

Final Report

# Ecological Due Diligence: 520 Meningoort Road, Bookaar, Victoria

Prepared for

**Bookaar Renewables Pty Ltd**

April 2018



**Ecology and Heritage Partners Pty Ltd**

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## Document Control

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## 1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Bookaar Renewables Pty Ltd to conduct an Ecological Due Diligence at a proposed solar farm site within the landholding known as 'Meningoort', at 520 Meningoort Road, Bookaar, Victoria. The purpose of the assessment is to identify ecological values that are known to, or are likely to occur within the site (the Study Area). The potential regulatory and legislative implications and key constraints associated with the proposed solar farm are then determined. The report also provides recommendations to address or reduce impacts and, where necessary, highlights components that require further investigation, such as targeted surveys.

## 2 Study Area

The study area is located at 520 Meningoort Road, Bookaar, Victoria, approximately 170 kilometres southwest of Melbourne's CBD and approximately eight kilometres northwest of Camperdown (Figure 1). The study area covers 620 hectares and is bound by paddocks to the north, east and south, and Meningoort Road to the west.

The study area is generally flat along the western half and gently slopes downwards towards the east in the eastern half of the study area. There is a drainage line (Blind Creek) running east-west in the lower third of the study area.

The study area and wider landscape are used for agricultural purposes. At the time of the assessment, the study area's southern 'triangle' was being used for cropping, while the remaining land was being used to graze cattle (Figure 1).

According to the Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2017a), the study area occurs within the Victorian Volcanic Plain bioregion. It is located within the jurisdiction of the Glenelg Hopkins Catchment Management Authority (CMA) and the Corangamite Shire municipality.

## 3 Project Overview

The proposed Bookaar Solar Farm (the 'Proposal') would generate electricity through the conversion of solar radiation to electricity.

The Proposal involves the installation of PV panels with a combined generation capacity of approximately 200 MW. The Proposal includes the following elements:

- Solar arrays: which would be made up of approximately 800,000 solar panels supported by a mounting system installed on approximately 100,000 piles driven or screwed into the ground;
- The panels would be installed on either:
  - A fixed tilt system (oriented west to east); or
  - A single axis system (orientated north to south);
- Up to 60 central inverters located throughout the development (placed together in groups of two units or singularly, each unit would likely be between 2 and 3 MW);

- Above and/or below ground onsite cabling and electrical connections;
- Onsite access tracks;
- Substation area, up to a maximum area of 125 m by 132 m by up to 4 m high which would connect the Proposal to the national electricity grid;
- The substation may also contain a telecommunication tower, similar in nature to a cellular mast;
- Adjacent to the substation would be a triangular area designated for battery storage (approximately 140 m 110 m by 4 m high). This area may contain lightning protection rods which would rise above the storage facility;
- Support buildings adjacent to the southern side of the 220kV line crossing the site (approximately 160 m x 80m x 4m high and triangular in site);
- Drainage system aiding water movement away from the site's eastern areas that are subject to inundation;
- Perimeter fence (security fence approximately 2.5 m high);
- Vegetation screens for visual screening; and
- Firebreaks.

The final location of the elements listed above will be micro-sited within the designated areas post consent through a detailed design process. The main Planning Report details these components and locations further.

In addition to the key components outlined above, there would be a temporary construction compound required to facilitate the construction and decommissioning phases of the Proposal. The construction compound would include:

- Temporary construction offices;
- Car and bus parking areas;
- A staff amenity block (including portable toilets, showers and a kitchen) designed to accommodate peak staff numbers during the construction period; and
- Laydown areas.

All land required for the temporary construction compound, if not used as part of the array area, would be restored to its current condition. A detailed description of the project's key components can be found in the main planning report.

## **4 Methods**

### **4.1 Desktop Assessment**

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

- The DELWP NVIM Tool (DELWP 2017a) and NatureKit (DELWP 2017b) 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 2017c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2017d);
- The 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 2017);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected Lists (DELWP 2017e; DELWP 2016);
- The Planning Maps Online (DELWP 2017f) and Planning Schemes Online (DELWP 2017g) to ascertain current zoning and environmental overlays in the study area;
- Other relevant environmental legislation and policies as required; and
- Aerial photography of the study area.

#### 4.2 Field Assessment

A field assessment was undertaken on 1 November 2017 to obtain information on flora and fauna values within the study area. The study area was largely driven, however frequent stops were made to assess floral species present. All observed vascular flora and fauna species were recorded, any significant records mapped and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions (DELWP 2017c).

#### 4.3 Removal of Native Vegetation (Guidelines)

Under the *Planning and Environment Act 1987*, Clause 52.17 of the Planning Schemes requires a planning permit from the relevant local Council to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the 'Guidelines for the removal, destruction or lopping of native vegetation (Guidelines)' (DELWP 2017h). The 'Assessor's handbook – Applications to remove, destroy or lop native vegetation' (Handbook) provides clarification regarding the application of the Guidelines (DELWP 2017i).

##### 4.3.1 Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using a risk-based approach. Two factors – extent risk and location risk – 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 Native Vegetation Information Management (NVIM) Tool (DELWP 2017a). Determination of the assessment pathway is summarised in Table 1.

**Table 1.** Assessment pathways for applications to remove native vegetation (DELWP 2017h)

Extent of native vegetation	Location		
	1	2	3
Less than 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.

#### 4.3.2 *Vegetation Assessment*

Native vegetation (as defined in Table 2) is assessed using two key parameters: extent (in hectares) and condition. Extent is determined through a field assessment. The condition score for Intermediate and Detailed assessment pathways must be assessed through a habitat hectare<sup>1</sup> assessment conducted by a qualified ecologist. The condition score for Basic assessment pathways may be based on either modelled data available on the NVIM Tool (DELWP 2017a), or through a habitat hectare assessment.

In addition, all mapped wetlands (based on the DELWP ‘Current Wetlands’ layer) must be included as native vegetation, with the modelled condition score assigned to them (DELWP 2017b).

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<sup>1</sup> A ‘habitat hectare’ is a unit of measurement which combines the condition and extent of native vegetation.

**Table 2.** Determination of remnant native vegetation (DELWP 2017h)

Category	Definition	Extent	Condition
Patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native. OR Any 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 <i>Current wetlands map</i> , available in DELWP systems and tools.	Measured in hectares. Based on hectare area of the patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered tree	A native canopy tree that does not form part of a patch.	Measured in hectares. A small tree is assigned an extent of 0.031 hectares (10m radius). A large tree is assigned an extent of 0.071 hectares (15m radius).	Scattered trees are assigned a default condition score of 0.2.

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

### 4.3.3 Offsets

Offsets are required to compensate for the permitted removal of native vegetation. An offset is needed if vegetation on site to be removed meets the classification of remnant native vegetation as described in Table 1.

### 4.4 Assessment Qualifications and Limitations

The ‘snap shot’ nature of a standard biodiversity assessment meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Targeted flora or fauna surveys were not undertaken, as this was beyond the scope of this project. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate assessment of the ecological values present within the study area.

## 5 Results

### 5.1 Native Vegetation

Pre-1750 modelled Ecological Vegetation Class (EVC) mapping indicates that a large majority of the study area would have been historically dominated by Plains Grassland (EVC 132). Plains Grassy Woodland (EVC 55) and Stony Rises Woodland (EVC 203) were present intermittently along the study area’s western boundary, while Plains Sedgy Wetland (EVC 647) occurred in an almost continuous 100 metre strip along the study area’s

eastern boundary (DELWP 2017b). Current (2005) modelled EVC mapping indicates that very small isolated remnant EVC patches remain within the study area mainly along its eastern boundary and in the ‘triangle’ at the base of the study area. These current modelled EVC patches are not accurate, as exotic pasture grass exists where the 2005 EVC mapping had identified native vegetation in all cases.

Mature remnant River Red-gums *Eucalyptus camaldulensis* are located within the study area (Figure 2), which range in height from approximately 10 to 25 metres. These are largely distributed in a 50 metre wide strip along the western boundary (Plate 1). A small patch is also found at the study area’s southern-most tip. These trees would have once formed part of the Plains Grassy Woodland EVC; however the understorey vegetation now consists of exotic pasture grasses and small weeds.

The Blind Creek drainage line that runs east-west towards the southern end of the study area contains the native Common Spike-sedge (Plate 2), which was common within the Plains Sedgy Wetland EVC.



**Plate 1.** Remnant River Red-gums strip (50m wide) along the longest western boundary within the study area (Ecology and Heritage Partners Pty Ltd 01/11/20167).



**Plate 2.** Common Spike-sedge growing within the Blind Creek drainage line within the study area (Ecology and Heritage Partners Pty Ltd 01/11/20167).

## 5.2 Planted and Introduced Vegetation

Four fenced-off densely-planted revegetation areas are present along the western boundary (Figure 2), with the trees all being approximately 10 metres tall (Plate 3). These areas are all approximately 50 metres wide and range in length from approximately 170 to 400 metres, appearing to ‘fill in the gaps’ between remnant River Red-gum patches along the western boundary. These revegetation areas contain a variety of native species, including Swamp Gum *E. ovata*, Lightwood *Acacia implexa*, Blackwood *A. melanoxylon* and Swamp She-oak *Casuarina glauca*.

Two small isolated areas of Sugar Gum *E. cladocalyx*, which is native to South Australia, are identified along Meningoort Road along the study area’s southwestern boundary (Figure 2). These are not fenced off, but had been avoided when the paddock was planted out with crops.

The entire study area (including under remnant trees and within fenced-off revegetation areas) contains exotic grasses and herbs (Plate 3), most of which are considered environmental weeds. The study area is largely dominated by Barley Grass *Hordeum leporinum*, Perennial Rye-grass *Lolium perenne*, Annual Grass *Poa annua*, Common Mouse-ear Chickweed *Cerastium glomeratum* and White Clover *Trifolium repens*. Other less



commonly observed species included Capeweed *Arctotheca calendula*, Wild Oat *Avena fatua* and Buck's-horn Plantain *Plantago coronopus*.

The noxious weeds Spear Thistle *Cirsium vulgare* (Plate 4) and Variegated Thistle *Silybum marianum* are common throughout the western half of the study area.



**Plate 3.** Exotic paddock grasses in the foreground. Fenced-off revegetation area along the western boundary in the background (Ecology and Heritage Partners Pty Ltd 01/11/2017).



**Plate 4.** Spear Thistle was common along the western half of the study area (Ecology and Heritage Partners Pty Ltd 01/11/2017).

### 5.3 Fauna and Fauna Habitat

A wide range of birds are observed within the study area, with the three types of vegetation structures providing habitat for various types of birds.

#### 5.3.1 Remnant River Red-gums

The remnant River Red-gums throughout the study area are all mature, with some senescing (i.e. dying) and others dead. Hollows of various sizes, limb failure points and lifting bark are observed across the population, which provide valuable habitat for foraging, roosting and nesting that the younger revegetation areas cannot provide. Although no animals were observed using the hollows or lifting bark for nesting at the time of the assessment, they provide huge benefits to birds, possums, bats and insects.

#### 5.3.2 Fenced-off Revegetation

The four fenced-off revegetation areas located throughout the study area are valuable as foraging, roosting and nesting habitat for mobile generalist fauna, including locally common birds and microbats. Species observed using this habitat include the Red Wattlebird *Anthochaera carunculata*, Crested Pigeon *Ocyphaps lophotes*, Grey Butcherbird *Cracticus torquatus* and Noisy Miner *Manorina melanocephala*.

#### 5.3.3 Introduced Grasslands

The majority of the study area consists of paddocks that contain improved exotic pastures, with the southern 'triangle' being used for cropping. These areas are likely to be used as a foraging resource by common generalist bird species which are tolerant of modified open areas. Birds observed using this habitat include Australian Magpie *Cracticus tibicen*, Little Raven *Corvus mellori*, Little Corella *Cacatua sanguinea*, Magpie-lark

*Grallina cyanoleuca* and Australasian Pipit *Anthus novaeseelandiae*. The introduced Eurasian Skylark *Alauda arvensis* was also seen.

#### 5.3.4 Wetland System and Drainage Line

A wetland system, which includes Lake Bookaar, is located approximately 1 kilometre east of the study area. A dam and drainage line (Blind Creek) are also located within the study area (Figure 2). As a result of these water bodies, two water birds were observed, being the White-necked Heron *Ardea pacifica* and Australian Shelduck *Tadorna tadornoides*. The drainage line does not connect to the wetland system, running parallel to the study area's eastern boundary and heading north (Figure 2). Likewise, water run-off from the study area does not appear to reach the wetland system, being intercepted by the above-mentioned drainage line, or settling in the depression along the study area's eastern boundary (Figure 2).

### 5.4 Removal of Native Vegetation (Guidelines)

#### 5.4.1 Vegetation proposed to be removed

In the event that native vegetation within the study is proposed to be cleared, a site assessment would be required to determine the extent of clearing and the associated assessment pathway as per Section 4.3. Three areas of native vegetation would require a permit if removed, which are the remnant River Red-gums, the modelled wetland to the north-east of the study area and Common Spike-sedge within the Blind Creek drainage line (Figure 2).

Given that the River Red-gums are largely located along paddock boundaries, the development will be designed to avoid any tree removals (which means avoiding these trees Tree Retention Zones). The development will also not encroach into the modelled wetland area and a 20 metre buffer will be applied to its boundary to ensure no impacts to it. One to two culverts over the drainage line will be constructed, which will result in the removal of some Common Spike-sedge. The location of culvert(s) will be determined in the detailed design period post consent. Once these locations are determined, the applicant will carry out a further assessment to determine any offsets following the process defined in Section 4.3, and would expect that this assessment is a condition of consent.

#### 5.4.2 Offset Targets

Upon further assessment, it may be determined that offsets are required associated with the removal of Common Spike-sedge, however given that such a small area will be removed (i.e. up to approximately 40 square metres for two culverts), the requirement for offsets may not be triggered.

### 5.5 Significance Assessment

#### 5.5.1 Flora

The VBA contains records of 13 nationally significant and six State significant flora species previously recorded within 10 kilometres of the study area (DELWP 2017d) (Figure 3).

Based on the highly modified agricultural nature of the study area, landscape context and fact that no significant flora species have been recorded within it, significant flora species are considered unlikely to occur within the study area.

### 5.5.2 Fauna

The VBA contains records of 18 nationally, 22 State significant and 8 regionally significant fauna species previously recorded within 10 kilometres of the study area (DELWP 2017d) (Figure 4). The PMST nominated an additional 14 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoEE 2017).

While none of the fauna shown in Figure 4 were recorded within the study area, or observed during the site assessment, it is possible that these species use the study area and the trees within it for foraging, roosting and nesting.

### 5.5.3 Communities

The Grassy Eucalypt Woodland of the Victorian Volcanic Plain ecological community is known to occur within 10 kilometres of the study area, and is Critically Endangered under the EPBC Act. The tree canopy is typically dominated by River Red-gums, with an understorey of sparse shrubs and a species-rich ground layer of grasses and herbs. It is likely that the remnant River Red-gums within the study area formed part of this ecological community before agricultural development.

The native understorey has been replaced by pasture grass and therefore does not meet the condition thresholds to qualify as the listed ecological community.

Three other nationally significant ecological communities under the EPBC Act are likely to occur within 10 kilometres of the study area, which are:

- Natural Temperate Grassland of the Victorian Volcanic Plains;
- Seasonally Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and
- White Box-Yellow Box-Blakely's Red-gum Grassy Woodland and Derived Native Grassland.

None of these are however observed within the study site and are unlikely to be there due to the large agricultural disturbance that has occurred.

A RAMSAR site is located approximately one kilometre east of the study area (Figure 2). The area generally along the study area's eastern boundary gets boggy. The proponent is proposing to drain these seasonally boggy areas by installing a drainage system with pipes under the ground that divert water away from these areas.

## 6 Legislative and Policy Implications

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

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

The proposed development is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not required regarding matters listed in the EPBC Act.

Based on the presence of a largely modified landscape, no targeted surveys are recommended for the study area.

## **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.

The trees within the study area may provide suitable habitat for several FFG Act-listed fauna species, however they are not proposed to be cleared and are located on private land, hence a permit under the FFG Act is not required.

## **6.3 Planning and Environment Act 1987 (Victoria)**

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under Clause 52.17-7 of the Victorian Planning Schemes applies or a subdivision is proposed with lots less than 0.4 hectares<sup>2</sup>. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 6.3.1).

### **6.3.1 Local Planning Schemes**

The study area is located within the Corangamite Shire municipality. The following zoning and overlays apply (DELWP 2017f, 2017g):

- Farming Zone – Schedule 1 (FZ1)
- Heritage Overlay Schedule (HO80) (coverage around homestead only)
- Significant Landscape Overlay – Schedule 1 (SLO1) (coverage around homestead only)

### **6.3.2 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 ‘Guidelines for the removal, destruction or lopping of native vegetation’ (Guidelines) (DELWP 2017h).

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<sup>2</sup> In accordance with the Victorian Civil and Administrative Tribunal’s (VCAT) decision *Villawood v Greater Bendigo CC* (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

### 6.3.3 Implications

Upon further assessment, it may be determined that offsets are required associated with the removal of Common Spike-sedge, however given that such a small area will be removed (i.e. up to approximately 40 square metres for two culverts), the requirement for offsets may not be triggered.

A Planning Permit from Corangamite Shire would be required under Clause 52.47 to remove, destroy or lop any native vegetation (depending on the size), which in this case would be Common Spike-sedge.

## 6.4 **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.

## 6.5 **Water Act 1989 (Victoria)**

The purposes of the *Water Act 1989* are manifold but (in part) relate to the orderly, equitable, efficient and sustainable use of water resources within Victoria. This includes the provision of a formal means of protecting and enhancing environmental qualities of waterways and their in-stream uses as well as catchment conditions that may affect water quality and the ecological environments within them.

The Blind Creek drainage line crosses through the study area, while Lake Bookaar and the associated wetlands (a RAMSAR site) are located approximately one kilometre east of the study area. It is unlikely that any runoff from the study area would enter Lake Bookaar and the wetlands, as the drainage line running parallel to the study area to the east, and the depressions along the study area's eastern boundary would likely intercept any water (Figure 2).

A 'works on waterways' licence from the Glenelg Hopkins CMA will be required where any action that impacts on waterways within the study area, in this case the culvert(s). Additionally, where structures are installed within or across waterways that potentially interfere with the passage of fish or the quality of aquatic habitat, including culverts, these activities should be referred to DELWP with the Glenelg Hopkins CMA included for comment.

The proponent is proposing to drain the seasonally boggy areas generally along the study area's eastern boundary by installing a drainage system with pipes under the ground that divert water away from these areas. The drainage system is not expected to alter the topography of the study area and will not appear to increase or decrease the total flow into the drainage line system that exists in the local area, or adversely impact hydrological flows into the RAMSAR site located one kilometre to the east (Figure 2). A hydrological engineer will be engaged to ensure there are no negative environmental impacts of the installed drainage system. The proponent would address appropriate controls and this will be addressed in the CEMP and OEMP.

## 6.6 Catchment and Land Protection Act 1994 (Victoria)

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values.

Weeds listed as noxious under the CaLP Act were recorded during the assessment (Spear Thistle *Cirsium vulgare* and Variegated Thistle *Silybum marianum*). A Weed Management Plan may be required.

## 6.7 Best Practice Mitigation Measures

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. Habitat Zones (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Tree Retention Zones (TRZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2011). A TRZ 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 TRZ should consider the following:
  - A TRZ 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 TRZ;
  - Where encroachment exceeds 10% of the total area of the TRZ, the tree should be considered as lost and offset accordingly;
  - Directional drilling may be used for works within the TRZ 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 TRZ has not been met an offset may be required.
- Removal of any habitat trees or shrubs (particularly hollow-bearing trees) should be undertaken between February and September to avoid the breeding season for the majority of fauna species. If any habitat trees or shrubs are proposed to be removed, this should be undertaken under the supervision of an appropriately qualified zoologist to salvage and translocate any displaced fauna. A Fauna Management Plan may be required to guide the salvage and translocation process;
- 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.

In addition to these measures, the following documents should be prepared and implemented prior to any construction activities:

- Construction Environmental Management Plan (CEMP). The CEMP should include specific species/vegetation conservation strategies, daily monitoring, sedimentation management, site specific rehabilitation plans, weed and pathogen management measures, hydrology during construction, etc.;
- Weed Management Plan. This plan should follow the guidelines set out in the CaLP Act, and clearly outline any obligations of the project team in relation to minimising the spread of weeds as a result of this project. This may include a pre-clearance weed survey undertaken prior to any construction activities to record and map the locations of all noxious and environmental weeds;

## 6.8 Offset Impacts

### 6.8.1 Offset Options

If offsets area required, potential offsets may be sourced using the following mechanisms:

- BushBroker: BushBroker maintains a register of landowners who are willing to sell offset credits. Offsets secured by Bushbroker are done so via a Section 69 Agreement under the *Conservation, Forest and Lands Act 1987*.
- Trust for Nature: Trust for Nature holds a list of landowners who are willing to sell vegetation offsets. Offsets secured by Trust for Nature are done so under the Victorian *Conservation Trust Act 1972*.
- Local Councils: The proponent may contact local councils to seek availability of offsets.
- Over-the-Counter Offsets Scheme: The Guidelines include the expansion of the “Over-the-Counter” (OTC) Offsets Scheme, allowing non-government agencies to establish themselves as OTC Facilities. OTC Facilities will broker native vegetation offsets (credits) between landholders (with offset sites) and permit holders (with offset requirements).

### 6.8.2 Offset Strategy

Ecology and Heritage Partners are a DELWP accredited OTC offset broker and are able to assist if offsets are required.

## **7 Biodiversity improvement opportunities**

The ecological features of the study area will be improved through this development by encouraging tree recruitment and planting large strips of indigenous vegetation. The existing remnant River-red Gums currently show no evidence of recruitment, which can be attributed to the presence of cattle freely grazing around these trees or walking over any new seedlings. Fencing is proposed to exclude cattle from areas containing remnant River-red Gums, which will provide seedlings with the opportunity to establish and in time form multi-age stands. Fencing off remnant Red-gum stands will also have the added effect of reducing the stress caused to existing trees and therefore improving their health. Constant cattle movements around trees compacts the soils, which alters soil structure and hydrology. These can decrease a soil's porosity and infiltration capacity, thereby reducing a plant's ability to absorb mineral nutrients and photosynthesise properly (Kozlowski 1999).

A continuation of the planted tree sections is proposed along many of the study area's boundaries. These will act as a screen for the solar panels, for example along Meningoort Road, but also provide large biodiversity benefits in a landscape where relatively few shrubs and trees exist. These include more habitat for mammals (e.g. bats), birds and insects in the form of nesting, roosting and foraging opportunities, and more connectivity between trees strips in the wider landscape. The biodiversity benefits of revegetating a landscape are well known, with several studies highlighting the many biodiversity benefits (Kavanagh, Stanton and Herring 2007; Munro, Lindenmayer and Fischer 2007; Williams 2017).



## 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 3.

**Table 3.** Further requirements associated with development of the study area

Relevant Legislation	Implications	Further Action
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	The proposed development is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not required regarding matters listed in the EPBC Act.	No further action required.
<i>Flora and Fauna Guarantee Act 1988</i>	The trees within the study area may provide suitable habitat for several FFG Act-listed fauna species, however they are not proposed to be cleared and are located on private land, hence a permit under the FFG Act is not required.	No further action required.
<i>Planning and Environment Act 1987</i>	<p>Scattered trees and remnant patches of native vegetation, as defined by the Guidelines, were identified within the study area. A habitat hectares assessment would have to be undertaken if River Red-gums were proposed to be removed.</p> <p>Upon further assessment, it may be determined that offsets are required associated with the removal of Common Spike-sedge, however given that such a small area will be removed (i.e. up to approximately 40 square metres for two culverts), the requirement for offsets may not be triggered.</p> <p>A Planning Permit from Corangamite Shire would be required under Clause 52.47 to remove, destroy or lop any native vegetation (depending on the size), which in this case would be Common Spike-sedge.</p> <p>The property is partially covered by a Heritage Overlay and Significant Landscape Overlay.</p>	<p>Prepare and submit a Planning Permit application. Planning Permit conditions are likely to include a requirement for:</p> <ul style="list-style-type: none"> <li>• Demonstration of impact minimisation.</li> <li>• A Construction Environment Management Plan (CEMP).</li> </ul> <p>Identification of a compliant offset for the removal of Common Spike-sedge is proposed as a condition of the planning permit.</p>
<i>Catchment and Land Protection Act 1994</i>	One weed species listed under the CaLP Act was 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.
<i>Water Act 1989</i>	A 'works on waterways' permit may be required from the Glenelg Hopkins CMA where any action impacts on waterways within the study area.	Obtain a 'works on waterways' permit from Glenelg Hopkins CMA.
<i>Wildlife Act 1975</i>	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.

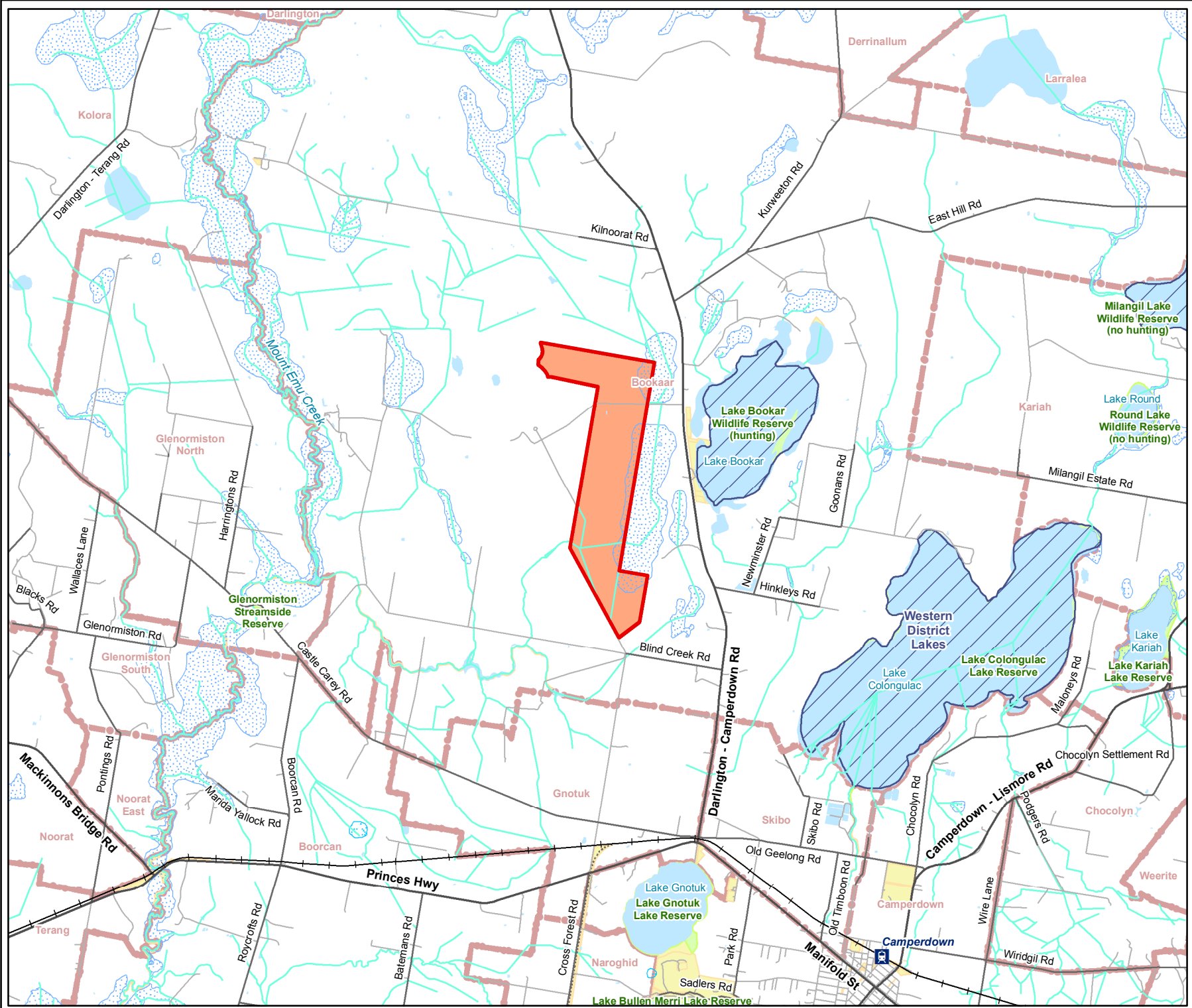
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## 10 Figures

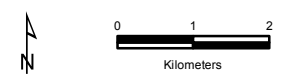
Figure 1: Location of the Study Area



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



**Figure 1**  
**Location of the study area**  
*Preliminary Ecological Assessment: Camperdown Solar Farm*



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Figure 2: Ecological Features – Features recorded during the site assessment



**Legend**

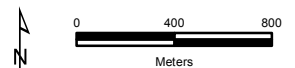
- Study Area
- Ramsar wetland
- Current Wetlands

**Vegetation**

- Remnant River Red Gums
- Fenced-off dense revegetation
- Common Spike-sedge within drainage line
- Planted Sugar Gums



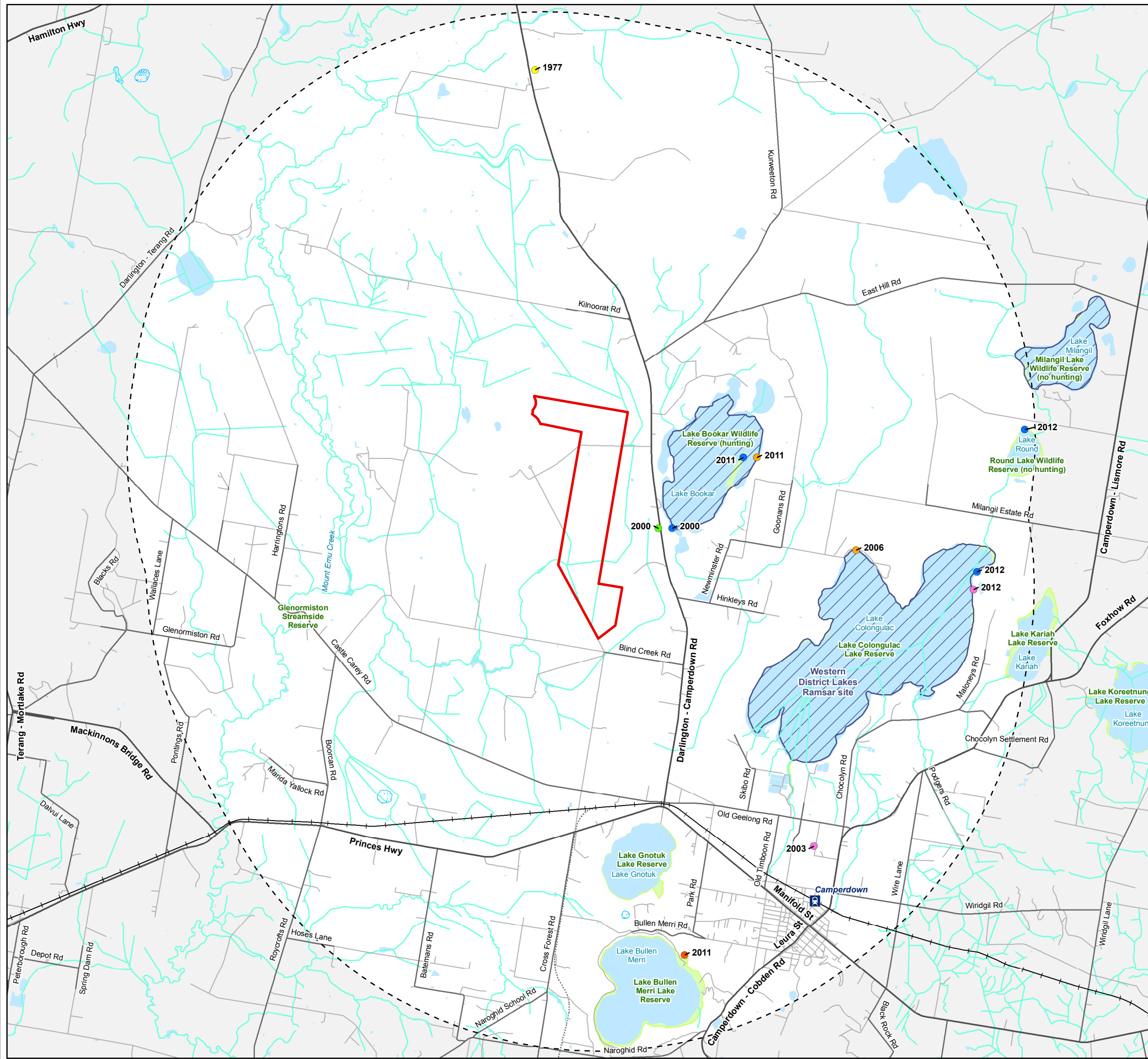
**Figure 2**  
**Ecological Features**  
*Preliminary Ecological Assessment: Camperdown Solar Farm*



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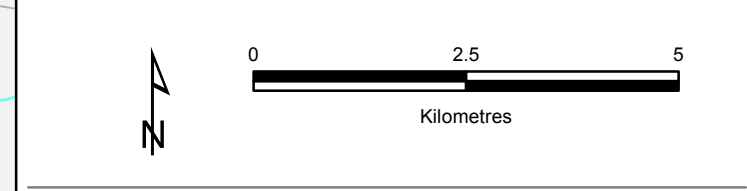
Figure 3: Significant Flora Records



- Legend**
- Study Area
- Significant Flora**
- Basalt Sun-orchid
  - Brackish Plains Buttercup
  - Giant Honey-myrtle
  - Salt Blown-grass
  - Salt-lake Tussock-grass
  - Wind-blown Tussock-grass

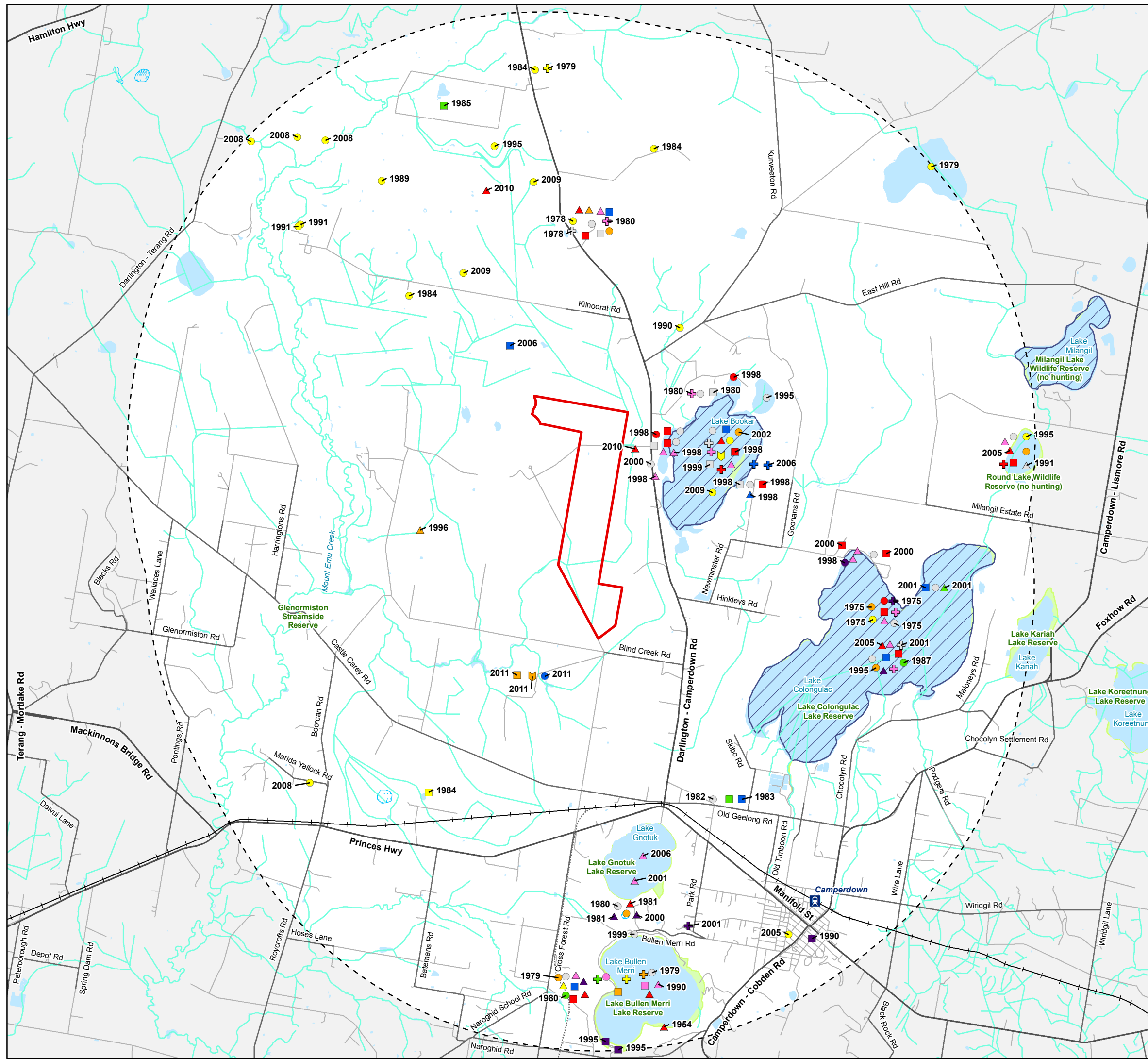


**Figure 3**  
**Previously documented significant flora within 10km of the study area**  
*Preliminary Ecological Assessment: Camperdown Solar Farm*



VBA 2017. Victorian Biodiversity Atlas. // Sourced from: 'VBA\_FLORA25' and 'VBA\_FLORA100', February 2017 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.  
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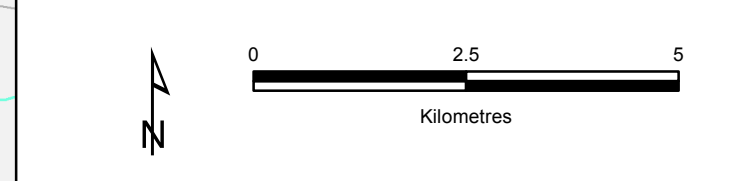
Figure 4 Significant Fauna Records



- Legend**
- Study Area
- Significant Fauna**
- Australasian Shoveler
  - Black Falcon
  - Blue-billed Duck
  - Brolga
  - Caspian Tern
  - Common Bent-wing
  - Bat (southern ssp.)
  - Common Sandpiper
  - Corangamite Water Skink
  - Curlew Sandpiper
  - Eastern Great Egret
  - Eastern Snake-necked Turtle
  - Fairy Prion
  - Freckled Duck
  - Golden Perch
  - Grey Goshawk
  - ▲ Gull-billed Tern
  - ▲ Hardhead
  - ▲ Latham's Snipe
  - ▲ Little Egret
  - ▲ Magpie Goose
  - ▲ Marsh Sandpiper
  - ▲ Musk Duck
  - ▲ Nankeen Night Heron
  - + Pied Cormorant
  - + Royal Spoonbill
  - + Silver Perch
  - + Southern Toadlet
  - + Spotted Harrier
  - + Tussock Skink
  - + Whiskered Tern
  - + White-throated Needletail
  - + Wood Sandpiper
  - + Yellow-bellied Sheathtail Bat



**Figure 4**  
**Previously documented significant fauna within 10km of the study area**  
*Preliminary Ecological Assessment: Camperdown Solar Farm*



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