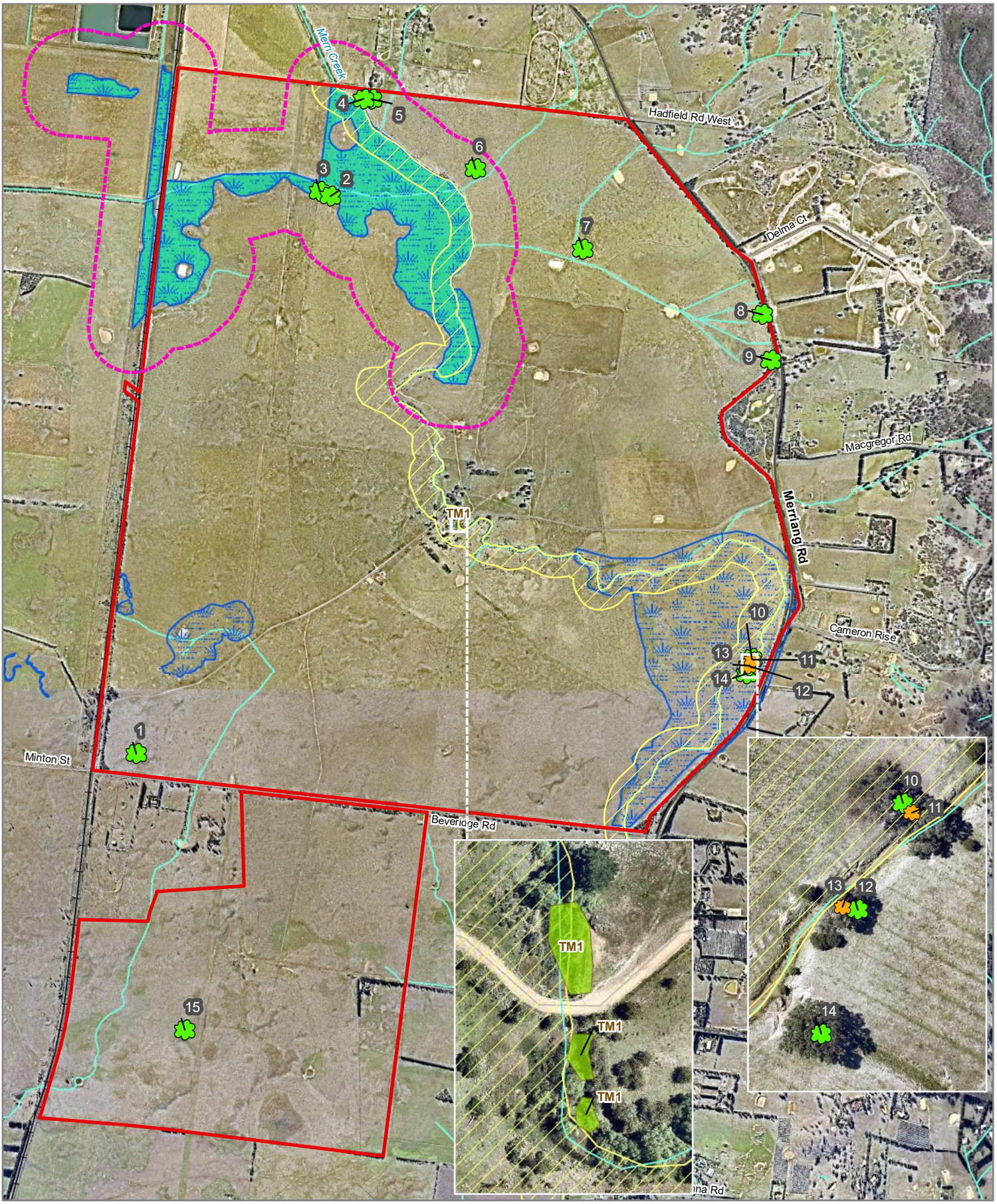

Figure 3

Ecological features

Biodiversity Assessment for the Beveridge Intermodal Freight Terminal

ecology & heritage partners

Legend

- Study Area
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. Listed as Critically Endangered under the EPBC Act (Hearnes Swamp)
- MSA approval exclusion zone (200m)
- BCS Conservation Area
- Current Wetlands
- Minor Watercourse
- Scattered Large Tree
- Scattered Small Tree

Ecological Vegetation Class

- Tall Marsh (EVC 821)

N

0 260 520
Metres

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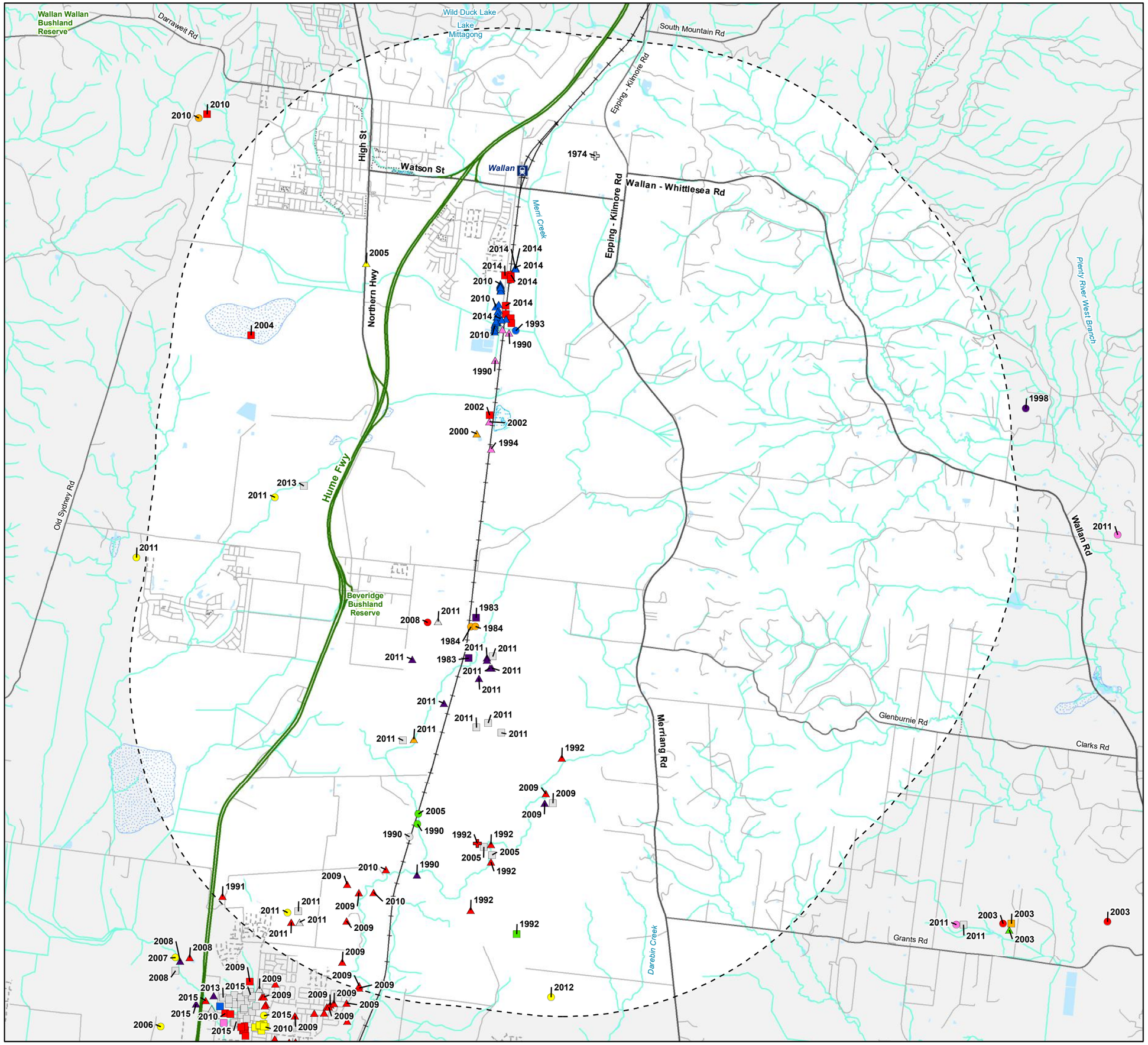
Aerial source: Nearmap 2019



Legend

Significant flora

- Adamson's Blown-grass
- Austral Crane's-bill
- Basalt Peppercress
- Basalt Tussock-grass
- Curly Sedge
- Floodplain Fireweed
- Keeled Goosefoot
- Large-leaf Cinnamon-wattle
- Matted Flax-lily
- Pale Swamp Everlasting
- Plains Joyweed
- Plains Yam-daisy
- Plump Swamp Wallaby-grass
- Purple Blown-grass
- Rosemary Grevillea
- Silurian Leek-orchid
- Slender Bindweed
- Slender Tick-trefoil
- Small Scurf-pea
- Small-flower Wallaby-grass
- Spotted Gum
- Swamp Everlasting
- Swamp Fireweed
- Tough Scurf-pea
- Veined Spear-grass
- Winged Water-starwort

Figure 4

Previously documented significant flora within 5km of the study area

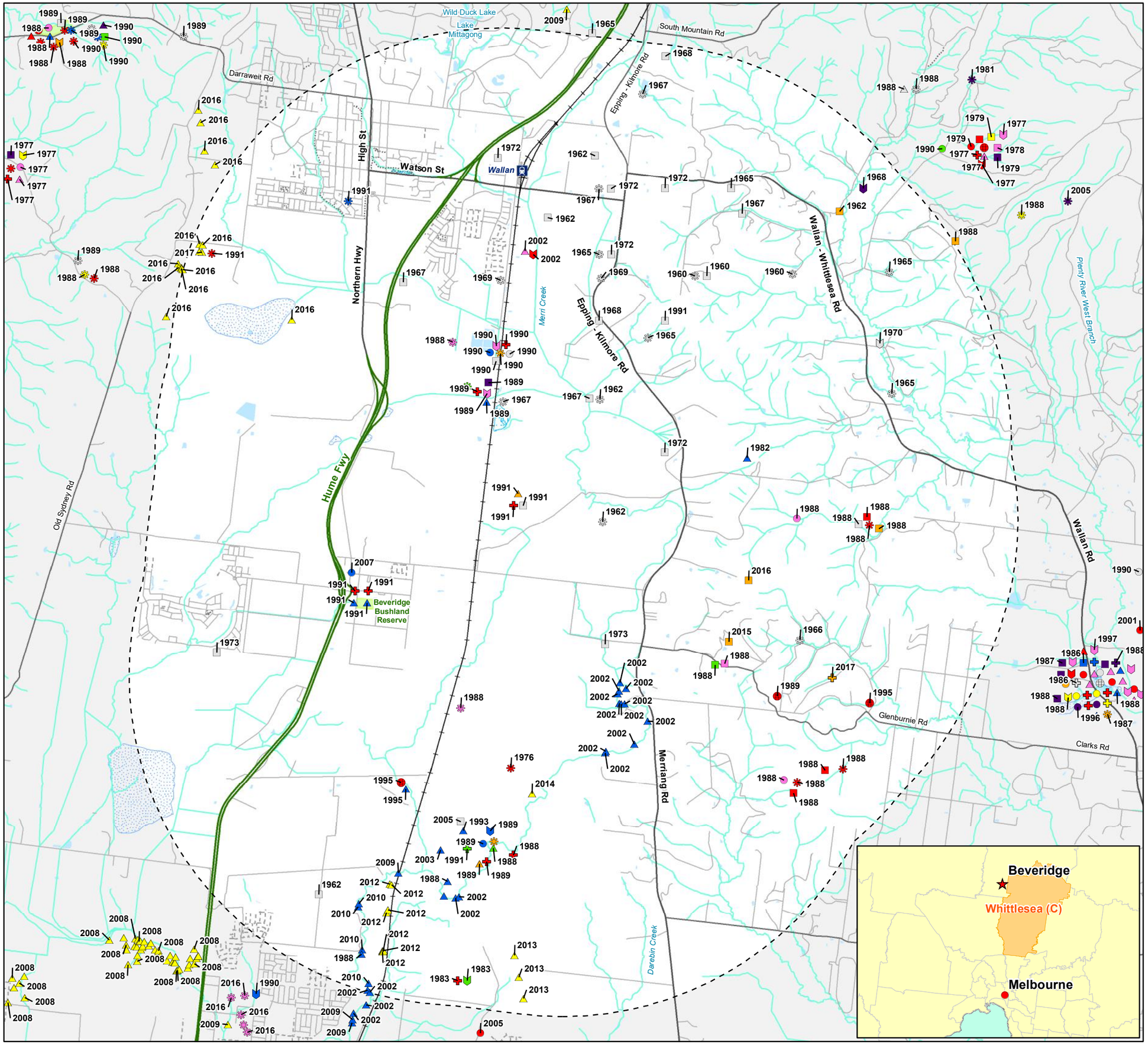
Biodiversity Assessment for the Beveridge Intermodal Freight Terminal

N

0 1.5 3

Kilometres

ecology & heritage partners



Legend

Significant fauna

- Australasian Bittern
- Australasian Shoveler
- Australian Painted Snipe
- Baillon's Crake
- Barking Owl
- Black Falcon
- Black-eared Cuckoo
- Blue-billed Duck
- Brown Toadlet
- Brown Treecreeper (south-eastern ssp.)
- Brush-tailed Phascogale
- Caspian Tern
- Common Dunnart
- Common Greenshank
- Diamond Firetail
- Eastern Great Egret
- Eastern Horseshoe Bat
- Eastern Snake-necked Turtle
- Fat-tailed Dunnart
- Golden Sun Moth
- Grassland Earless Dragon
- Growling Grass Frog
- Hardhead
- Hooded Robin
- Intermediate Egret
- Latham's Snipe
- Leadbeater's Possum
- Little Bittern
- Little Button-quail
- Little Egret
- Macquarie Perch
- Marsh Sandpiper
- Murray Cod
- Musk Duck
- Painted Honeyeater
- Pied Cormorant
- Plains-wanderer
- Red-chested Button-quail
- Royal Spoonbill
- Southern Brown Bandicoot
- Southern Toadlet
- Speckled Warbler
- Spotted Harrier
- Spotted Quail-thrush
- Striped Legless Lizard
- Swift Parrot
- Tussock Skink
- Two-spined Blackfish
- Whiskered Tern
- White-throated Needletail

Figure 5

Previously documented significant fauna within 5km of the study area

Biodiversity Assessment for the Beveridge Intermodal Freight Terminal

0 1.5 3

Kilometres

ecology & heritage partners

Appendix 1 – Flora

Appendix 1.1 – Flora species observed during the site assessment

Legend:

I Protected under the FFG Act (DELWP 2017b);

L Listed under the FFG Act (DELWP 2018b);

v/r Listed as vulnerable/rare in Victoria under the Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014);

***** Listed as a noxious weed under the CaLP Act;

w Weed of National Significance;

Planted Victorian and non-Victorian species;

+ Planted indigenous species that also occur in remnant native vegetation in the study area;

****** Planted indigenous species in the study area.

Table A1.1. Flora recorded within the study area

Scientific Name	Common Name	Notes
INDIGENOUS SPECIES		
Acacia melanoxylon	Blackwood	**
Acaena novae-zelandiae	Bidgee-widgee	-
Allocasuarina littoralis	Black Sheoak	**
Cycnogeton procerum	Water Ribbon	-
Eucalyptus camaldulensis	River Red-gum	+
Eucalyptus ovata	Swamp Gum	-
Eucalyptus viminalis	Manna Gum	-
Juncus pallidus	Pale Rush	-
Juncus subsecundus	Finger Rush	-
Melaleuca ericifolia	Swamp Paperbark	**
Microlaena stipoides var. *stipoides*	Weeping Grass	-
Phragmites australis	Common Reed	-
Rumex brownii	Slender Dock	-
Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass	-
Typha orientalis	Broad-leaf Cumbungi	-
NON-INDIGENOUS OR INTRODUCED SPECIES		
Acacia baileyana	Cootamundra Wattle	#
Arctotheca calendula	Cape weed	-

Scientific Name	Common Name	Notes
Callistemon rugulosus	Scarlet Bottlebrush	#
Cirsium vulgare	Spear Thistle	*
Crataegus monogyna	Hawthorn	*
Cupressus macrocarpa	Monterey Cypress	-
Cynara cardunculus subsp. *flavescens*	Artichoke Thistle	*
Eucalyptus cladocalyx	Sugar Gum	#
Eucalyptus occidentalis	Swamp Yate	#
Eucalyptus spathulata subsp. *spathulata*	Swamp Mallet	#
Geranium molle	Dove's Foot	-
Holcus lanatus	Yorkshire Fog	-
Hypochaeris radicata	Flatweed	-
Lagurus ovatus	Hare's-tail Grass	-
Lolium perenne	Perennial Rye-grass	-
Lycium ferocissimum	African Box-thorn	* w
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	r #
Melaleuca halmaturorum	Salt Paperbark	v l L
Melaleuca styphelioides	Prickly Paperbark	#
Nassella trichotoma	Serrated Tussock	* w
Oxalis pes-caprae	Soursob	*
Pennisetum clandestinum	Kikuyu	-
Phalaris aquatica	Toowoomba Canary-grass	-
Pinus radiata	Radiata Pine	-
Plantago lanceolata	Ribwort	-
Poa annua	Annual Meadow-grass	-
Romulea rosea	Onion Grass	-
Rosa rubiginosa	Sweet Briar	*
Rubus fruticosus spp. agg.	Blackberry	* w
Salix fragilis	Crack Willow	* w
Silybum marianum	Variegated Thistle	*
Taraxacum officinale spp. agg.	Garden Dandelion	-
Ulex europaeus	Gorse	* w

Appendix 1.2 – Native Scattered Trees Recorded within the Study Area

Table A3.1. Native scattered trees recorded within the study area.

Tree #	Common Name	Species Name	DBH (cm)	TPZ (m)	Category
1	Swamp Gum	*Eucalyptus ovata*	98	11.76	Scattered large tree
2	River Red-gum	*Eucalyptus camaldulensis*	115	13.8	Scattered large tree
3	River Red-gum	*Eucalyptus camaldulensis*	128	15	Scattered large tree
4	Swamp Gum	*Eucalyptus ovata*	86	10.32	Scattered large tree
5	Swamp Gum	*Eucalyptus ovata*	116	13.92	Scattered large tree
6	Swamp Gum	*Eucalyptus ovata*	86	10.32	Scattered large tree
7	Swamp Gum	*Eucalyptus ovata*	88	10.56	Scattered large tree
8	Swamp Gum	*Eucalyptus ovata*	127	15	Scattered large tree
9	Dead stag	*Eucalyptus* sp.	129	15	Scattered large tree
10	River Red-gum	*Eucalyptus camaldulensis*	224	15	Scattered large tree
11	River Red-gum	*Eucalyptus camaldulensis*	67	8.04	Scattered small tree
12	River Red-gum	*Eucalyptus camaldulensis*	154	15	Scattered large tree
13	River Red-gum	*Eucalyptus camaldulensis*	12	2	Scattered small tree
14	River Red-gum	*Eucalyptus camaldulensis*	94	11.28	Scattered large tree
15	Manna Gum	*Eucalyptus viminalis*	128	15	Scattered large tree

Appendix 1.3 – Significant Flora

Table A1.3 Significant flora recorded within 10 kilometres of the study area

Key:

EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
FFG	*Flora and Fauna Guarantee Act 1988* (FFG Act)
DEPI	Advisory List of Threatened Flora in Victoria (DEPI 2014)

EX	Extinct	X	Extinct
CR	Critically endangered	e	Endangered
EN	Endangered	v	Vulnerable
VU	Vulnerable	r	Rare
K	Poorly Known (Briggs and Leigh 1996)	k	Poorly Known
#	Records identified from EPBC Act Protected Matters Search Tool.	L	Listed
*	Records identified from the FIS		

1	Known occurrence	Recorded within the study area recently (i.e. within ten years)
2	High Likelihood	Previous records of the species in the local vicinity; and/or, The study area contains areas of high quality habitat.
3	Moderate Likelihood	Limited previous records of the species in the local vicinity; and/or, The study area contains poor or limited habitat.
4	Low Likelihood	Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	Unlikely	No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area	Rationale for occurrence likelihood
NATIONAL SIGNIFICANCE								
Amphibromus fluitans #	River Swamp Wallaby-grass	-	-	VU	-	-	5	No suitable habitat
Dianella amoena	Matted Flax-lily	54	2015	EN	L	e	4	Potential habitat, but very unlikely due to agricultural disturbance
Dodonaea procumbens #	Trailing Hop-bush	-	-	VU	-	v	5	No suitable habitat
Glycine latrobeana #	Clover Glycine	-	-	VU	L	v	4	Potential habitat, but very unlikely due to agricultural disturbance
Lachnagrostis adamsonii	Adamson's Blown-grass	1	1990	EN	L	v	5	No suitable habitat
Lepidium hyssopifolium s.s.	Basalt Peppercress	7	2010	EN	L	e	4	Potential habitat, but very unlikely due to agricultural disturbance
Leucochrysum albicans var. *tricolor #*	Hoary Sunray	-	-	EN	-	e	5	Outside distribution range
Pimelea spinescens subsp. *spinescens #*	Spiny Rice-flower	-	-	CR	L	e	5	Outside distribution range
Pomaderris vacciniifolia #	Round-leaf Pomaderris	-	-	CR	L	e	5	No suitable habitat
Prasophyllum frenchii #	Maroon Leek-orchid	-	-	EN	L	e	5	No suitable habitat
Pterostylis chlorogramma #	Green-striped Greenhood	-	-	VU	L	v	5	No suitable habitat
Rutidosis leptorhynchoides #	Button Wrinklewort	-	-	EN	L	e	4	Potential habitat, but very unlikely due to agricultural disturbance
Senecio macrocarpus #	Large-headed Fireweed	-	-	VU	L	e	5	Outside distribution range
Senecio psilocarpus	Swamp Fireweed	21	2002	VU	-	v	4	Potential habitat, but very unlikely due to agricultural disturbance
Thelymitra matthewsii #	Spiral Sun-orchid	-	-	VU	L	v	5	Outside distribution range
Xerochrysum palustre	Swamp Everlasting	70	2014	VU	L	v	4	Potential habitat, but very unlikely due to agricultural disturbance

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area	Rationale for occurrence likelihood
STATE SIGNIFICANCE								
Acacia leprosa var. *uninervia*	Large-leaf Cinnamon-wattle	7	2011	-	-	r	5	Outside distribution range
Acacia uncifolia	Coast Wirilda	1	2006	-	-	r	5	Outside distribution range
Alternanthera sp. 1 (Plains)	Plains Joyweed	1	2003	-	-	k	5	Outside distribution range
Amphibromus pithogastrus	Plump Swamp Wallaby-grass	1	1992	-	L	e	4	Potential habitat, but very unlikely due to agricultural disturbance
Austrostipa rudis subsp. *australis*	Veined Spear-grass	1	1974	-	-	r	5	Outside distribution range
Bartramia mossmaniana	Tall Apple-moss	1	1953	-	-	r	5	No suitable habitat. Last known record is also very old
Billardiera scandens s.s.	Velvet Apple-berry	3	1852	-	-	r	5	No suitable habitat. Last known record is also very old
Callitriche brachycarpa	Short Water-starwort	2	1853	-	L	v	5	Potential habitat, but very unlikely due to agricultural disturbance. Last known record is also very old
Callitriche umbonata	Winged Water-starwort	3	2012	-	X	r	4	Potential habitat, but very unlikely due to agricultural disturbance
Cardamine tenuifolia	Slender Bitter-cress	1	1770	-	-	P	5	Potential habitat, but very unlikely due to agricultural disturbance. Last known record is also very old
Carex tasmanica	Curly Sedge	2	2005	-	L	v	4	Potential habitat, but very unlikely due to agricultural disturbance
Convolvulus angustissimus subsp. *omnigracilis*	Slender Bindweed	10	2015	-	-	k	5	Outside distribution range
Coronidium gunnianum	Pale Swamp Everlasting	38	2014	-	-	v	4	Potential habitat, but very unlikely due to agricultural disturbance

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area	Rationale for occurrence likelihood
Cullen parvum	Small Scurf-pea	2	2011	-	L	e	5	No suitable habitat
Cullen tenax	Tough Scurf-pea	13	2015	-	L	e	4	Potential habitat, but very unlikely due to agricultural disturbance
Desmodium varians	Slender Tick-trefoil	59	2015	-	-	k	5	No suitable habitat
Dysphania carinata	Keeled Goosefoot	2	2011	-	-	v	5	No suitable habitat
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum	2	2016	-	X	v	5	No suitable habitat
Eucalyptus X *studleyensis*	Studley Park Gum	1	2006	-	-	e	5	Outside distribution range
Eucalyptus yarraensis	Yarra Gum	2	1996	-	X	r	5	Outside distribution range
Geranium solanderi var. *solanderi* s.s.	Austral Crane's-bill	5	2012	-	-	v	5	No suitable habitat
Geranium sp. 1	Large-flower Crane's-bill	1	2012	-	L	e	5	No suitable habitat
Geranium sp. 3	Pale-flower Crane's-bill	1	2012	-	-	r	5	No suitable habitat
Goodia pubescens	Silky Golden-tip	6	2011	-	-	r	5	No suitable habitat
Grevillea repens	Creeping Grevillea	7	2003	-	-	r	5	No suitable habitat
Grevillea rosmarinifolia	Rosemary Grevillea	1	2015	-	-	P	5	No suitable habitat
Lachnagrostis punicea subsp. *punicea*	Purple Blown-grass	1	2015	-	-	r	5	No suitable habitat
Microseris scapigera s.s.	Plains Yam-daisy	9	2010	-	-	v	5	No suitable habitat
Pauridia vaginata var. *brevistigmata*	Yellow Star	2	2016	-	-	k	5	No suitable habitat
Pleurosorus subglandulosus	Glandular Blanket-fern	1	1853	-	-	k	5	Potential habitat, but very unlikely due to agricultural disturbance. Last known record is also very old
Poa labillardierei var. (Volcanic Plains)	Basalt Tussock-grass	11	2015	-	-	k	4	Potential habitat, but very unlikely due to agricultural disturbance

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area	Rationale for occurrence likelihood
Prasophyllum pyriforme s.s.	Silurian Leek-orchid	3	1983	-	-	e	5	No suitable habitat. Last known record is also not recent
Rytidosperma monticola	Small-flower Wallaby-grass	4	2005	-	-	r	4	Potential habitat, but very unlikely due to agricultural disturbance
Senecio campylocarpus	Floodplain Fireweed	1	1993	-	-	r	5	No suitable habitat

Appendix 2 – Fauna

Table A2.1. Significant fauna within 10 kilometres of the study area.

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

1	High Likelihood	• Known resident in the study area based on site observations, database records, or expert advice; and/or, • Recent records (i.e. within five years) of the species in the local area (VBA 2011); and/or, • The study area contains the species' preferred habitat.
2	Moderate Likelihood	• The species is likely to visit the study area regularly (i.e. at least seasonally); and/or, • Previous records of the species in the local area (DSE 2011b); and/or, • The study area contains some characteristics of the species' preferred habitat.
3	Low Likelihood	• The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or, • There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, • The study area contains few or no characteristics of the species' preferred habitat.
4	Unlikely	• No previous records of the species in the local area; and/or, • The species may fly over the study area when moving between areas of more suitable habitat; and/or, • Out of the species' range; and/or, • No suitable habitat present.

EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
FFG	*Flora and Fauna Guarantee Act 1988* (FFG Act)
DSE	Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013); Advisory List of Threatened Invertebrate Fauna in Victoria (DSE 2009b)
NAP	National Action Plan (Cogger et al 1993; Duncan et al. 1999; Garnet and Crowley 2000; Lee 1995; Maxwell et al. 1996; Sands and New 2002; Tyler 1997)

EX	Extinct
RX	Regionally extinct
CR	Critically endangered
EN	Endangered
VU	Vulnerable
RA	Rare
NT	Near threatened
CD	Conservation dependent
LC	least concern

DD	Data deficient (insufficiently or poorly known
L	Listed as threatened under FFG Act
I	Invalid or ineligible for listing under the FFG Act
#	Listed on the Protected Matters Search Tool
*	Additional information from the Victorian Fauna Database

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood	Rationale for occurrence likelihood
NATIONAL SIGNIFICANCE									
Australasian Bittern	*Botaurus poiciloptilus*	1994	6	EN	L	EN	VU	5	No suitable habitat
Australian Grayling #	*Prototroctes maraena*	-	-	VU	L	VU	VU	5	No suitable habitat
Australian Painted Snipe	*Rostratula australis*	1988	2	VU	L	CR	VU	5	No suitable habitat
Broad-toothed Rat #	*Mastacomys fuscus mordicus*	-	-	VU	L	EN	VU	5	Outside distribution range
Curlew Sandpiper #	*Calidris ferruginea*	-	-	CR	-	EN	-	5	Outside distribution range
Dwarf Galaxias #	*Galaxiella pusilla*	-	-	VU	L	EN	VU	5	Outside distribution range
Eastern Curlew #	*Numenius madagascariensis*	-	-	CR	-	VU	-	5	Outside distribution range
Eastern Quoll	*Dasyurus viverrinus*	1930	1	EN	L	RX	NT	5	No suitable habitat. Last known record is also very old
Flat-headed Galaxias #	*Galaxias rostratus*	-	-	CR	-	VU	RA	5	Outside distribution range
Golden Sun Moth	*Synemon plana*	2017	153	CR	L	CR	-	5	No suitable habitat
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	1988	1	EN	L	CR	VU	5	No suitable habitat
Greater Glider	*Petauroides volans*	1991	4	VU	-	VU	VU	5	Outside distribution range
Green and Golden Bell Frog	*Litoria aurea*	1971	1	VU	-	VU	EN	5	No suitable habitat. Last known record is also old
Grey-headed Flying-fox #	*Pteropus poliocephalus*	-	-	VU	L	VU	VU	5	No suitable habitat
Growling Grass Frog	*Litoria raniformis*	2010	117	VU	L	EN	VU	2	Suitable habitat and recent records in the area
Leadbeater's Possum	*Gymnobelideus leadbeateri*	2017	1	CR	L	EN	EN	5	Outside distribution range
Long-nosed Potoroo #	*Potorous tridactylus tridactylus*	-	-	VU	L	NT	EN	5	Outside distribution range
Macquarie Perch	*Macquaria australasica*	1970	3	EN	L	EN	DD	5	No suitable habitat. Last known record is also old
Murray Cod	*Maccullochella peelii*	1970	2	VU	L	VU	-	5	Outside distribution range

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood	Rationale for occurrence likelihood
Painted Honeyeater	*Grantiella picta*	1988	2	VU	L	VU	NT	5	No suitable habitat
Plains-wanderer	*Pedionomus torquatus*	1983	5	CR	L	CR	EN	5	No suitable habitat. Last known record is also old
Regent Honeyeater	*Anthochaera phrygia*	1971	2	CR	L	CR	EN	5	No suitable habitat
Smoky Mouse #	*Pseudomys fumeus*	-	-	EN	L	EN	RA	5	Outside distribution range
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1968	1	EN	L	NT	NT	5	Outside distribution range. Last known record is also old
Spot-tailed Quoll #	*Dasyurus maculatus maculatus*	-	-	EN	L	EN	VU	5	No suitable habitat
Striped Legless Lizard	*Delma impar*	1991	3	VU	L	EN	VU	5	No suitable habitat
Superb Parrot	*Polytelis swainsonii*	1940	1	VU	L	EN	VU	5	No suitable habitat. Last known record is also old
Swift Parrot	*Lathamus discolor*	1991	5	CR	L	EN	EN	5	No suitable habitat
STATE SIGNIFICANCE									
Australasian Shoveler	*Anas rhynchotis*	2005	17	-	-	VU	-	5	No suitable habitat
Baillon's Crake	*Porzana pusilla palustris*	1989	2	-	L	VU	-	5	No suitable habitat
Barking Owl	*Ninox connivens connivens*	1990	6	-	L	EN	NT	3	May visit the study area occasionally or on an opportunistic basis
Black Falcon	*Falco subniger*	2007	3	-	-	VU	-	3	May visit the study area occasionally or on an opportunistic basis
Blue-billed Duck	*Oxyura australis*	1996	4	-	L	EN	-	5	No suitable habitat
Brown Toadlet	*Pseudophryne bibronii*	2005	192	-	L	EN	DD	4	Potential habitat, but very unlikely due to agricultural disturbance

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood	Rationale for occurrence likelihood
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1988	8	-	-	NT	NT	4	Potential habitat, but very unlikely due to agricultural disturbance
Brush-tailed Phascogale	*Phascogale tapoatafa*	2016	6	-	L	VU	NT	5	No suitable habitat
Bush Stone-curlew	*Burhinus grallarius*	1940	1	-	L	EN	NT	5	No suitable habitat.
Caspian Tern	*Hydroprogne caspia*	1979	1	-	L	NT	-	5	No suitable habitat
Common Dunnart	*Sminthopsis murina murina*	1990	2	-	-	VU	-	5	No suitable habitat
Common Greenshank	*Tringa nebularia*	1986	2	-	-	VU	-	4	May visit the study area occasionally or on an opportunistic basis. Single record is also not recent
Common Sandpiper #	*Actitis hypoleucos*	-	-	-	-	VU	-	5	No suitable habitat
Diamond Firetail	*Stagonopleura guttata*	1991	5	-	L	NT	NT	5	No suitable habitat
Eastern Great Egret	*Ardea modesta*	2000	22	-	L	VU	-	3	May visit the study area occasionally or on an opportunistic basis
Eastern Horseshoe Bat	*Rhinolophus megaphyllus megaphyllus*	1988	1	-	L	VU	-	5	Potential habitat, but very unlikely due to agricultural disturbance. Single record is also not recent
Freckled Duck	*Stictonetta naevosa*	1988	1	-	L	EN	-	5	No suitable habitat
Glossy Grass Skink	*Pseudemoia rawlinsoni*	1988	1	-	-	VU	-	5	No suitable habitat
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	1976	1	-	L	VU	-	5	No suitable habitat
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	1940	1	-	L	EN	NT	5	No suitable habitat
Hardhead	*Aythya australis*	2002	25	-	-	VU	-	5	No suitable habitat

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood	Rationale for occurrence likelihood
Hooded Robin	*Melanodryas cucullata cucullata*	1990	1	-	L	NT	NT	5	No suitable habitat
Intermediate Egret	*Ardea intermedia*	1986	1	-	L	EN	-	5	No suitable habitat
Lewin's Rail	*Lewinia pectoralis pectoralis*	1991	1	-	L	VU	NT	5	No suitable habitat
Little Bittern	*Ixobrychus minutus dubius*	1987	1	-	L	EN	-	5	No suitable habitat
Little Egret	*Egretta garzetta nigripes*	1989	3	-	L	EN	-	5	No suitable habitat
Marsh Sandpiper	*Tringa stagnatilis*	1988	1	-	-	VU	-	5	No suitable habitat
Musk Duck	*Biziura lobata*	2002	8	-	-	VU	-	5	No suitable habitat
Powerful Owl	*Ninox strenua*	1988	1	-	L	VU	-	5	No suitable habitat
Red-chested Button-quail	*Turnix pyrrhothorax*	1990	2	-	L	VU	-	5	Potential habitat, although very unlikely due to agricultural disturbance. Single record is also not recent
Silver Perch	*Bidyanus bidyanus*	1981	1	-	L	VU	-	5	No suitable habitat
Southern Toadlet	*Pseudophryne semimarmorata*	1990	111	-	-	VU	-	4	Potential habitat, but very unlikely due to agricultural disturbance
Speckled Warbler	*Chthonicola sagittatus*	1991	14	-	L	VU	NT	5	No suitable habitat
Tussock Skink	*Pseudemoia pagenstecheri*	2016	24	-	-	VU	-	4	Potential habitat, although very unlikely due to agricultural disturbance
White-throated Needletail	*Hirundapus caudacutus*	1995	10	-	-	VU	-	3	May visit the study area occasionally or on an opportunistic basis
REGIONAL SIGNIFICANCE									
Azure Kingfisher	*Alcedo azurea*	1988	2	-	-	NT	-	5	No suitable habitat

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood	Rationale for occurrence likelihood
Black-eared Cuckoo	*Chrysococcyx osculans*	1991	5	-	-	NT	-	5	Potential habitat, although very unlikely due to agricultural disturbance. Records are also not recent
Eastern Pygmy-possum	*Cercartetus nanus*	1986	1	-	-	NT	-	5	No suitable habitat
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	1991	4	-	-	NT	-	4	Potential habitat, but very unlikely due to agricultural disturbance
Golden Perch	*Macquaria ambigua*	1981	2	-	-	NT	-	5	No suitable habitat
Latham's Snipe	*Gallinago hardwickii*	1993	17	-	-	NT	-	4	Potential habitat, although very unlikely due to agricultural disturbance
Little Button-quail	*Turnix velox*	1991	2	-	-	NT	-	5	No suitable habitat
Nankeen Night Heron	*Nycticorax caledonicus hillii*	1994	2	-	-	NT	-	5	No suitable habitat
Pectoral Sandpiper #	*Calidris melanotos*	-	-	-	-	NT	-	5	No suitable habitat
Pied Cormorant	*Phalacrocorax varius*	1997	3	-	-	NT	-	5	No suitable habitat
Royal Spoonbill	*Platalea regia*	2000	17	-	-	NT	-	5	No suitable habitat
Spotted Harrier	*Circus assimilis*	1999	6	-	-	NT	-	3	May visit the study area occasionally or on an opportunistic basis
Spotted Quail-thrush	*Cinclosoma punctatum*	1990	4	-	-	NT	-	5	No suitable habitat
Whiskered Tern	*Chlidonias hybridus javanicus*	1989	2	-	-	NT	-	5	Potential habitat, although very unlikely due to agricultural disturbance. Records are also not recent

Data source: Victorian Biodiversity Atlas (DELWP 2018a); Protected Matters Search Tool (DoEE 2019).

Taxonomic order: Mammals (Strahan 1995 *in* Menkhorst & Knight 2004); Birds (Christidis & Boles, 2008); Reptiles and Amphibians (Cogger et al. 1983 *in* Cogger 1996); Fish (Nelson 1994).

Appendix 3 – EnSym Report

Scenario test – native vegetation removal

This report provides offset requirements for internal testing of different proposals to remove native vegetation. **This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.** A report must be obtained from the Department of Environment, Land, Water and Planning (DELWP).

Date of issue: **27/08/2019**
Time of issue: **11:38 am**

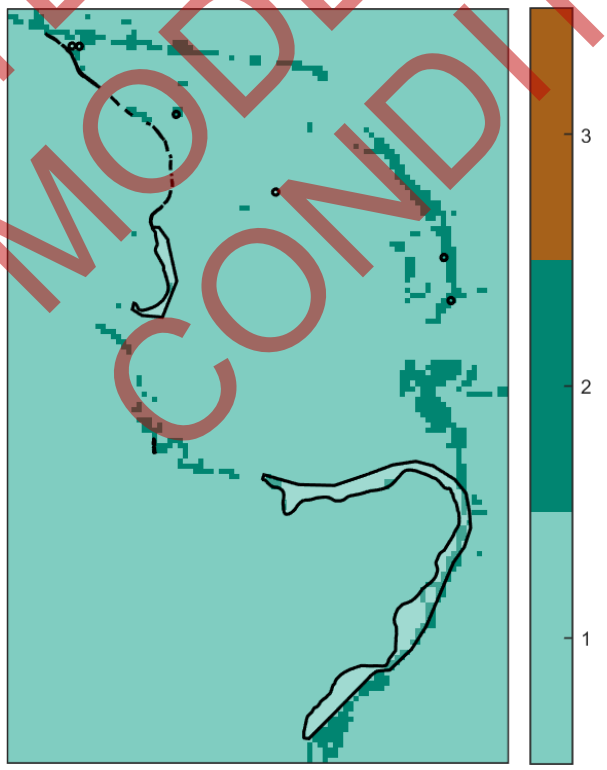
Report ID: Scenario Testing

Project ID	EHP12159_Beveridge_VG94

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	21.493 ha
Extent of past removal	0.000 ha
Extent of proposed removal	21.493 ha
No. Large trees proposed to be removed	8
Location category of proposed removal	Location 2 The native vegetation is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). Removal of less than 0.5 hectares of native vegetation in this location will not have a significant impact on any habitat for a rare or threatened species.

1. Location map



Scenario test – native vegetation removal

Offset requirements if a permit is granted

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

General offset amount[1]	6.505 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Whittlesea City Council
Minimum strategic biodiversity value score[2]	0.299
Large trees	8 large trees

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

Appendix 1 includes information about the native vegetation to be removed

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

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

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

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

Scenario test – native vegetation removal

Next steps

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

This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.

If you wish to remove the mapped native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to ensymnvrtool.support@delwp.vic.gov.au. DELWP will provide a *Native vegetation removal report* that is required to meet the permit application requirements in accordance with *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines).

Appendix 1: Description of native vegetation to be removed

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

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

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

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

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

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

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

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file						Information calculated by EnSym						
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Modelled Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
1-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.490		0.016	General
2-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.396		0.015	General
3-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.290		0.014	General
4-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.340		0.014	General
5-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.375		0.014	General
6-TR	Scattered Tree	vvp_0821	Endangered	1	no	0.200	0.070	0.070	0.354		0.014	General
7-A	Patch	vvp_0821	Endangered	0	no	0.540	0.016	0.016	0.630		0.010	General
8-A	Patch	vvp_0821	Endangered	0	no	0.480	0.008	0.008	0.630		0.005	General
9-A	Patch	vvp_0821	Endangered	0	no	0.440	0.005	0.005	0.630		0.003	General

Information provided by or on behalf of the applicant in a GIS file						Information calculated by EnSym						
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Modelled Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
10-B	Patch	vvp_0821	Endangered	0	no	0.200	2.383	2.383	0.306		0.467	General
11-B	Patch	vvp_0821	Endangered	2	no	0.307	18.509	18.509	0.382		5.884	General
12-B	Patch	vvp_0821	Endangered	0	no	0.460	0.017	0.017	0.360		0.008	General
13-B	Patch	vvp_0821	Endangered	0	no	0.341	0.096	0.096	0.374		0.034	General
14-B	Patch	vvp_0821	Endangered	0	no	0.200	0.005	0.005	0.330		0.001	General
15-B	Patch	vvp_0821	Endangered	0	no	0.390	0.003	0.003	0.360		0.001	General
16-B	Patch	vvp_0821	Endangered	0	no	0.200	0.001	0.001	0.360		0.000	General
17-B	Patch	vvp_0821	Endangered	0	no	0.200	0.000	0.000	0.360		0.000	General
18-B	Patch	vvp_0821	Endangered	0	no	0.200	0.012	0.012	0.360		0.002	General
19-B	Patch	vvp_0821	Endangered	0	no	0.200	0.000	0.000	0.340		0.000	General
20-B	Patch	vvp_0821	Endangered	0	no	0.200	0.003	0.003	0.340		0.001	General
21-B	Patch	vvp_0821	Endangered	0	no	0.200	0.000	0.000	0.340		0.000	General
22-B	Patch	vvp_0821	Endangered	0	no	0.200	0.004	0.004	0.340		0.001	General
23-B	Patch	vvp_0821	Endangered	0	no	0.200	0.000	0.000	0.340		0.000	General
24-B	Patch	vvp_0821	Endangered	0	no	0.200	0.004	0.004	0.320		0.001	General
25-B	Patch	vvp_0821	Endangered	0	no	0.200	0.002	0.002	0.320		0.000	General
26-B	Patch	vvp_0821	Endangered	0	no	0.200	0.003	0.003	0.339		0.001	General

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

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

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Large-flower Crane's-bill	*Geranium sp. 1*	505342	Endangered	Dispersed	Habitat importance map	0.0006
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0006
Yellow Watercrown Grass	*Paspalidium flavidum*	507820	Endangered	Dispersed	Habitat importance map	0.0004
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0004
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0003
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0003
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0003
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0003
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0002
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0002
Brackish Plains Buttercup	*Ranunculus diminutus*	504314	Rare	Dispersed	Habitat importance map	0.0002
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0002
Western Golden-tip	*Goodia medicaginea*	501518	Rare	Dispersed	Habitat importance map	0.0002
Smooth Grevillea	*Grevillea rosmarinifolia subsp. glabella*	501536	Rare	Dispersed	Habitat importance map	0.0002
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0002
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0002
Swamp Fireweed	*Senecio psilocarpus*	504659	Vulnerable	Dispersed	Habitat importance map	0.0002
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0002

Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0002
Golden Sun Moth	*Synemon plana*	15021	Critically endangered	Dispersed	Habitat importance map	0.0001
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0001
Emerald-lip Greenhood	*Pterostylis smaragdyna*	503915	Rare	Dispersed	Habitat importance map	0.0001
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0001
Brown Toadlet	*Pseudophryne bibronii*	13117	Endangered	Dispersed	Habitat importance map	0.0001
Slender Stylewort	*Levenhookia sonderi*	501998	Rare	Dispersed	Habitat importance map	0.0001
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0001
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0001
Large-headed Fireweed	*Senecio macrocarpus*	503116	Endangered	Dispersed	Habitat importance map	0.0001
Speckled Warbler	*Chthonicola sagittatus*	10504	Vulnerable	Dispersed	Habitat importance map	0.0001
Bearded Dragon	*Pogona barbata*	12177	Vulnerable	Dispersed	Habitat importance map	0.0001
Painted Honeyeater	*Grantiella picta*	10598	Vulnerable	Dispersed	Habitat importance map	0.0000
Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	505337	Vulnerable	Dispersed	Habitat importance map	0.0000
Barking Owl	*Ninox connivens connivens*	10246	Endangered	Dispersed	Habitat importance map	0.0000
Curly Sedge	*Carex tasmanica*	500650	Vulnerable	Dispersed	Habitat importance map	0.0000
Crimson Spider-orchid	*Caladenia concolor*	504347	Endangered	Dispersed	Habitat importance map	0.0000
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	502750	Rare	Dispersed	Habitat importance map	0.0000
Square-tailed Kite	*Lophoictinia isura*	10230	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	10498	Vulnerable	Dispersed	Habitat importance map	0.0000
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0000
Striped Legless Lizard	*Delma impar*	12159	Endangered	Dispersed	Habitat importance map	0.0000

Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Swift Parrot	*Lathamus discolor*	10309	Endangered	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Milkwort	*Comesperma polygaloides*	500798	Vulnerable	Dispersed	Habitat importance map	0.0000
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0000

Habitat group

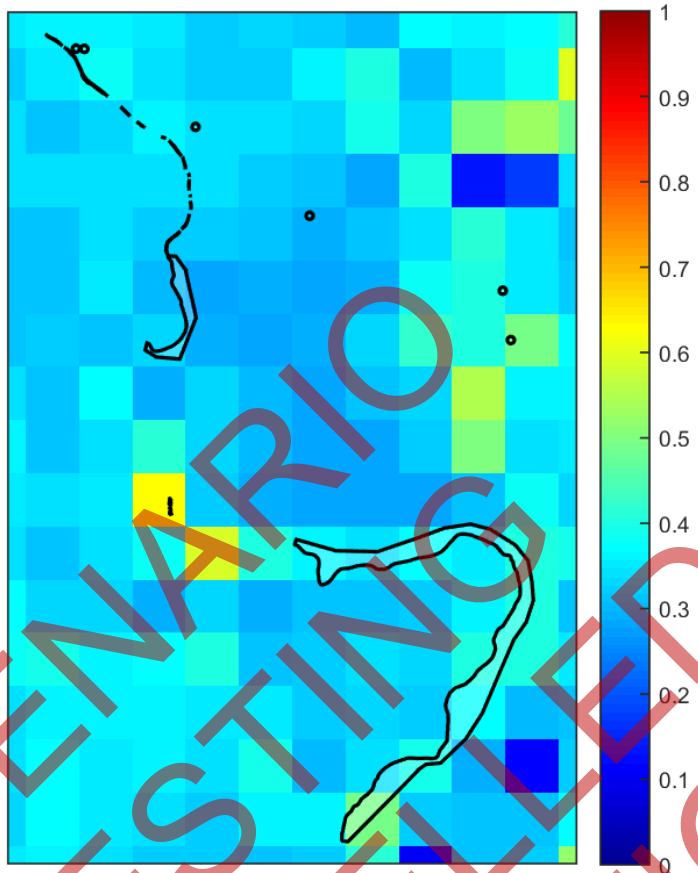
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

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

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



Appendix 4 – Habitat Compensation Obligations

Estimate of obligations under the Biodiversity Conservation Strategy

Date of estimate: 29 August 2019

Time of estimate: 19:48

Summary of parcel obligations

Total fee estimate: $6,210,773.92

This Total fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

Number of parcels included in this estimate: 4

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Native vegetation	0.082 ha	$104,582.50	$8,575.77
Scattered trees	1 tree	$14,539.80	$14,539.80
Matted Flax-lily	0.082 ha	$12,315.60	$1,009.88
Golden Sun Moth	526.900 ha	$8,705.40	$4,586,875.26
Growling Grass Frog	193.165 ha	$8,281.90	$1,599,773.21

All prices are inclusive of GST

Conservation areas

Conservation area number	Conservation area type	Area
34A	Growling Grass Frog	63.164 ha

Salvage and Translocation

Your parcel(s) is not labelled as ‘Potential Salvage Operations’ and salvage is therefore not required.

Next steps

The Biodiversity Conservation Strategy and a number of approvals under section 146B of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) form part of the Melbourne Strategic Assessment (MSA) program.

For information about how to meet habitat compensation obligations, or how conservation areas are treated under the program, either refer to the Melbourne Strategic Assessment website (http://www.depi.vic.gov.au/msa) or contact msa.habitatcompensation@delwp.vic.gov.au.

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel details

Standard Parcel Identifier (SPI)	2\PS328947
Address	165 BEVERIDGE ROAD BEVERIDGE 3753

Parcel fee estimate: $878,360.20

This Parcel fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

A section of this parcel is impacted by the Outer Metropolitan Ring / E6 Transport Corridor (OMR). This estimate excludes any obligations in the area covered by the Public Acquisition Overlay for the OMR. Please contact DELWP for further information.

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Native vegetation	0.082 ha	$104,582.50	$8,575.77
Matted Flax-lily	0.082 ha	$12,315.60	$1,009.88
Golden Sun Moth	77.175 ha	$8,705.40	$671,839.25
Growling Grass Frog	23.779 ha	$8,281.90	$196,935.30

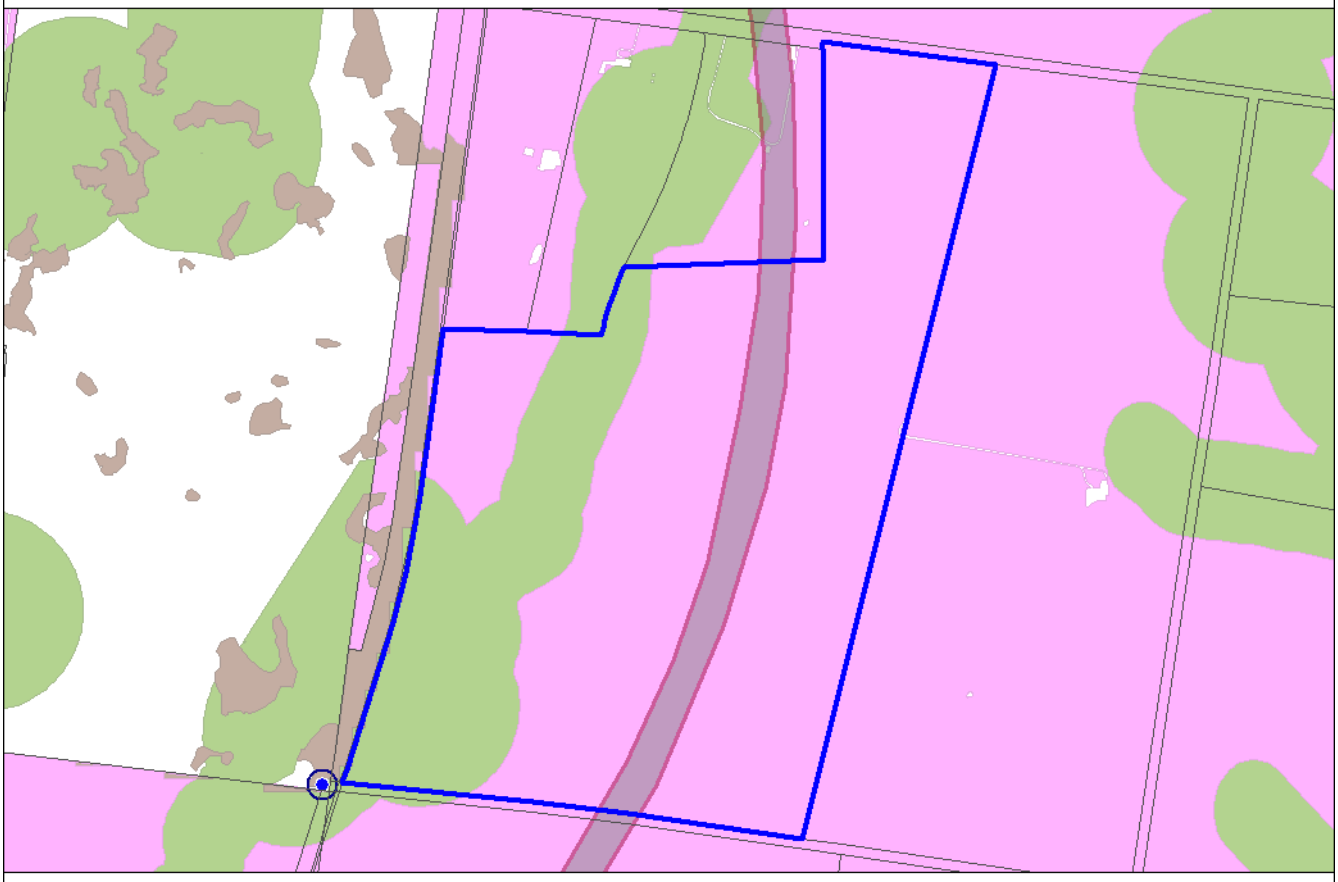
All prices are inclusive of GST

Conservation areas

This parcel contains no conservation areas under the Biodiversity Conservation Strategy.

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel SPI: 2\PS328947



Legend

- Growling Grass Frog
- Growling Grass Frog and Southern Brown Bandicoot
- Golden Sun Moth
- Native vegetation
- Native vegetation and Matted Flax-lily
- Native vegetation and Southern Brown Bandicoot
- Native vegetation and Spiny Rice-flower
- Southern Brown Bandicoot
- Scattered trees
- Scattered tree survey required
- Conservation areas
- Outer Metropolitan Ring Transport Corridor/E6 Road Reservation
- Parcel boundaries
- MSA program area - Outside BCS
- Native vegetation permitted clearing regulations

N

0 140 280 420

Metres

VICTORIA State Government | Environment, Land, Water and Planning

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel details

Standard Parcel Identifier (SPI)	1\PS328947
Address	125 BEVERIDGE ROAD BEVERIDGE 3753

Parcel fee estimate: $796,954.02

This Parcel fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Golden Sun Moth	81.634 ha	$8,705.40	$710,656.62
Growling Grass Frog	10.420 ha	$8,281.90	$86,297.40

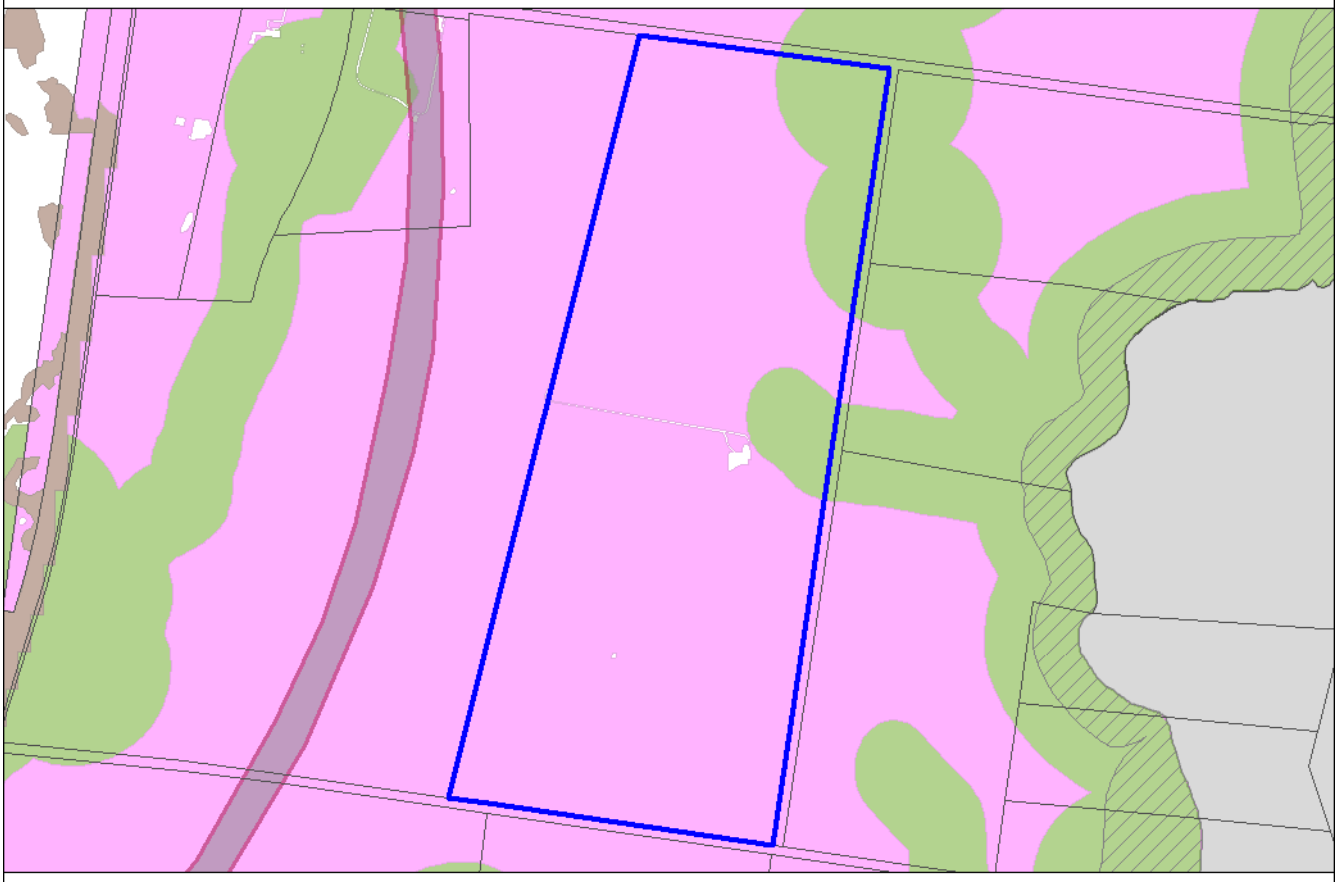
All prices are inclusive of GST

Conservation areas

This parcel contains no conservation areas under the Biodiversity Conservation Strategy.

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel SPI: 1\PS328947



Legend

- Growling Grass Frog
- Growling Grass Frog and Southern Brown Bandicoot
- Golden Sun Moth
- Native vegetation
- Native vegetation and Matted Flax-lily
- Native vegetation and Southern Brown Bandicoot
- Native vegetation and Spiny Rice-flower
- Southern Brown Bandicoot
- Scattered trees
- Scattered tree survey required
- Conservation areas
- Outer Metropolitan Ring Transport Corridor/E6 Road Reservation
- Parcel boundaries
- MSA program area - Outside BCS
- Native vegetation permitted clearing regulations

N

0 140 280 420

Metres

VICTORIA State Government | Environment, Land, Water and Planning

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel details

Standard Parcel Identifier (SPI)	1\TP95683
Address	2025 MERRIANG ROAD BEVERIDGE 3753

Parcel fee estimate: $1,541,558.63

This Parcel fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

A section of this parcel is outside the area covered by the Biodiversity Conservation Strategy (BCS). Only the obligations within the BCS are estimated. Please contact DELWP for further information about the remaining offset obligations for this parcel.

A section of this parcel is impacted by the Outer Metropolitan Ring / E6 Transport Corridor (OMR). This estimate excludes any obligations in the area covered by the Public Acquisition Overlay for the OMR. Please contact DELWP for further information.

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Golden Sun Moth	116.824 ha	$8,705.40	$1,016,999.65
Growling Grass Frog	63.338 ha	$8,281.90	$524,558.98

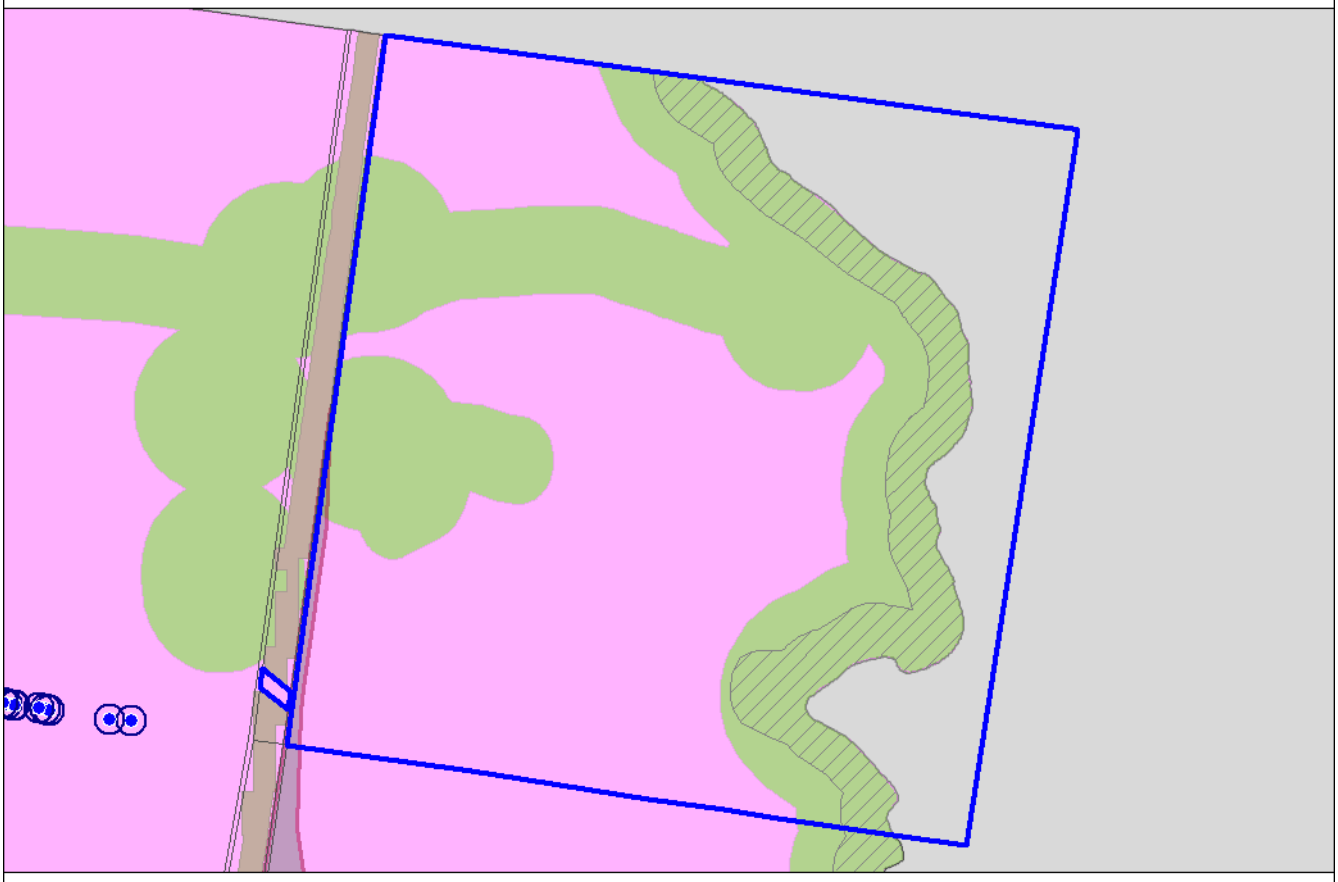
All prices are inclusive of GST

Conservation areas

Conservation area number	Conservation area type	Habitat type	Area
34A	Growling Grass Frog	Not applicable	25.993 ha

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel SPI: 1\TP95683



Legend

- Growling Grass Frog
- Growling Grass Frog and Southern Brown Bandicoot
- Golden Sun Moth
- Native vegetation
- Native vegetation and Matted Flax-lily
- Native vegetation and Southern Brown Bandicoot
- Native vegetation and Spiny Rice-flower
- Southern Brown Bandicoot
- Scattered trees
- Scattered tree survey required
- Conservation areas
- Outer Metropolitan Ring Transport Corridor/E6 Road Reservation
- Parcel boundaries
- MSA program area - Outside BCS
- Native vegetation permitted clearing regulations

N

0 160 320 480

Metres

VICTORIA State Government | Environment, Land, Water and Planning

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel details

Standard Parcel Identifier (SPI)	1\TP710781
Address	2025 MERRIANG ROAD BEVERIDGE 3753

Parcel fee estimate: $2,993,901.07

This Parcel fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

A section of this parcel is impacted by the Outer Metropolitan Ring / E6 Transport Corridor (OMR). This estimate excludes any obligations in the area covered by the Public Acquisition Overlay for the OMR. Please contact DELWP for further information.

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Scattered trees	1 tree	$14,539.80	$14,539.80
Golden Sun Moth	251.267 ha	$8,705.40	$2,187,379.74
Growling Grass Frog	95.628 ha	$8,281.90	$791,981.53

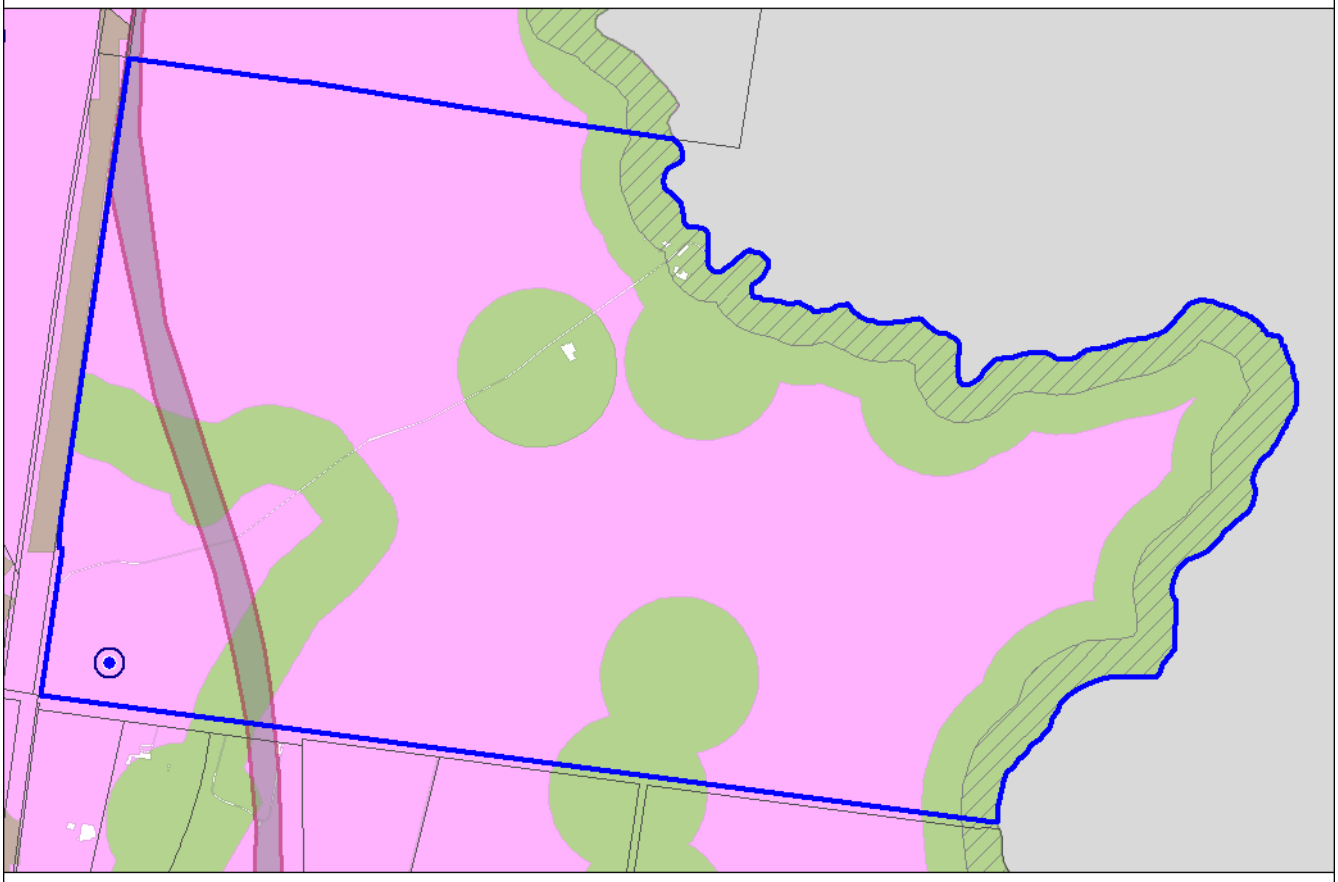
All prices are inclusive of GST

Conservation areas

Conservation area number	Conservation area type	Habitat type	Area
34A	Growling Grass Frog	Not applicable	37.171 ha

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel SPI: 1\TP710781



Legend

- Growling Grass Frog
- Growling Grass Frog and Southern Brown Bandicoot
- Golden Sun Moth
- Native vegetation
- Native vegetation and Matted Flax-lily
- Native vegetation and Southern Brown Bandicoot
- Native vegetation and Spiny Rice-flower
- Southern Brown Bandicoot
- Scattered trees
- Scattered tree survey required
- Conservation areas
- Outer Metropolitan Ring Transport Corridor/E6 Road Reservation
- Parcel boundaries
- MSA program area - Outside BCS
- Native vegetation permitted clearing regulations

N

0 180 360 540

Metres

VICTORIA State Government | Environment, Land, Water and Planning

Estimate of obligations under the Biodiversity Conservation Strategy

For more information, telephone the DELWP Customer Service Centre on 136 186.

Disclaimer

Any fee estimate or estimate of habitat compensation obligations on which the fee estimate is based is provided for indicative purposes only. No claim or representation is made as to the final obligations in respect of a parcel of land. An estimate is not an invoice. Information concerning the fee estimate and habitat compensation obligations that might apply to a parcel of land at the time of the issue of the information only. Parcel boundaries, fees and habitat compensation obligations shown may be subject to change. The estimate of fees and extent of habitat compensation obligations for a parcel of land produced by NVIM may be incomplete in some cases (for example, scattered tree obligations may not be displayed and may require a survey to be determined, and habitat compensation obligations may already have been met). Please refer to the terms and conditions of use (available at http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/native-vegetation-information-management/terms-and-conditions-of-use) for the terms and conditions governing your use of the Native Vegetation Information Management system.

http://www.delwp.vic.gov.au

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Appendix 5 – Significant Fauna and Ecological Community Descriptions

Appendix 5.1 Growling Grass Frog

EPBC Act Conservation Status: Vulnerable

FFG Act Conservation Status: Listed

Victorian Advisory List: Endangered

Plate A1. Growling Grass Frog (*Litoria raniformis*), Ecology and Heritage Partners Pty

Although formerly widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963, 1982; Hero *et al*. 1991), the Growling Grass Frog has declined markedly over the past two decades and in many areas, particularly in south and central Victoria where some populations have experienced local extinction.

Growling Grass Frog (Plate A1) are largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al*. 1995; Ashworth 1998). The species can also utilise temporarily inundated waterbodies during breeding season, to facilitate reproduction (Organ 2005). The presence of key habitat attributes, primarily an extensive cover of emergent, submerged and floating vegetation (Robertson *et al*. 2002, Organ 2005), and the spatial orientation of waterbodies (Robertson *et al*. 2002; Heard *et al*. 2004; Hamer and Organ 2008) are strong determinants of the species' presence. Terrestrial vegetation (grasses, sedges), rocks and other ground debris around wetland perimeters also provide important foraging, dispersal and over-wintering sites. Dispersal is thought to occur primarily along drainage lines or other low-lying areas between waterbodies, and unhindered movement between and within waterbodies is considered important for population viability.

Potential Habitat in the Study Area

Growling Grass Frog is considered to have a moderate to high likelihood of occurring within the study area as the species has been recorded within two kilometres (south) of the study area along Merri Creek. In addition, Merri Creek provides suitable habitat such as slow flowing water, emergent vegetation, and submerged and floating vegetation surrounding by open grassland/pastoral land. There are also several dams and drainage lines located throughout the study area.

Appendix 5.2 Golden Sun Moth

EPBC Act Conservation Status: Critically Endangered

FFG Act Conservation Status: Listed

Victorian Advisory List: Endangered

Golden Sun Moth (Plate A2) typically occur in native grassland, grassy woodland, dominated by greater than 40% cover of wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species. Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 1999). The male of this species generally flies between 10am and 3pm on calm, warm (over 20°C), sunny days.

Plate A2. Golden Sun Moth (*Synemon plana*) Ecology and Heritage Partners Pty Ltd.

Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it now mainly inhabits small isolated sites (DSE 2004). The species is threatened by habitat loss, disturbance and fragmentation due to agricultural expansion and urbanisation. Many populations are isolated and fragmented, impeding the ability of the relatively immobile females to recolonise areas, thereby reducing the likelihood of genetic exchange (DSE 2004). Such populations are therefore vulnerable as there is little likelihood of recolonisation in the event of a local extinction.

The species' preferred host plant, Wallaby Grass *Rytidosperma* spp. is scattered throughout the study area. However, the site is dominated by the exotic grasses Sweet Vernal Grass *Anthoxanthum odoratum*, Toowoomba Canary Grass Phalaris *aquatica*, Yorkshire Fog *Holcus lanatus* and Cocksfoot *Dactylis glomerata.*

Potential Habitat in the Study Area

The study area supports isolated occurrences (patches) of native grassland, usually associated with rocky outcrops. Although much of the study area supports low quality habitat, given the proximity of documented records of the species (i.e. to the south of the study area), there are small areas that superficially support suitable habitat for the species. The areas of potential habitat were targeted during the targeted surveys.

Appendix 5.3 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

EPBC Act Conservation Status: Critically Endangered

FFG Act Conservation Status: N/A

Victorian Advisory List: N/A

The Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community (Plate A3) occurs in Victoria, south-eastern South Australia and southern New South Wales and is associated with various geologies and generally fertile but poorly drained clays. The community is characterised by temporary freshwater wetlands which are inundated on a seasonal basis, typically filling after winter-spring rains and then drying out for the remainder of the year (DSEWWPC 2012).

Plate A3. Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (Ecology and Heritage Partners 2018)

The frequency, duration and depth of inundation of these wetlands are highly variable and are greatly dependent on the physical attributes of the site, weather conditions and hydrology/topography of the catchment area (TSSC 2012). In 'normal' years, wetlands can be inundated up to a few months to a depth of less than one metre, however in ongoing drought conditions there may be no inundation for several years.

The vegetation present typically consists of native wetland graminoids (i.e. grasses and grass-like plants) and herbs/forbs, with sparse trees and/or shrubs (if present) restricted to the fringes or as scattered emergents within the inundation area (TSSC 2012). Common species include wallaby-grasses *Rytidosperma* spp. and *Amphibromus* spp., true grasses *Poa* spp., rushes *Juncus* spp., daisys *Brachyscome* and willowherbs *Epilobium* spp.

Potential Habitat in the Study Area

The Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community is considered to have a very low likelihood of occurrence within the study area. This is due to the agricultural use of the study area over several decades modifying and disturbing the soil, with evidence of extensive pugging during the previous Biodiversity Assessment fieldwork (Ecology and Heritage Partners 2019) and again during this targeted survey field assessment. This process can destroy a soil's structure by removing large soil pores and can kill plants or push propagules further down the soil profile.