

**PLANNING and ENVIRONMENT ACT  
MOYNE PLANNING SCHEME**

**PERMIT NO. 2006-0222-2**

**Condition 23**

**ENDORSED PLAN**

**Sheet 1 of 147**

Signed:  for  
**MINISTER FOR PLANNING**

**Date: 04/05/2022**

## **Ryan Corner Wind Farm**

### Native Vegetation Plan

**Ryan Corner Development Pty Ltd  
(a wholly owned subsidiary of GPG  
Australia Pty Ltd)**

April 2022  
Report No. 14144 (15.7)



**Nature  
Advisory**

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# 1. Introduction

Ryan Corner Development Pty Ltd (RCD) (a wholly owned subsidiary of GPG Australia Pty Ltd) engaged Nature Advisory Pty Ltd (formerly Brett Lane & Associates) to prepare a Native Vegetation Plan (NVP) for the approved Ryan Corner Wind Farm (RCWF) located north-west of Port Fairy in south-western Victoria.

The RCWF layout consists of a network of 52 approved turbines, including 17 turbines to the west of Riverside/Harris Road and 35 turbines to the east of Riverside/Harris Road. The second entrance point for the wind farm (off Port Fairy Hamilton Road) was constructed in 2012. The study area spans 11 farming properties; five that occur between Hamilton-Port Fairy Road and Riverside/Harris Road, and six that occur west of Riverside/Harris Road.

The RCWF development has been the subject of a Native Vegetation Assessment which is outlined in the report *Ryan Corner Wind Farm: Native Vegetation Assessment* prepared by Nature Advisory (10.5) (2021). The report identified 69 patches of native vegetation totalling 38.086 hectares, and 45.439 ha of DELWP mapped wetlands (treated as native vegetation) within the wind farm study area.

A revised wind farm layout, project footprint and associated civil works will require the removal of 3.836 hectares of native vegetation, comprising:

- The loss of 1.915 hectares of native vegetation from remnant patches;
- The loss of 1.921 hectares of native vegetation from DELWP mapped wetlands; and
- No scattered trees

Condition 22 of Planning Permit No. 20060222-2 (issued on 9 March 2022) (the permit) allows for the removal of no more than 3.836 hectares of native vegetation.

This NVP details strategies and approaches to meet the requirements of Condition 23 of the permit.

## 1.1. Native Vegetation Removal – Permit No. 20060222-2A

23) *Before any native vegetation is removed under this permit, a Native Vegetation Plan to the satisfaction of DELWP environment portfolio and the Minister for Planning must be submitted to and approved by the Minister for Planning. When approved the Native Vegetation Plan will be endorsed and then form part of the permit. All works constructed or carried out must be in accordance with the endorsed plan. The native vegetation plan must include:*

- A. *A final Biodiversity Assessment Report or similar which identifies all losses being approved by this permit and the associated offset requirements, in accordance with the permitted clearing of native vegetation – biodiversity assessment guidelines (DEPI 2013).*
- B. *Plans drawn to scale with dimensions that identify:*
  - (i) *native vegetation to be removed.*
  - (ii) *any current mapped wetlands as defined in the Permitted clearing of native vegetation – Biodiversity assessment handbook (DEPI 2015), that are present on the site.*
  - (iii) *any native vegetation to be retained that is within the permissible micro siting envelope or ancillary infrastructure.*
  - (iv) *the location of any detected threatened flora and fauna species.*
- C. *Measures to be used during construction to protect native vegetation to be retained and to protect the function and hydrology of wetlands where native vegetation removal will occur.*
- D. *Measures to induct and educate all construction personnel.*

This plan provides the following:

- A description of the site;
- Maps outlining areas of native vegetation to be removed and retained, current mapped wetlands and locations of detected threatened flora and fauna species;
- Methods for the identification of potential threats to areas of retained native vegetation and methods for protection of these areas; and
- Risk management measures with management indicators for managing risks to retained native vegetation.

The aim of this NVP is to provide guidance on the management of the construction phase of the project to minimize impact on areas of native vegetation to be retained, as well as to minimise unnecessary impacts on the site as a whole.

An A3 map summarising the requirements of the NVP will be prepared upon endorsement of this document by the Minister for Planning. Upon completion, the map will be displayed on site to assist contractors and the proponent in understanding the obligations they have in relation to native vegetation protection, removal and management. The summary will communicate key messages for each management/mitigation component and reference relevant parts of the plan. Maps showing the location of all native vegetation detected on site will also be displayed. These maps will not replace this NVP, but rather will be a quick reference guide for personnel working on site. The maps will be updated as required to reflect any changes made to this document and approved by the Minister for Planning.

This Plan was prepared by a team from Nature Advisory, comprising Verity Fyfe (Senior Ecologist), Elinor Ebsworth (Senior Ecologist) and Jim Grant (Senior Ecologist and Project Manager).

## 2. Project Description

The Ryan Corner Wind Farm will constitute a network of 52 approved turbines, including 17 turbines to the west of Riverside/Harris Road and 35 turbines to the east of Riverside/Harris Road. It will also involve access tracks to all turbines, plus a concrete batching plant, site compound, on-site substation and underground cabling, as shown in Figure 2 A1 – C2. Where underground cabling crosses Riverside Road, it will be directionally drilled to avoid impacts to high-quality roadside vegetation. Impacts arising from the off-site transmission line are addressed in a separate report and planning permit, and are therefore not considered here.

To determine impacts to native vegetation the footprint, which provided partial buffers for ground works, was overlaid with the native vegetation mapped as part of this investigation, and the following applied except where further opportunities to avoid native vegetation applied. Construction activities (impact area) will comprise the following infrastructure:

- Roads and ground works, a three-metre buffer was applied in areas of native vegetation and this was taken as extent of impact;
- Hardstand areas, including:
  - Crane Hardstand Platforms – ~60m x 40m in close proximity of the turbine foundation
  - Blade Laydown Fingers 70m x 20m adjacent to the hardstand on the opposite side of the access track;
  - Auxiliary Crane Pads – 12m x 7m

A three-metre buffer was applied in areas of native vegetation and this was taken as extent of impact of hardstand areas.

- Where cabling was not associated with a road, cabling was designated an 8m corridor in areas of native vegetation;
- The northern two cable crossings of Riverside Road will be directionally drilled. The southern cable with access track will be trenched adjacent to the track in an area without native vegetation. Therefore, there will be no impacts to native vegetation within the Riverside Road reserve;
- Meteorological Mast – access track and 75m radius;
- On-site substation – 100m x 125m;
- On-site concrete batching plant – 100m x 100m; and
- Site compound – 55m x 190m.

This impact area is indicated in Figure 2 A1 – C2 of the Native Vegetation Assessment prepared by Nature Advisory (2021) which is provided as Attachment 1 of this plan. These figures provide a defined area in which contractors will be confined to for areas containing, or adjacent to, native vegetation, so as to eliminate unintentional impacts on retained native vegetation.

### 2.1. NVP context

This NVP details strategies and approaches to meet the requirements of Condition 23 of the permit. These requirements are outlined below.

### 2.1.1. Native Vegetation Plan

23) Before any native vegetation is removed under this permit, a Native Vegetation Plan to the satisfaction of DELWP environment portfolio and the Minister for Planning must be submitted to and approved by the Minister for Planning. When approved the Native Vegetation Plan will be endorsed and then form part of the permit. All works constructed or carried out must be in accordance with the endorsed plan. The native vegetation plan must include:

- A. A final Biodiversity Assessment Report or similar which identifies all losses being approved by this permit and the associated offset requirements, in accordance with the permitted clearing of native vegetation – biodiversity assessment guidelines (DEPI 2013).
- B. Plans drawn to scale with dimensions that identify:
  - (i) native vegetation to be removed.
  - (ii) any current mapped wetlands as defined in the permitted clearing of native vegetation – biodiversity assessment handbook (DEPI 2015), that are present on the site.
  - (iii) any native vegetation to be retained that is within the permissible micro siting envelope or ancillary infrastructure.
  - (iv) the location of any detected threatened flora and fauna species.
- C. Measures to be used during construction to protect native vegetation to be retained and to protect the function and hydrology of wetlands where native vegetation removal will occur.
- D. Measures to induct and educate all construction personnel in relation to the permit conditions and statutory requirements for the protection and removal of native vegetation.

### 2.1.2. NVP objectives

The objectives of this NVP include, but are not limited to the following:

- Provide a final Biodiversity Assessment Report or similar which identifies all losses being approved by the planning permit and the associated offset requirements, in accordance with the Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013);
- Clearly and accurately show the location and extent of native vegetation to be removed within the wind farm site as permitted in the planning permit.
- Clearly and accurately show the location and extent of native vegetation to be retained, and define protection parameters for any areas of native vegetation that occur in the proximity of the construction impact zone ('No Go Zones');
- Provide methods to manage (i.e. avoid and minimise) impacts on native vegetation within these 'No Go Zones' that may be directly or indirectly affected by the development;
- Clearly and accurately show the location and extent of any current mapped wetlands as defined in the Permitted clearing of native vegetation – Biodiversity assessment handbook (DEPI 2015); and
- Clearly and accurately show the locations of any threatened flora or fauna that have been detected within the wind farm site.

### 3. Management Actions

#### 3.1. Management actions to be undertaken

RCWF refers to Ryan Corner Wind Farm the responsible entity being Ryan Corner Development Pty Ltd.

This Plan proposes a number of measures to be incorporated into the Construction Environmental Management Plan (CEMP) to ensure impacts to retained native vegetation are minimised. These include:

- Restriction of unauthorised access;
- Provision of signage to deter prohibited activities;
- Limiting of all machinery and vehicular traffic to defined impact areas as much as possible (including containing access/damage to impact areas during wet boggy weather);
- Temporary fencing and signage of retained native vegetation within 30 metres of defined impact areas see (Figure 4);
- Temporary clear perimeter flagging and signage of retained native vegetation beyond 30 metres and within 50 metres (approx.) of defined impact areas;
- Induction of all contractors accessing the wind farm site into the prescriptions of this plan before accessing the wind farm site;
- Manage all rubbish and construction waste during the construction phase of the project; and
- Manage the threat of weed invasion throughout the construction phase of the project.
- No pruning or lopping of native vegetation will be required. No removal of native trees is required.

**Table 1 Management actions**

Timeframe	Action	Responsibility
All times	All vehicles are to remain within the defined 'impact areas'.	RCWF, Construction contractors and sub-contractors.
All times	All contractors to be trained in issues relating to protection of native vegetation and weed hygiene at a compulsory induction prior to commencing works.	RCWF, except where RCWF specifically delegate responsibilities in writing.
Pre-construction	All native vegetation to be removed and native vegetation to be retained is to be shown on construction drawings.	RCWF, except where RCWF specifically delegate responsibilities in writing.
Pre-construction	<p>"No Go Zones" are to be delineated as follows:</p> <ul style="list-style-type: none"> <li>▪ Temporary fencing will be erected along the edge of the defined 'impact area' where patches of native vegetation occur within 30m of the footprint.</li> <li>▪ Where there are patches of Native Vegetation that occur beyond 30m but within 50m (approx.) of the defined 'impact area', temporary flagging will be erected along the edge of the defined 'impact area'.</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.

Timeframe	Action	Responsibility
	<ul style="list-style-type: none"> <li>▪ Flagged and fenced areas will be appropriately signed “Significant Vegetation – No Go Zone”.</li> </ul>	
Pre-construction	Offsets must be obtained prior to removal of any native vegetation	RCWF
During construction	<p>The following activities are not to be undertaken within “No Go Zones”:</p> <ul style="list-style-type: none"> <li>▪ Vehicular or pedestrian access</li> <li>▪ Parking areas</li> <li>▪ Turning points</li> <li>▪ Trenching or soil excavation</li> <li>▪ Storage or dumping of any soils, materials, equipment, vehicles, machinery or waste products</li> <li>▪ Entry and exit pits for underground services</li> <li>▪ Any other actions or activities that may result in adverse impacts to retained native vegetation</li> </ul> <p>All stock piles must be located in areas within the surveyed and assessed development footprint where there is no identified native vegetation.</p>	RCWF, except where RCWF specifically delegate responsibilities in writing.
During construction	<p>The following ‘clearing protocol’ will be followed:</p> <ul style="list-style-type: none"> <li>▪ The day before any clearing of native vegetation approved to be removed is to be cleared, the site environment officer is to clearly delineate native vegetation that may be removed, and ensure “No Go Zones” are in place.</li> <li>▪ Personnel undertaking clearing of native vegetation approved to be removed are to be briefed prior to work on the exact extent of what may be impacted.</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.
During construction	<p>The following hygiene protocols will be implemented:</p> <ul style="list-style-type: none"> <li>▪ Any earth moving equipment that is delivered to site is to be clean.</li> <li>▪ Wheel washing facilities will be provided at the site compound at the entrance to the wind farm. Any vehicles not meeting the required standards of hygiene and cleanliness shall be sent to this location for cleaning before given access to site.</li> <li>▪ Any materials required for construction (eg. road making materials) must be free of weeds and weed seeds.</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.
During construction	Regular monitoring of rubbish/construction waste adjacent to construction works areas must be carried out and any rubbish/construction waste found occurring within or adjacent to areas of native vegetation must be removed immediately.	RCWF, except where RCWF specifically delegate responsibilities in writing.
During construction and operation	A program of spot spraying of any noxious weeds will be implemented throughout construction and operational phases. Details of this are included in the Pest Plant Management Plan for Ryan Corner Wind Farm December 2020.	RCWF, except where RCWF specifically delegate responsibilities in writing.



Timeframe	Action	Responsibility
During construction and operation	Monitoring and review of this NVP will be regularly undertaken by the site environment officer. Should the requirements of this Plan be found to not be met, work is to stop until this Plan can be complied with.	RCWF, except where RCWF specifically delegate responsibilities in writing.
Post-construction	Any areas of native vegetation temporarily disturbed during construction that can be rehabilitated will be so in consultation with the respective landowner.	RCWF, except where RCWF specifically delegate responsibilities in writing.
During construction and operation	Indirect impacts on wetlands. Drainage patterns are maintained using the hydrology report to inform audits.	RCWF, except where RCWF specifically delegate responsibilities in writing.

## 4. Addressing Permit Requirements – Condition 23

### 4.1. Requirement 23 A

*A final Biodiversity Assessment Report or similar which identifies all losses being approved by this permit and the associated offset requirements, in accordance with the permitted clearing of native vegetation – biodiversity assessment guidelines (DEPI 2013).*

The information required by this permit condition is provided in the report *Ryan Corner Wind Farm: Native Vegetation Assessment, Report No. 14144 (10.5)* prepared by Nature Advisory (2021) (hereon referred to the Native Vegetation Report). The BIOR report is provided as an Attachment to this report. See Section 5 of the report for impacts to native vegetation and Section 6.1.3 and 6.1.4 for offset requirements.

### 4.2. Requirement 23 B

*Plans drawn to scale with dimensions that identify:*

(i) *native vegetation to be removed.*

An accurate representation of the native vegetation to be removed at Ryan Corner Wind Farm is included in Figure 2 A1 – C2 of the attached Native Vegetation Report (Attachment 1).

(ii) *any current mapped wetlands as defined in the permitted clearing of native vegetation – biodiversity assessment handbook (DEPI 2015), that are present on the site.*

An accurate representation of the Current Mapped Wetlands as defined in the Permitted clearing of native vegetation – Biodiversity assessment handbook (DELWP 2015) is included in Figure 2 A1 – C2 of the attached Native Vegetation Report (Attachment 1).

(iii) *any native vegetation to be retained that is within the permissible micro siting envelope or ancillary infrastructure.*

An accurate representation of the native vegetation to be retained at Ryan Corner Wind Farm is included in Figure 2 A1 – C2 of the attached Native vegetation report (Attachment 1).

Micro-siting is defined in Condition 2 of the planning permit as “*alteration to the siting of a turbine by not more than 100 metres. For the purposes of this condition, micro-siting of turbines includes any consequent changes to access tracks and electricity reticulation lines and the measurement of any distance between a dwelling and a turbine must be from the centre of the tower of the turbine (at ground level) to the closest point of the dwelling*”.

Should micro-siting of the wind farm layout occur, an assessment of impacts to native vegetation must be undertaken to determine whether the amendments result in any increased impacts to native vegetation and/or whether they impact patches of native vegetation that have not been previously approved to be affected by the wind farm. This would occur in accordance with Condition 2 of the planning permit which requires that, “*the use and development as shown on the endorsed plans must not be altered or modified without the written consent of the Minister for Planning; except that the micro siting of wind turbines (as defined in this condition) is permitted provided that (a) the developer of the wind energy facility has written advice from the appropriately qualified experts that the alteration or modification will not result in a material adverse change in landscape, flora and fauna, cultural heritage, visual amenity, shadow flicker, noise fire risk or aviation impacts compared to the endorsed plans*”.

Figure 3 has been prepared to clearly communicate the micro-siting provisions of each wind turbine and the location of the surrounding native vegetation.




(iv) *the location of any detected threatened flora and fauna species.*

The locations of threatened flora and fauna species detected at Ryan Corner Wind Farm are provided in the following figure (Figure 1 and 1a)). Figure 1 was created by Nature Advisory based on the results of ecological surveys conducted by Environmental Resources Management Australia (ERM) and Nature Advisory as well as records from the Victorian Biodiversity Atlas. The results are included in the reports *Ryan Corner Wind Farm Ecological Assessment, 3rd draft report* (ERM 2006), *Ryan Corner Wind Farm Bird Utilisation and Brolga Breeding Season Surveys*, Report No. 6114 (2.2) (BL&A 2007) and the attached Native Vegetation Report (Attachment 1) which includes information from surveys undertaken in 2017, 2020 and 2021. Figure 1a covers Basalt Leek Orchid records separately for clarity.

ERM recorded nine threatened fauna and three threatened flora species in 2006, while BL&A detected a breeding pair of Brolga in 2007. Nature Advisory recorded 34 individuals of the FFG Act listed Basalt Leek-orchid (*Prasophyllum viretrum*) within Habitat Zone R on Riverside Road in 2020. This habitat zone is not proposed to be impacted by the development layout, therefore this species, nor any other FFG listed species are proposed to be impacted. Additionally, no EPBC listed species are proposed to be impacted.

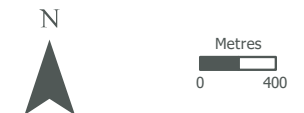
# Figure 1: Locations of threatened species

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Wind Farm Pty Ltd  
**Date:** 22/03/2022

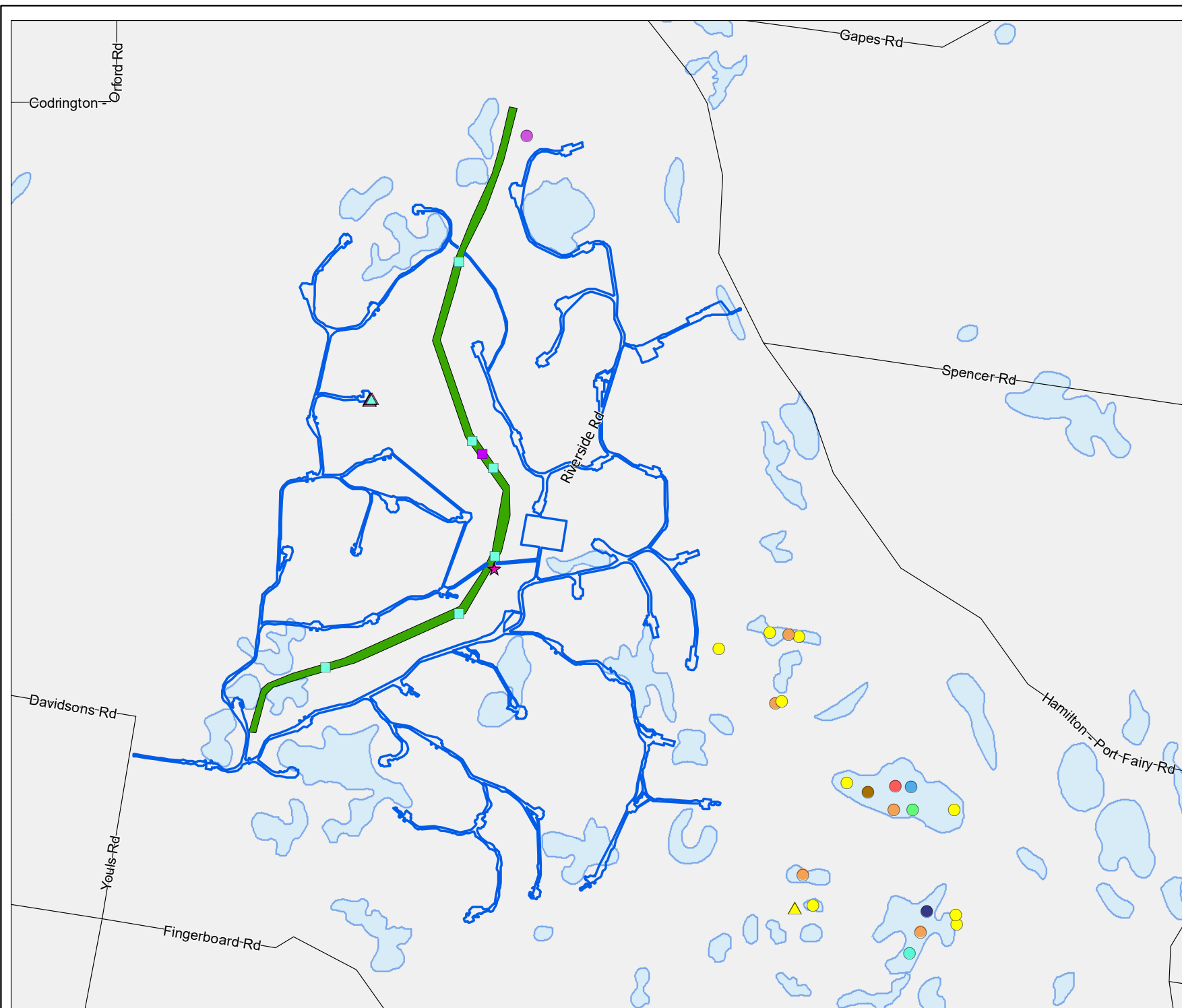
-  Ryan Corner Wind Farm footprint
-  DELWP wetlands
-  Nature Advisory 2020 Basalt Leek Orchid records
-  Nature Advisory 2021 Pale Swamp-everlasting records
-  Nature Advisory 2021 Swamp Fireweed records
-  BL&A Broлга breeding record - 2007

## ERM threatened fauna & flora - 2006

-  Broлга
-  Glossy Ibis
-  Great Egret
-  Hardhead
-  Latham's Snipe
-  Little Egret
-  Moderate Egret
-  Musk Duck
-  Royal Spoonbill
-  Pretty Hill Leek-orchid
-  Basalt Leek-orchid
-  Golden Cowslips







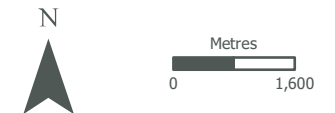
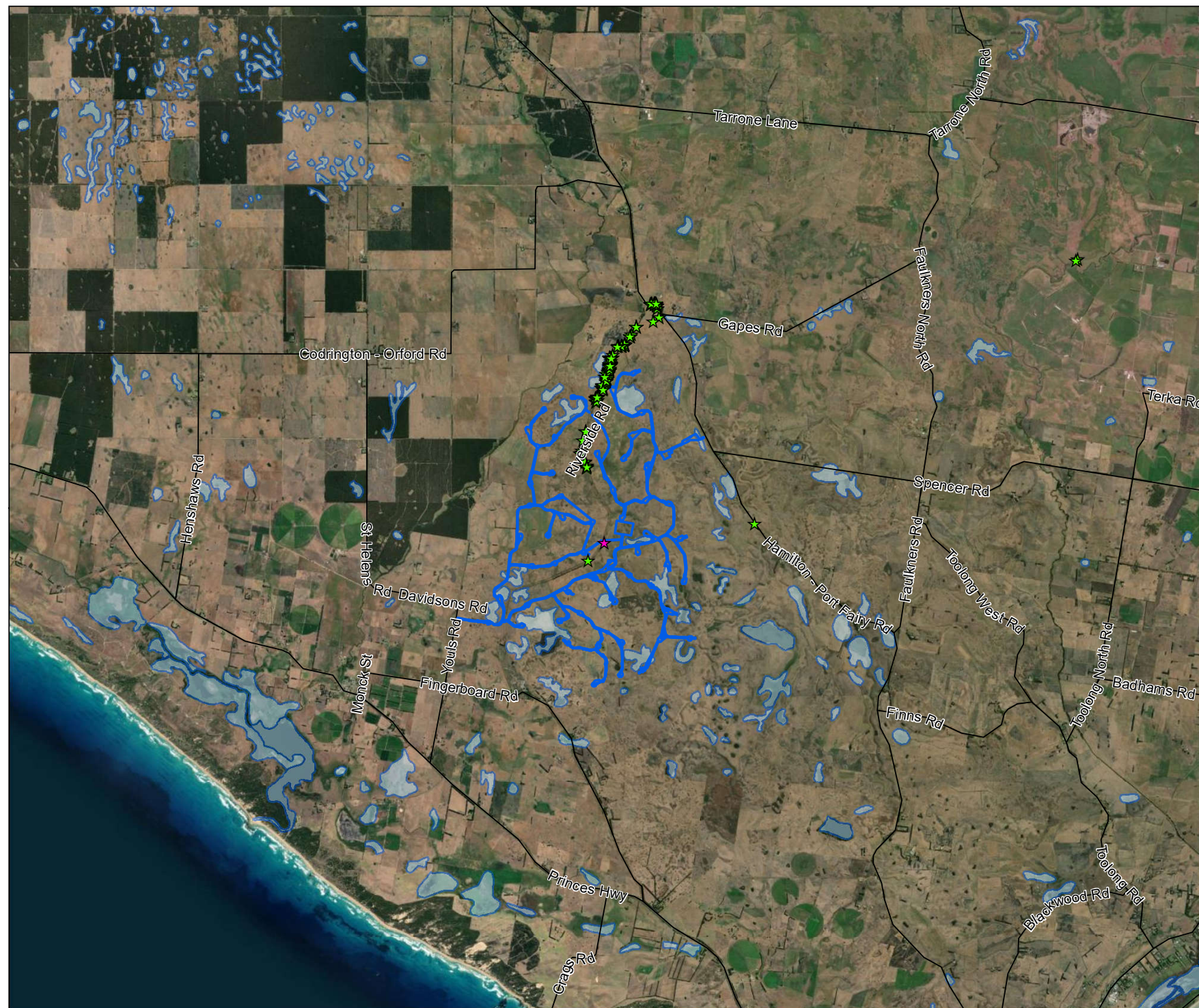
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**Figure 1a: VBA Basalt Leek-orchid records**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 13/04/2022

-  Ryan Corner Wind Farm footprint
-  DELWP wetlands
-  Nature Advisory 2020 Basalt Leek Orchid records
-  Basalt Leek-orchid records (VBA)



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# Figure 2a: Study area and native vegetation to be removed

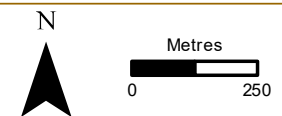
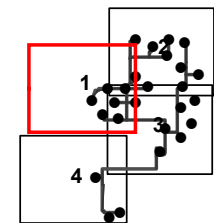
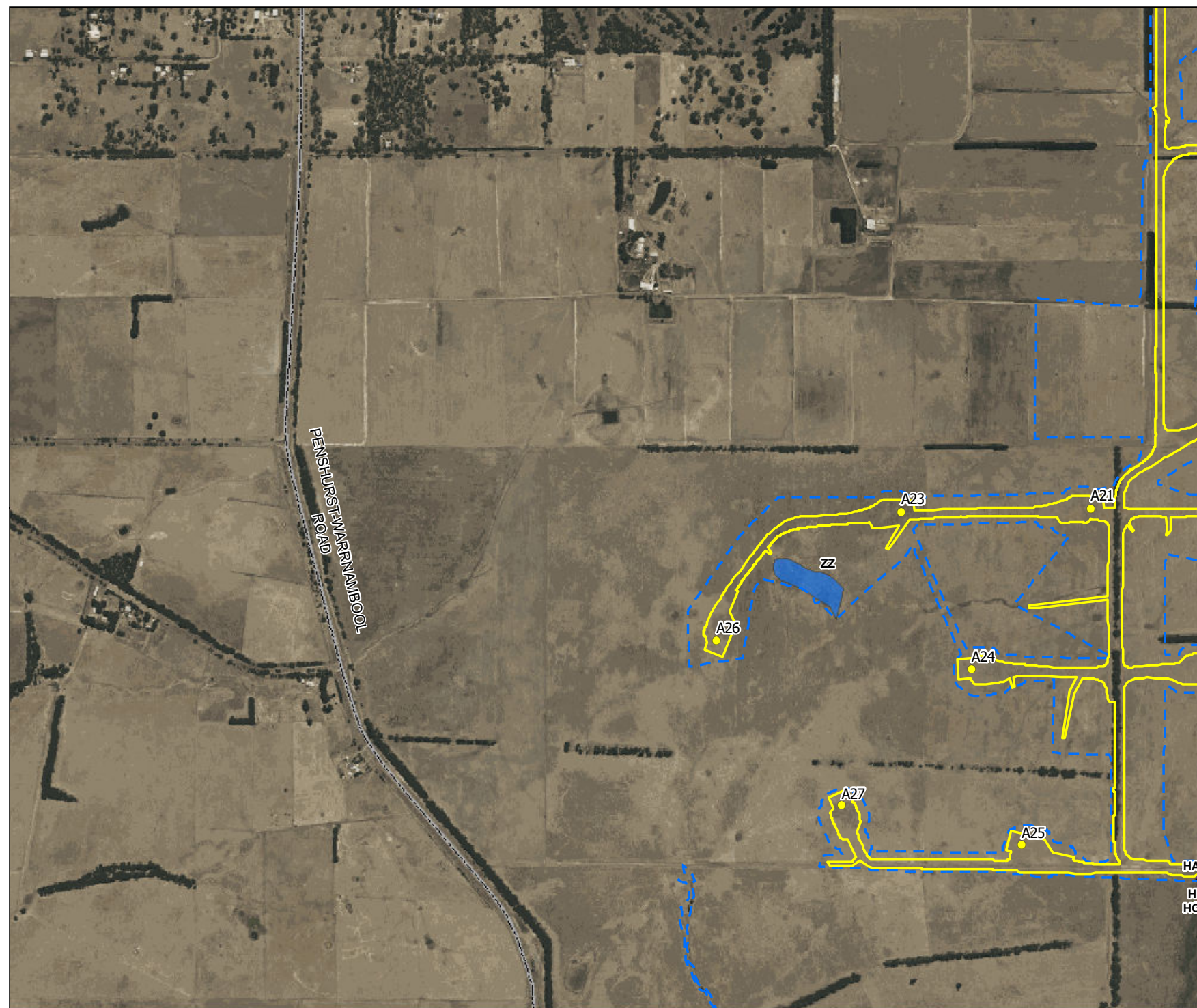
**Project:** Hawkesdale Wind Farm  
**Client:** Hawkesdale Wind Farm Pty Ltd  
**Date:** 24/11/2021

## Legend

- Combined Study Area
- Development footprint
- Proposed turbine locations

## Native vegetation

- Plains Grassy Wetland (EVC 125)
- Swamp Scrub (EVC 53)
- Curly Sedge






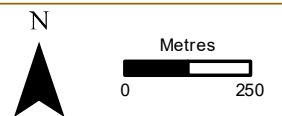
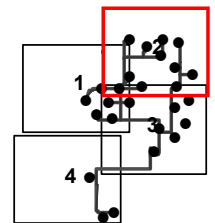
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**Figure 2b: Study area and native vegetation to be removed**

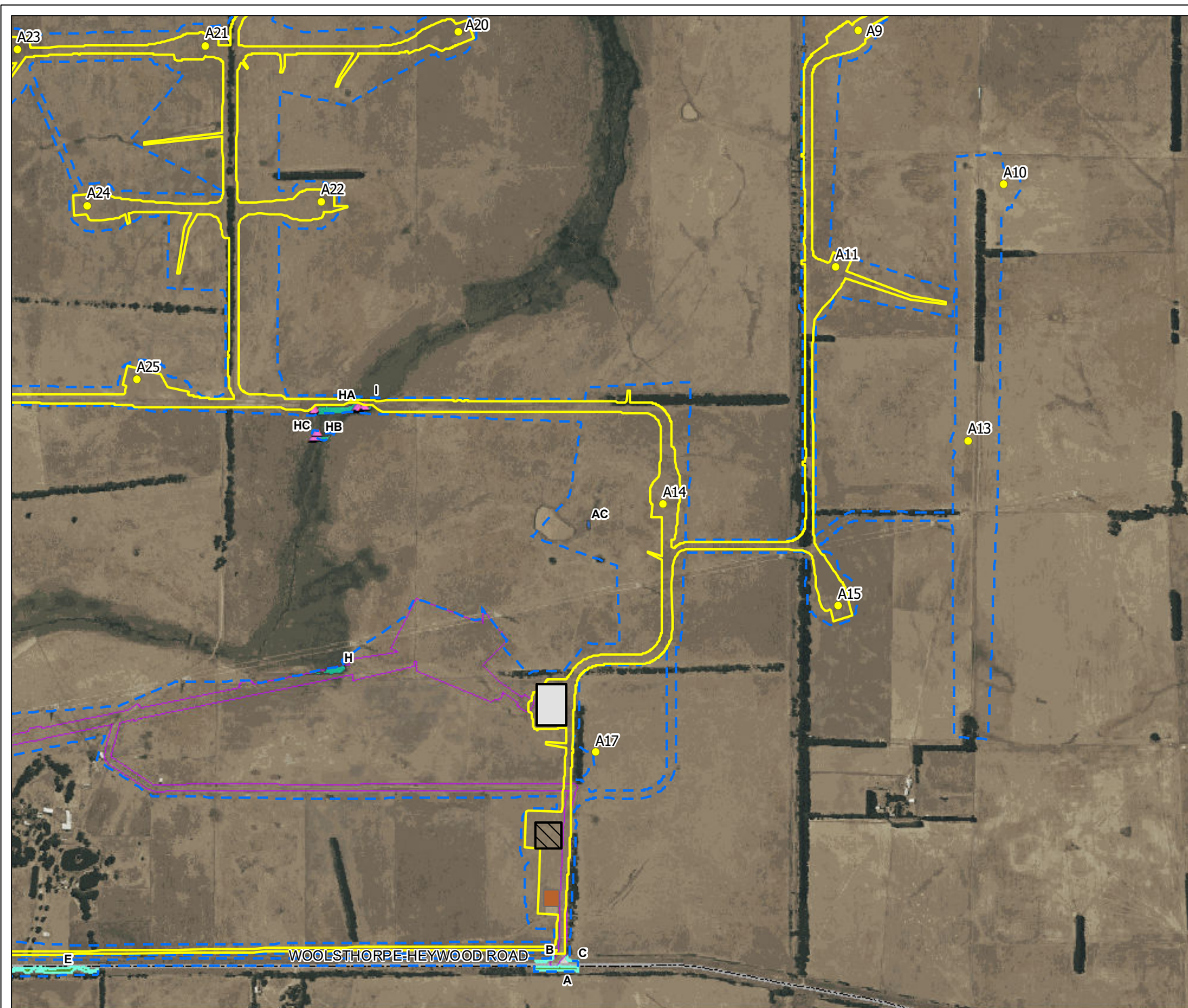
**Project:** Hawkesdale Wind Farm  
**Client:** Hawkesdale Wind Farm Pty Ltd  
**Date:** 24/11/2021

**Legend**

-  Combined Study Area
-  Development footprint
-  Proposed turbine locations

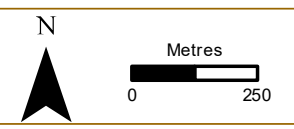
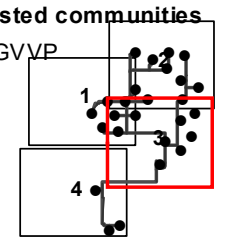


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**Figure 2c: Study area and native vegetation to be removed**  
 Project: Hawkesdale Wind Farm  
 Client: Hawkesdale Wind Farm Pty Ltd  
 Date: 24/11/2021

- Legend**
- Combined Study Area
  - Combined TXL study area
  - Development footprint
  - Proposed turbine locations
- Proposed infrastructure**
- Concrete Batching Plant
  - Site Compound
  - Substation On-Site
- Native vegetation**
- Plains Grassy Wetland (EVC 125)
  - Heavier-soils Plains Grassland (EVC 132\_61)
  - Swamp Scrub (EVC 53)
  - ▲ Curly Sedge
- EPBC listed communities**
- NTGVVP



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# Figure 2d: Study area and native vegetation

**Project:** Hawkesdale Wind Farm  
**Client:** Hawkesdale Wind Farm Pty Ltd  
**Date:** 24/11/2021

### Legend

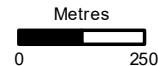
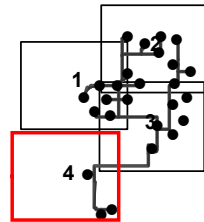
- Combined Study Area
- Combined TXL study area
- Development footprint
- Proposed turbine locations

### Native vegetation

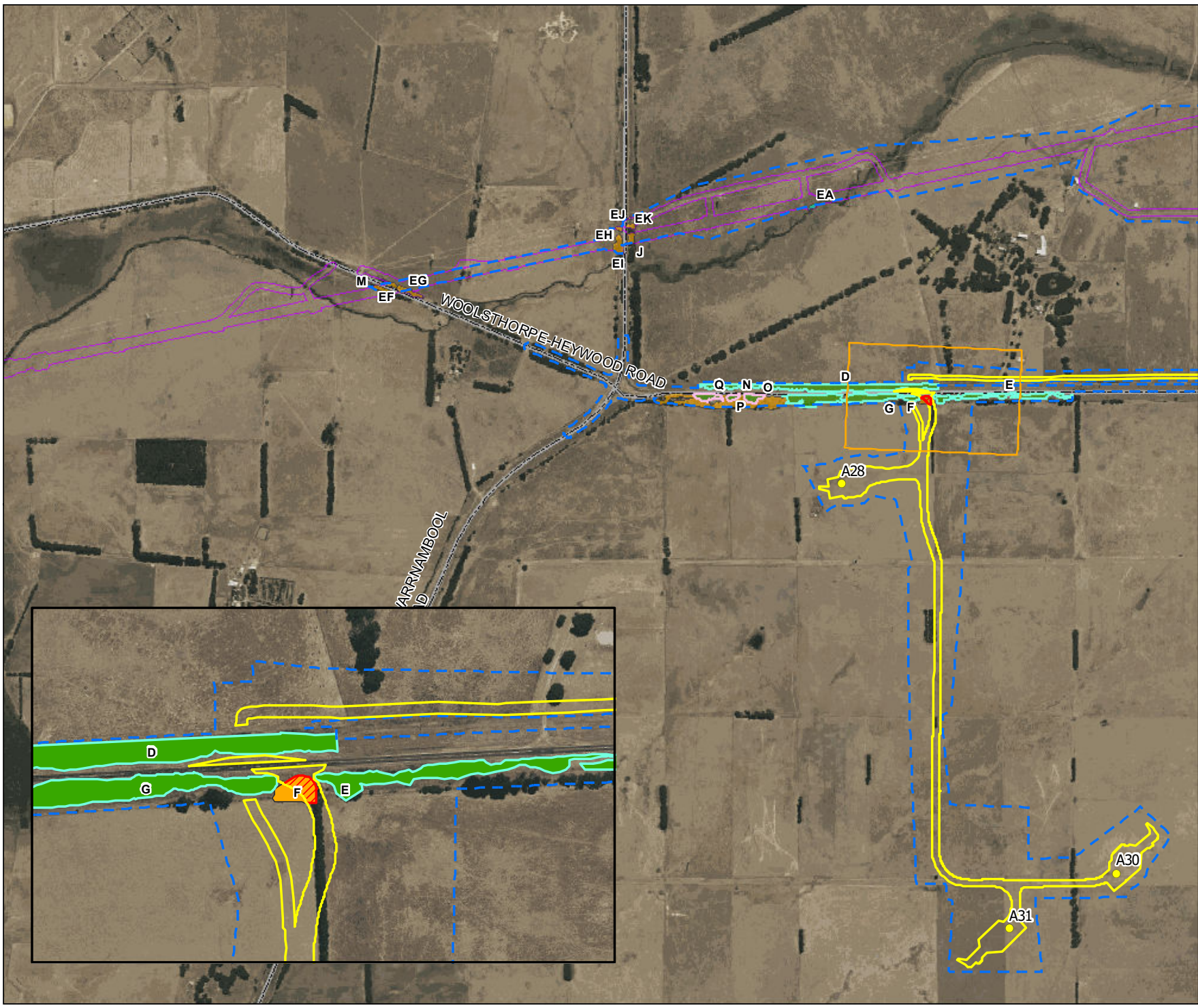
- Heavier-soils Plains Grassland (EVC 132\_61)
- Swamp Scrub (EVC 53)
- Basalt Shrubby Woodland (EVC 642)

### EPBC listed communities

- NTGVVP
- Potential NTGVVP
- Native vegetation to be removed



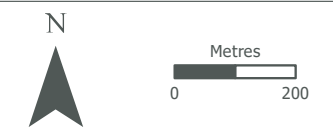
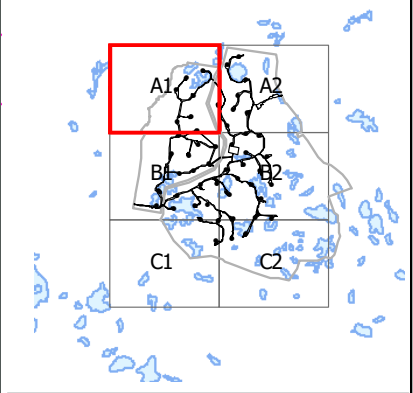
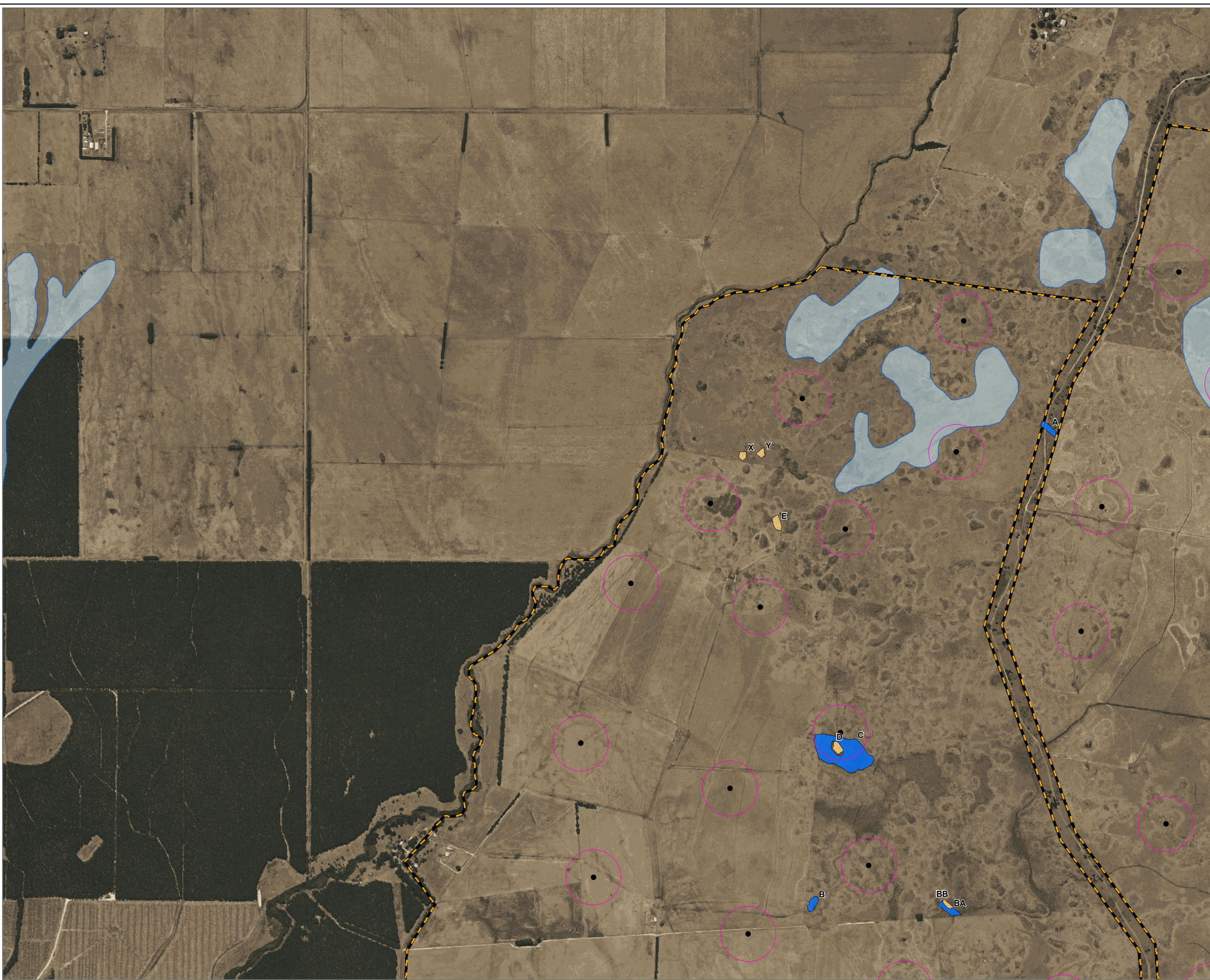
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**Figure 3a: Micro-siting**

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022







- Wind farm boundary
- Turbine (approved 2008)
- Turbine buffer (100m)
- Native vegetation**
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands

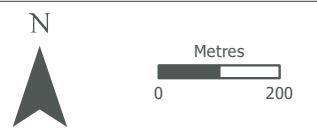
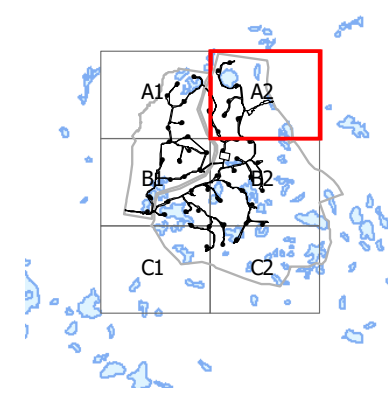


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Figure 3b : Micro-siting

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022

-  Wind farm boundary
-  Turbine (approved 2008)
-  Turbine buffer (100m)
- Native vegetation**
-  Plains Grassy Wetland (EVC 125)
-  Stony Knoll Shrubland (EVC 649)
-  DELWP wetlands

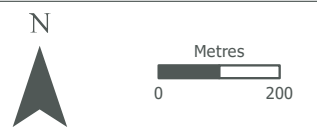
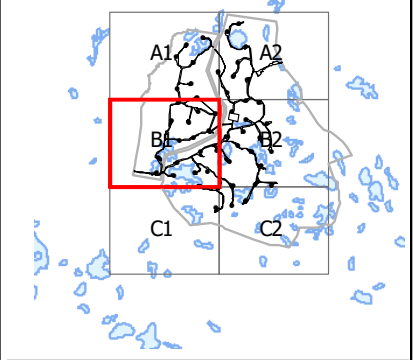
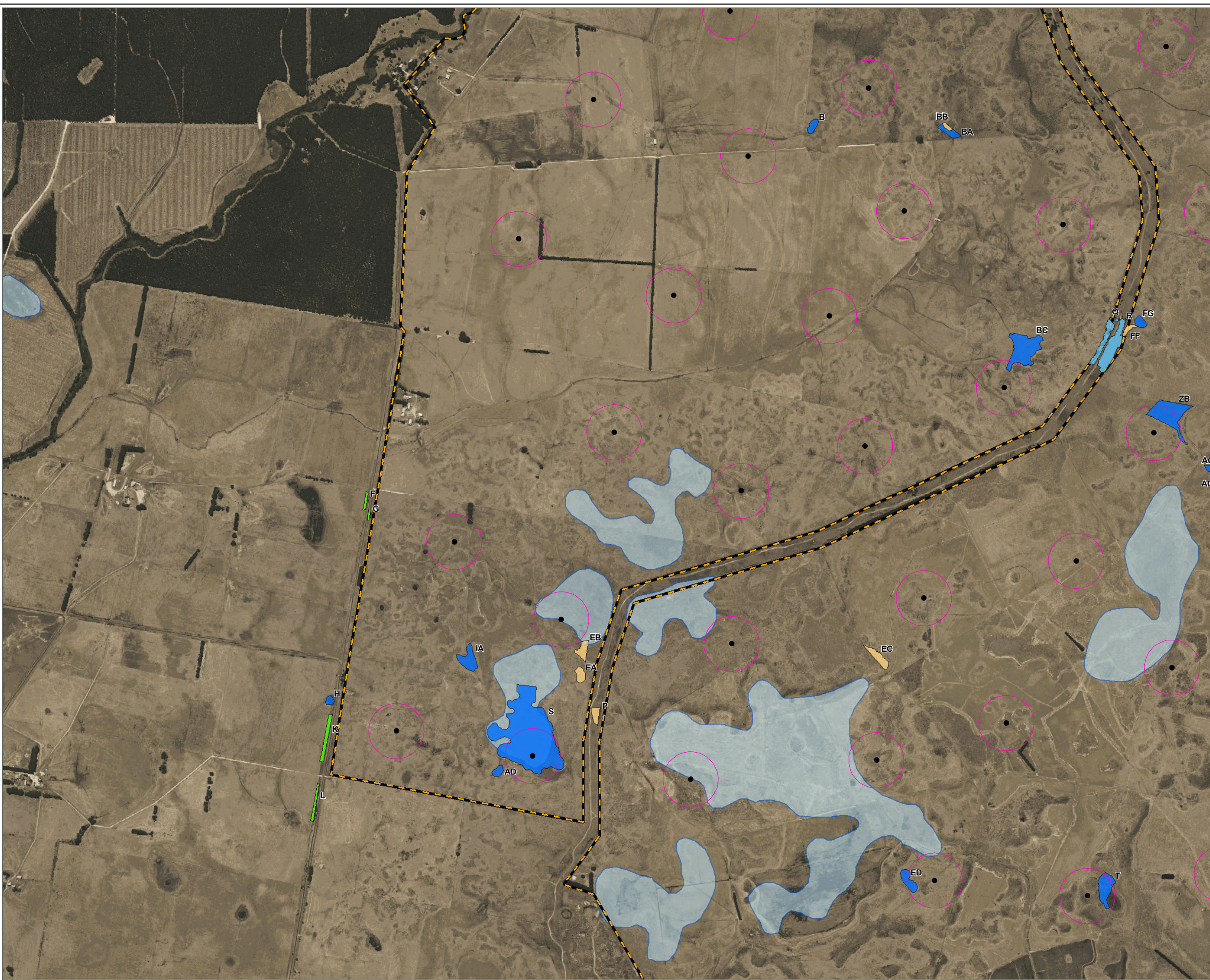


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**Figure 3c: Micro-siting**

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022

- Wind farm boundary
- Turbine (approved 2008)
- Turbine buffer (100m)
- Native vegetation**
  - Damp Sands Herb-rich Woodland (EVC 3)
  - Plains Grassland - Heavier-soils (EVC 132\_61)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands

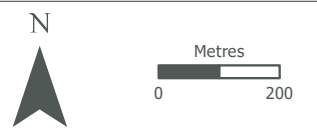
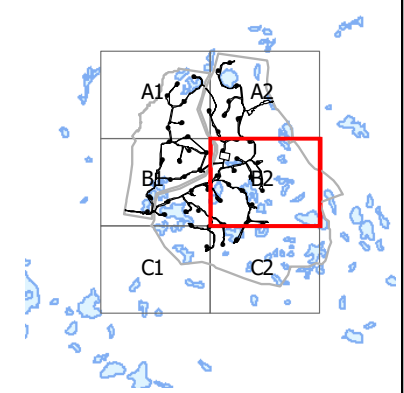


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**Figure 3d: Micro-siting**

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022

- Wind farm boundary
- Turbine (approved 2008)
- Turbine buffer (100m)
- Native vegetation**
  - Aquatic Herbland (EVC 653)
  - Higher Rainfall Plains
  - Grassy Woodland(EVC 55\_63)
  - Plains Grassland - Heavier-soils (EVC 132\_61)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands

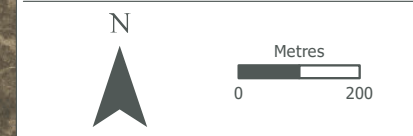
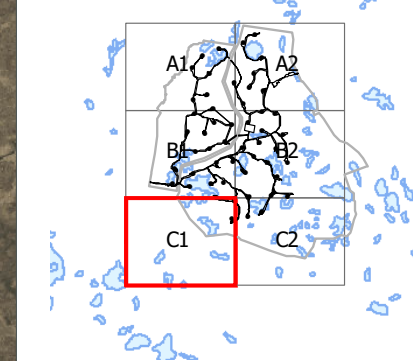


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**Figure 3e: Micro-siting**

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022

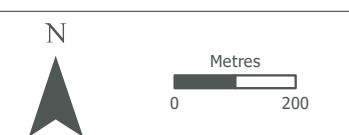
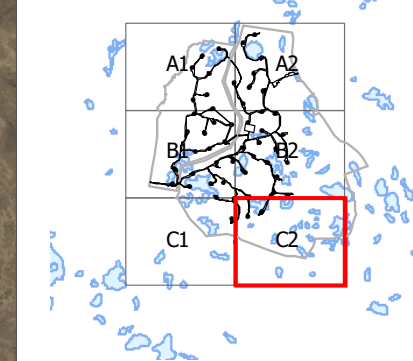
- Wind farm boundary
- Turbine (approved 2008)
- Turbine buffer (100m)
- Native vegetation**
  - Aquatic Herbland (EVC 653)
  - Damp Sands Herb-rich Woodland (EVC 3)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands



**Figure 3f: Micro-siting**

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 10/03/2022

- Wind farm boundary
- Turbine (approved 2008)
- Turbine buffer (100m)
- Native vegetation**
  - Aquatic Herbland (EVC 653)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands



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### 4.3. Requirement 23C - Measures to be used during construction to protect native vegetation to be retained.

#### 4.3.1. Native vegetation to be retained and protection measures

Native vegetation to be retained at RCWF is included in Figure 2 A1 – C2 of the attached Native Vegetation Report (Attachment 1). Native vegetation to be retained at RCWF occurs on private land and public roadside. No scattered trees have been recorded at the wind farm site.

#### 4.3.2. Protection of native vegetation to be retained

The management actions required for the protection of native vegetation to be retained are as follows:

- All vehicles are to remain within the defined ‘impact areas’ where native vegetation is present. In particular, trucks and heavy vehicles are strictly prohibited from using the section of Riverside Road north of the already constructed access tracks, while other vehicles must avoid the vegetated areas of this road by using the formal road surface and designated turning sites. This protocol would also satisfy Condition 11M of the permit (No. 20060222-A and its amendment).
- Prior to construction, temporary fencing will be erected along the edge of the defined ‘impact area’ where patches of native vegetation occur within 30m of the footprint.
- Prior to construction, temporary flagging will be erected along the edge of the defined ‘impact area’ where there are patches of Native Vegetation that occur beyond 30m but within 50m (approx.) of the footprint and.
- Flagged and fenced areas must be appropriately signed for protection - “Significant Vegetation – No Go Zone”.
- No turning points are to be created in the “No Go Zones”. Turning points will take advantage of existing paddock access points, driveways or roads.
- No parking areas are to be created in the “No Go Zones”. Parking areas will be established on adjacent private land or side roads.
- Regular monitoring of rubbish/construction waste adjacent to construction works areas must be carried out and any rubbish/construction waste found occurring within or adjacent to areas of native vegetation must be removed immediately.
- All contractors to be trained in issues relating to protection of native vegetation and weed hygiene at a compulsory induction prior to commencing works.
- Ensure all earth moving equipment that is delivered to site is clean.
- Wheel washing facilities will be provided at the site compound at the entrance to the wind farm. Any vehicles not meeting the required standards of hygiene and cleanliness shall be sent to this location for cleaning before given access to site.
- Any materials required for construction (eg. road making materials) must be free of weeds and weed seeds.
- A program of spot spraying of any noxious weeds will be implemented throughout construction and operational phases as per the pest management plan prepared for this project and forming part of the Environmental Management Plan and the planning permit.
- To prevent the spread of weeds and pathogens, all vehicles and machinery must be made free of soil, seed and plant material before being taken to the works site and again before being taken from the works site, during and on completion of the project as required by Condition 29 of the



planning permit. Additional weed hygiene procedures and associated roles and responsibilities are stipulated in the project's pest plan management plan forming part of the planning permit and must be adhered to.

- Any opportunities to avoid or minimize native vegetation approved for clearing during operations will identified an implemented if possible.

#### 4.3.3. Wetlands

A hydrological assessment was prepared to support the Native Vegetation Report in considering impacts of the wind farm to wetlands existing on site. A hydrological and flood risk analysis was completed to inform the hydrological assessment and form the basis for developing a wind farm design which respects the current hydrology of the site. The design aims to preserve the drainage elements that already exist and identify additional drainage elements necessary to achieve continuity of the natural runoff, both to preserve the flow feeding of the existing wetlands and to respect the natural drainage of the project zone. Refer to Appendix 8 of the Native Vegetation Report for the hydrological assessment.

- Design and drainage measures implemented to protect or minimise impacts to wetlands are as follows:
  - Where an access track or crane platform partially intercepted a wetland, earthworks were designed to allow runoff to continue to flow towards the main core of the wetland, leaving the existing runoff to the wetland unchanged.
  - On the other hand, in the specific cases where a wetland is intercepted by a road, drainage structures have been designed to preserve the natural runoff and hydraulic continuity of water accumulation areas.
  - Roads and crane hardstands areas have been designed so that they are not submerged by predicted flood levels. Roads and crane hardstands have been aligned so that they are not located wetland areas wherever possible.
  - Drainage has been designed to maintain the existing water flow of creeks, rural drainage channels and wetlands. Across the site, 22 floodways and 69 culvert crossings have been specified in the design. Each floodway and culvert have been designed for the specific conditions at each location.
  - To protect the access track and hardstand infrastructure, table drains will be installed on the side of the access tracks. Table drains have been designed as V drains with rock checks that will be reseeded and revegetated.
  - Provide suitable drainage elements in the road section that intercepts the wetland in order to preserve hydraulic connectivity between the two areas of the intercepted wetland thus keeping his natural levels and hydrodynamics. The typology of these drainage elements will be based on either floodways or culverts depending on the morphology of the terrain of the area and the maximum water levels reached in the wetland after the occurrence of storms with a return period of up to 10 years.
  - The drainage design philosophy is not to drain the site to prevent flooding. To retain the area's current hydrology, a deliberate decision has been made to not artificially drain any areas of the wind farm to protect wind farm infrastructure. Deliberately draining any areas or the wind farm would change the site's existing hydrology which may impact wetlands and flood plain areas.

#### 4.4. Requirement 23D – Training Requirements

All personnel, including RCWF employees, contractors and sub-contractors, will be required to attend a compulsory project induction before commencing any work on the Project as required by the project's Environmental Management Plan.

The environmental component of the induction will be delivered by RCWF or the contractor's Site Safety and Environment Officer (or delegate) and include:

- The NVP overview;
- The requirements of the planning permit as they relate to native vegetation removal and protection
- Responsibilities under the NVP in relation to implementing mitigation measures, monitoring, and reporting.
- Key management and protection controls
- Consequences of departure from specified procedures or other controls

"Toolbox" training will also be undertaken to ensure that the workforce is regularly updated on relevant information, issues of interest or concern, and regularly reminded of their duties to protect and minimise impacts to native vegetation.

Figures showing the areas of native vegetation to be impacted and those to be retained will be displayed in the site offices to talk to during induction sessions and toolbox training.

##### 4.4.1. Avoidance of roadside vegetation

The protocol for identification of any areas of indigenous roadside vegetation that may require removal or pruning includes completion of a pre-transport route assessment to identify removal, destruction or lopping of any native vegetation that may cause an obstruction and is not able to be avoided.

Areas along the route that are identified to potentially require the removal or pruning of vegetation will be surveyed by a suitably qualified ecologist to determine if the vegetation is native (as defined in the Victoria Planning Provisions and Guidelines for the removal, destruction or lopping of native vegetation - DELWP, 2017). GPGA will liaise with the relevant Responsible Planning Authority regarding any removal of native vegetation and, if required, approvals will be obtained having regard to the provisions of the relevant Planning Scheme prior to vegetation being removed.

## 5. Monitor and Review

If changes to the wind farm layout are to be sought, native vegetation impact assessments must be undertaken to investigate whether there will be additional impact on native vegetation. The assessments must include additional native vegetation surveys if the proposed changes to the layout are to occur in areas that have not been previously investigated. If impacts are concluded to increase as an outcome of the layout changes, an amendment to the planning permit and native vegetation plan must be sought and the new impacts must not occur until approval is achieved. If the assessment concludes that there are no additional impacts to native vegetation, the outcome of the investigations must be saved on record to provide to relevant authorities upon request.

Additional approvals may also be required depending on the native vegetation being impacted and its location. As such, a review of the additional impacts against the FFG Act and the EPBC Act would also be required. This should be undertaken by a qualified ecologist and any necessary changes to this vegetation management plan and other documentation made accordingly.

Monitoring and review of this NVP should be regularly undertaken by the site environment officer during construction and operation. Should the requirements of this Plan be found to not be met, work is to stop until this Plan can be complied with.

**Table 2 Monitoring and auditing**

Timeframe	Action	Responsibility	Monitoring/auditing
All times	All vehicles are to remain within the defined 'impact areas' in or near areas of native vegetation.	RCWF, Construction contractors and sub-contractors.	RCWF to inspect vehicle tracks monthly and photograph and report any impacts outside approved areas. Independent auditor to check six monthly during construction.
All times	All contractors to be trained in issues relating to protection of native vegetation and weed hygiene at a compulsory induction prior to commencing works.	RCWF, except where RCWF specifically delegate responsibilities in writing.	Audit six monthly on site during construction to check training and induction records. Independent auditor
Pre-construction	All native vegetation to be removed and native vegetation to be retained is to be shown on construction drawings.	RCWF, except where RCWF specifically delegate responsibilities in writing.	Moyne Shire Council inspectors
Pre-construction	<p>"No Go Zones" are to be delineated as follows:</p> <ul style="list-style-type: none"> <li>▪ Temporary fencing will be erected along the edge of the defined 'impact area' where patches of native vegetation occur within 30m of the footprint.</li> <li>▪ Where there are patches of Native Vegetation that occur beyond 30m but within 50m (approx.) of the</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.	Moyne Shire Council inspectors

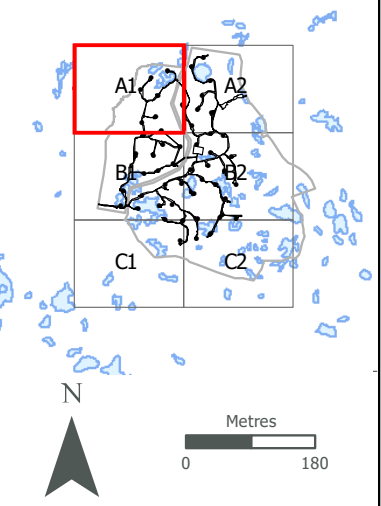
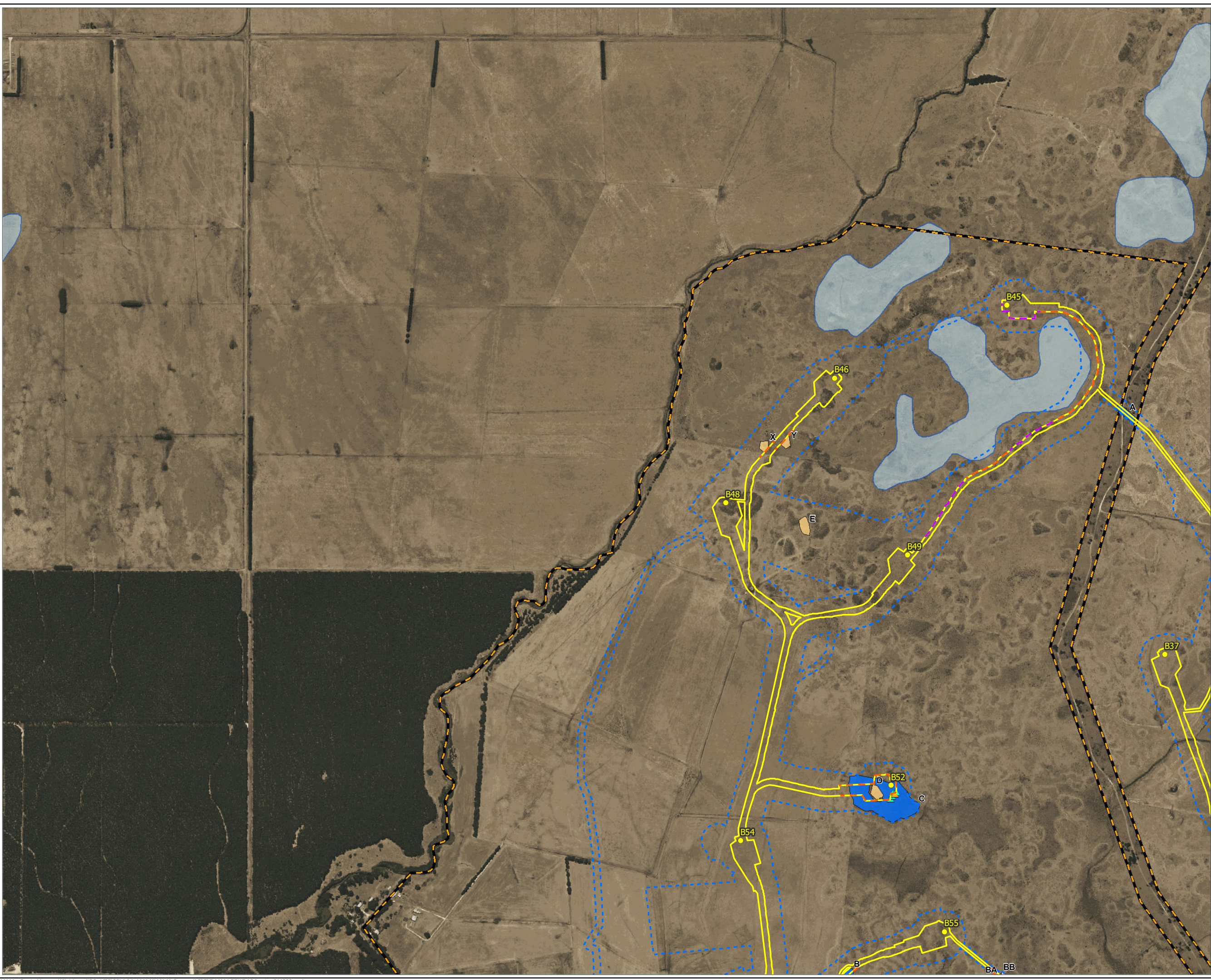
Timeframe	Action	Responsibility	Monitoring/auditing
	<p>defined 'impact area', temporary flagging will be erected along the edge of the defined 'impact area'.</p> <ul style="list-style-type: none"> <li>▪ Flagged and fenced areas will be appropriately signed "Significant Vegetation – No Go Zone".</li> </ul>		
Pre-construction	Offsets must be obtained prior to removal of any native vegetation	RCWF	Moyne Shire
During construction	<p>The following activities are not to be undertaken within "No Go Zones":</p> <ul style="list-style-type: none"> <li>▪ Vehicular or pedestrian access</li> <li>▪ Parking areas</li> <li>▪ Turning points</li> <li>▪ Trenching or soil excavation</li> <li>▪ Storage or dumping of any soils, materials, equipment, vehicles, machinery or waste products</li> <li>▪ Entry and exit pits for underground services</li> <li>▪ Any other actions or activities that may result in adverse impacts to retained native vegetation</li> </ul> <p>All stock piles must be located in areas within the surveyed and assessed development footprint where there is no identified native vegetation.</p>	RCWF, except where RCWF specifically delegate responsibilities in writing.	RCWF to inspect vehicle tracks monthly and photograph and report any impacts outside approved areas. Independent auditor to check six monthly during construction.
During construction	<p>The following 'clearing protocol' will be followed:</p> <ul style="list-style-type: none"> <li>▪ The day before any clearing of native vegetation approved to be removed is to be cleared, the site environment officer is to clearly delineate native vegetation that may be removed, and ensure "No Go Zones" are in place.</li> <li>▪ Personnel undertaking clearing of native vegetation approved to be removed are to be briefed prior to work on the exact extent of what may be impacted.</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.	Independent oversight required by consultant
During construction	<p>The following hygiene protocols will be implemented:</p> <ul style="list-style-type: none"> <li>▪ Any earth moving equipment that is delivered to site is to be clean.</li> <li>▪ Wheel washing facilities will be provided at the site compound at the entrance to the wind farm. Any vehicles not meeting the required standards of hygiene and cleanliness shall be sent to this location for cleaning before given access to site.</li> <li>▪ Any materials required for construction (eg. road making materials) must be free of weeds and weed seeds.</li> </ul>	RCWF, except where RCWF specifically delegate responsibilities in writing.	RCWF to inspect vehicle tracks monthly and photograph and report any impacts outside approved areas. Independent auditor to check six monthly during construction.
During construction	Regular monitoring of rubbish/construction waste adjacent to construction works areas must be carried out and any rubbish/construction waste found occurring within or adjacent to areas of native vegetation must be removed immediately.	RCWF, except where RCWF specifically delegate	RCWF to inspect vehicle tracks monthly and photograph and report any impacts

Timeframe	Action	Responsibility	Monitoring/auditing
		responsibilities in writing.	outside approved areas. Independent auditor to check six monthly during construction.
During construction and operation	A program of spot spraying of any noxious weeds will be implemented throughout construction and operational phases. Details of this are included in the Pest Plant Management Plan for Ryan Corner Wind Farm December 2020.	RCWF, except where RCWF specifically delegate responsibilities in writing.	RCWF to inspect vehicle tracks monthly and photograph and report any impacts outside approved areas. Independent auditor to check six monthly during construction.
During construction and operation	Monitoring and review of this NVP will be regularly undertaken by the site environment officer. Should the requirements of this Plan be found to not be met, work is to stop until this Plan can be complied with.	RCWF, except where RCWF specifically delegate responsibilities in writing.	Site Environment officer. Independent auditor to check six monthly during construction.
Post-construction	Any areas of native vegetation temporarily disturbed during construction that can be rehabilitated will be so in consultation with the respective landowner.	RCWF, except where RCWF specifically delegate responsibilities in writing.	Site Environment officer. Independent auditor to check six monthly during construction.
During construction and operation	Indirect impacts on wetlands. Drainage patterns are maintained using the hydrology report to inform audits.	RCWF, except where RCWF specifically delegate responsibilities in writing.	Site Environment officer. Independent auditor to check six monthly during construction.

Figure 4a: RCWF native vegetation and fencing plan

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 18/03/2022










- Wind farm boundary
  - - - Combined study area
  - Development footprint (2021)
  - Proposed turbine locations
  - - - Temporary fencing
  - - - Temporary perimeter flagging
- Native vegetation**
- Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - ▲ Pale Swamp-everlasting
  - ▲ Swamp Fireweed
  - DELWP wetlands

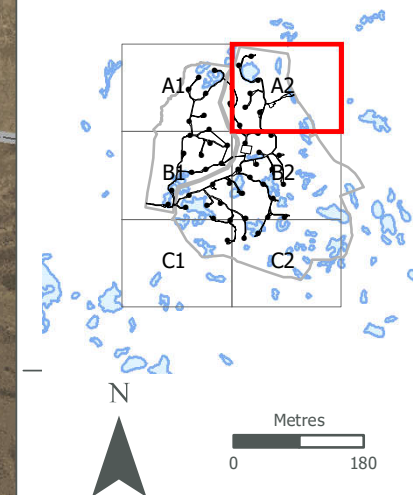


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**Figure 4b:** RCWF native vegetation and fencing plan

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 30/03/2022













-  Wind farm boundary
-  Combined study area
-  Combined TXL study area
-  Development footprint (2021)
-  Proposed turbine locations
-  Wheel washing facility
-  Temporary fencing
-  Temporary perimeter flagging
-  DELWP wetlands

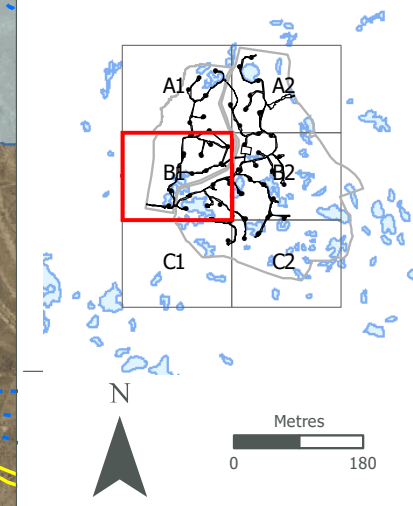


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Figure 4c: RCWF native vegetation and fencing plan

**Project:** Ryan Comer Wind Farm  
**Client:** Ryan Comer Development Pty Ltd  
**Date:** 18/03/2022

-  Wind farm boundary
  -  Combined study area
  -  Development footprint (2021)
  -  Proposed turbine locations
  -  Temporary fencing
  -  Temporary perimeter flagging
- Native vegetation**
-  Damp Sands Herb-rich Woodland (EVC 3)
  -  Plains Grassland - Heavier-soils (EVC 132\_61)
  -  Plains Grassy Wetland (EVC 125)
  -  Stony Knoll Shrubland (EVC 649)
  -  Basalt Leek Orchid
  -  DELWP wetlands

















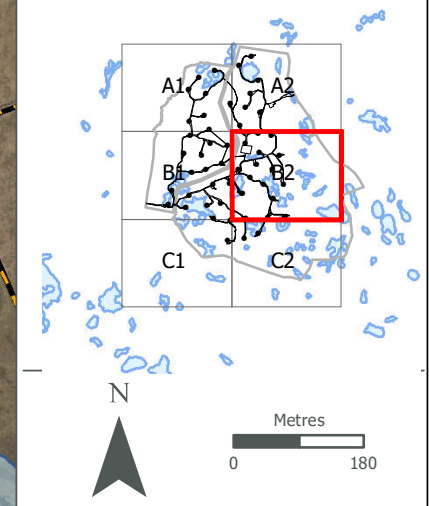

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**Figure 4d: RCWF native vegetation and fencing plan**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 30/03/2022

-  Wind farm boundary
  -  Combined study area
  -  Combined TXL study area
  -  Development footprint (2021)
  -  Proposed turbine locations
  -  Temporary fencing
  -  Temporary perimeter flagging
- Native vegetation**
-  Aquatic Herbland (EVC 653)
  -  Higher Rainfall Plains Grassy Woodland (EVC 55\_63)
  -  Plains Grassland - Heavier-soils (EVC 132\_61)
  -  Plains Grassy Wetland (EVC 125)
  -  Stony Knoll Shrubland (EVC 649)
  -  Basalt Leek Orchid
  -  DELWP wetlands



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Figure 4 e: RCWF  
Native vegetation and  
fencing plan

**Project:** Ryan Comer Wind  
Farm

**Client:** Ryan Comer  
Development Pty Ltd

**Date:** 18/03/2022

- Wind farm boundary
- Combined study area
- Development footprint (2021)
- Proposed turbine locations
- Temporary fencing

**Native vegetation**

- Damp Sands Herb-rich Woodland (EVC 3)
- Plains Grassy Wetland (EVC 125)
- DELWP wetlands

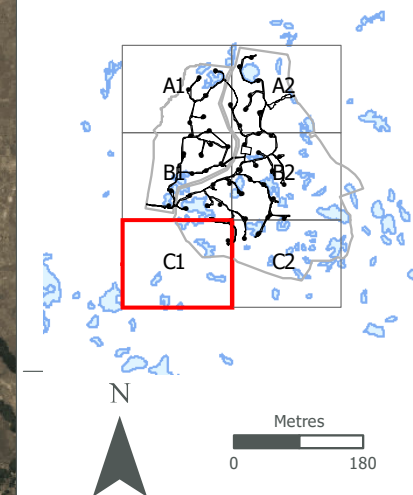


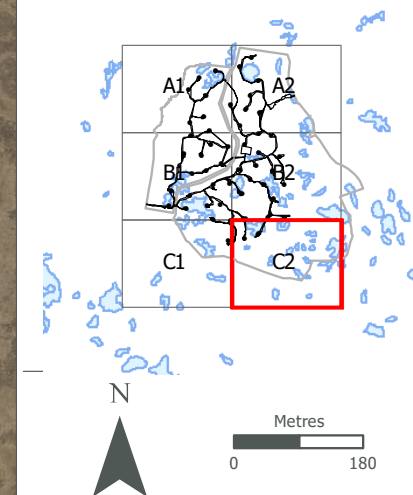
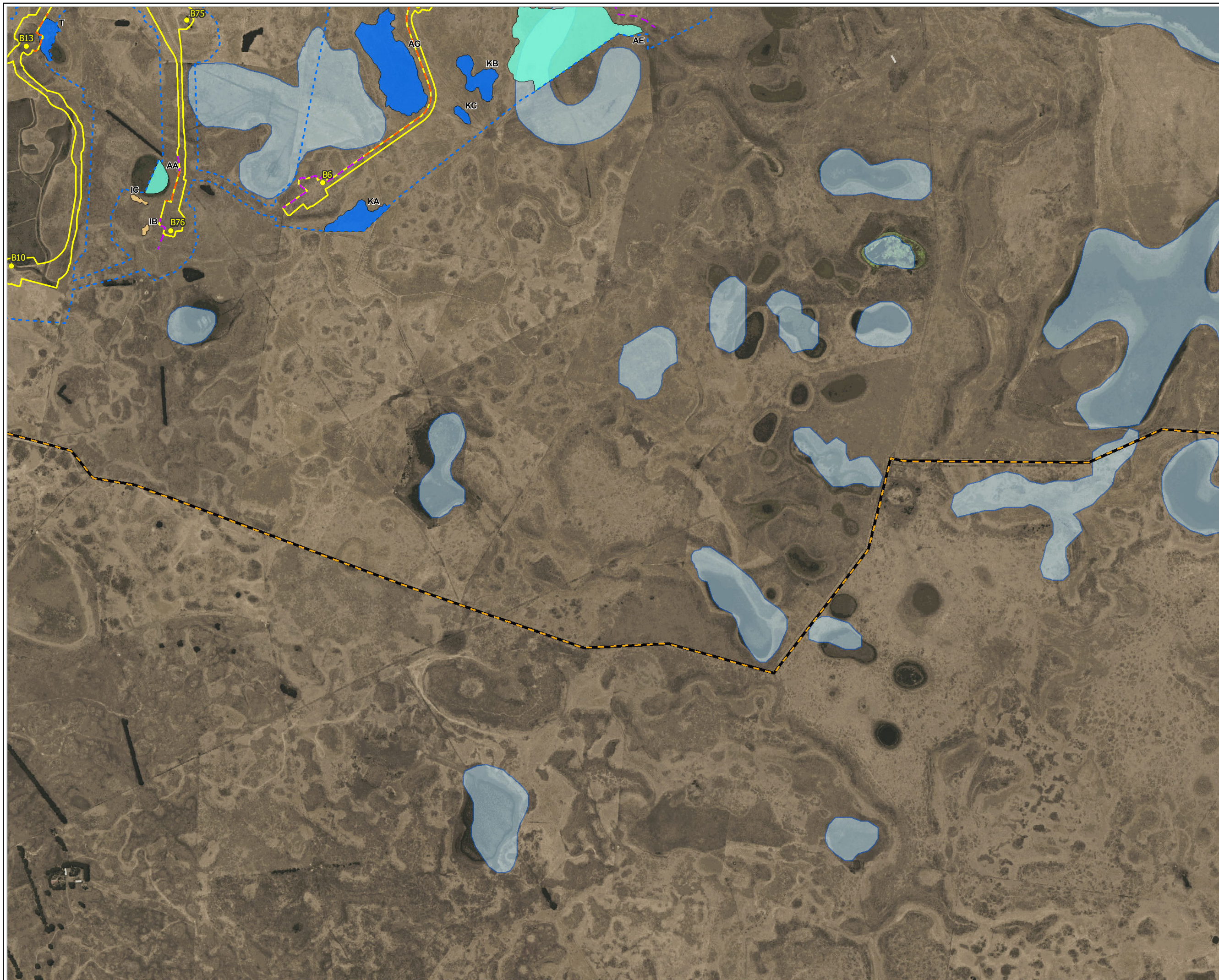
Figure 4f: RCWF native vegetation and fencing plan

**Project:** Ryan Comer Wind Farm

**Client:** Ryan Comer Development Pty Ltd

**Date:** 18/03/2022

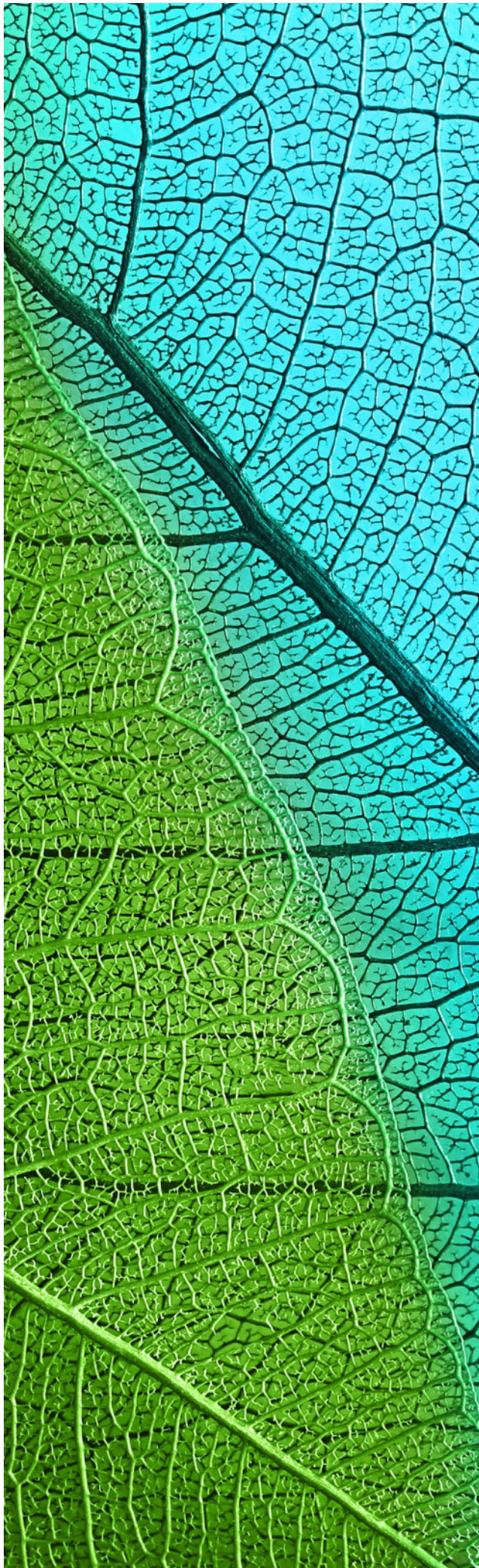
- Wind farm boundary
  - - - Combined study area
  - Development footprint (2021)
  - Proposed turbine locations
  - - - Temporary fencing
  - - - Temporary perimeter flagging
- Native vegetation**
- Aquatic Herbland (EVC 653)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands



## 6. References

- Brett Lane and Associates Pty Ltd (BL&A) 2007, *Ryan Corner Wind Farm: Bird Utilisation and Brolga Breeding Season Surveys*, Report No. 6114 (2.2), Report prepared for Gamesa Energy Australia Pty Ltd and Union Fenosa Wind Australia Pty Ltd by Brett Lane and Associates Pty Ltd (now Nature Advisory Pty Ltd), Hawthorn East, Victoria.
- Environmental Resources Management Australia (ERM) 2006, *Ryan Corner Wind Farm Ecological Assessment*, 3<sup>rd</sup> Draft Report, Report prepared for Ryan Corner Wind Farm Pty Ltd by Environmental Resources Management Australia Pty Ltd, Melbourne, Victoria.
- Nature Advisory Pty Ltd 2021, *Ryan Corner Wind Farm: Native Vegetation Assessment*, Report No. 14144 (10.5), Report prepared for Ryan Corner Development Australia Pty Ltd by Nature Advisory Pty Ltd, Hawthorn East, Victoria.

**Attachment 1: Ryan Corner Wind Farm: Native Vegetation Assessment, Report No. 14144 (10.5) prepared by Nature Advisory Pty Ltd (2021).**



# Ryan Corner Wind Farm

## Flora and Native Vegetation Assessment

**Prepared for Ryan Corner Development Pty Ltd**

November 2021  
Report No. 14144B (10.5)



**Nature  
Advisory**

(Formerly Brett Lane & Associates Pty Ltd)

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# 1. Executive summary

Nature Advisory Pty Ltd undertook a flora and native vegetation assessment of the area proposed to be developed for the approved Ryan Corner Wind Farm (Moynes Permit 200600222-A).

This report presents the information relevant to native vegetation in accordance with Moynes planning permit 200600222-A under Clause 52.17 of the Moynes Planning Scheme, as defined in the *Biodiversity Assessment Guidelines* (DEPI 2013).

Moynes Planning Permit 200600222-A allows for construction and operation of the Ryan Corner Wind Farm. Condition 22 of the planning permit allows for:

- The removal of no more than 3.637 hectares of native vegetation.

The following native vegetation was recorded in the study area:

- 69 patches of native vegetation, totalling 38.088 hectares (including no large trees in patches);
- No scattered trees; and
- 45.439 hectares of DELWP mapped wetlands.

A revised wind farm layout, project footprint and associated civil works will require the removal of 3.836 hectares of native vegetation, comprising:

- The loss of 1.915 hectares of native vegetation from remnant patches;
- The loss of 1.921 hectares of native vegetation from DELWP mapped wetlands; and
- No scattered trees.

As the quantum of native vegetation removal is greater than that allowed for in Moynes Planning Permit 200600222-A, it is anticipated that a permit amendment will be required. This report contains the necessary information to support an application for such a permit amendment.

The following EPBC and/or FFG Act listed flora species and communities have been recorded within the study area:

- Swamp Fireweed (EPBC Act: Vulnerable);
- Basalt Leek Orchid (FFG Act: critically endangered);
- Pale Swamp-everlasting (FFG Act: critically endangered);
- *Seasonal Herbaceous Wetlands of the Temperate Lowland Plains* (SHWTLP) (EPBC Act: Critically Endangered); and
- *Natural Temperate Grasslands of the Victorian Volcanic Plains* (NTGVVP) (EPBC Act: Critically Endangered), which also qualifies as the FFG Act listed community *Western (Basalt) Plains Grassland Community* (W(B)PGC).

All areas of EPBC listed communities and species have been avoided. There are therefore no implications under the EPBC or FFG Acts.

The table below summarises the compliance of the information in this report with the application requirements of the *Biodiversity Assessment Guidelines* (DEPI 2013).

Application requirement		Response
<b>Applications requirements for all risk pathway applications</b>		
1.	The location of the site native vegetation is to be removed. This includes the address of the property.	A description of the location of the RCWF site is provided in Section 4.1. Areas of native vegetation to be removed are shown in Figure 2.
2.	A description of the native vegetation to be removed including: whether the native vegetation is a remnant patch, or scattered trees, in accordance with the definitions in section 2.2 of the <i>Biodiversity assessment guidelines</i> ; the area of any remnant patches of native vegetation; and the number of any scattered trees.	Description of the native vegetation to be removed is provided in Sections 4.2 and 5.2.1.  The project will result in the 'extent loss' of 3.836 hectares of native vegetation including:  <ul style="list-style-type: none"> <li>▪ The loss of 3.836 hectares of native vegetation from remnant patches, 1.921 hectares of which is DELWP mapped wetlands; and</li> <li>▪ The loss of no scattered trees.</li> </ul>
3.	Maps or plans containing the following information:  north point and property boundaries;  all areas of native vegetation, clearly showing the native vegetation to be removed (including any area that the Country Fire Authority has recommended for removal or management for fire protection purposes); and  all scattered trees to be removed.	Maps of the site – See Figure 1: A1-C2  Maps of the native vegetation to be removed – See Figure 2.
4.	Recent dated photograph of native vegetation to be removed.	Representative photos of the native vegetation to be removed in the study area are provided in Appendix 4.
5.	The risk-based pathway of the application to remove native vegetation	The project will be assessed under the Moderate risk pathway. Further details are provided in Section 6.1.2.
6.	Where the purpose of removal, destruction or lopping of native vegetation is to create defensible space, a statement is required that explains why removal, destruction or lopping of native vegetation is necessary. The statement must have regard to other available bushfire risk mitigation measures. This requirement does not apply to the creation of defensible space in conjunction with an application under the Bushfire Management Overlay.	N/A
7.	A copy of any property vegetation plan that applies to the site.	N/A

8.	Details of any other native vegetation that was permitted to be removed on the same property with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before the application to remove native vegetation is lodged.	It is understood that no native vegetation has been approved for removal associated with the project within the last five years other than the existing permit.
9.	The strategic biodiversity score of the native vegetation to be removed.	The SBS of all native vegetation to be removed is 0.435. See Appendix 6 for more details.
10.	The offset requirements should a permit be granted to remove native vegetation.	The offset requirements are detailed in Section 6.1.3. In summary, this comprises:  0.953 <i>general</i> biodiversity equivalence units with a minimum strategic biodiversity score of 0.348 within the Glenelg Hopkins CMA area or the Moyne Shire Council.
<b>Additional requirements for <i>moderate</i> and <i>high</i> risk pathway applications</b>		
11.	A habitat hectare assessment report of the native vegetation that is to be removed.	Provided in Section 4.2.1 with detailed habitat hectare assessment results provided in Appendix 2.
12.	A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised. The steps taken should have regard to the contribution the native vegetation to be removed and the native vegetation to be retained makes to biodiversity. The statement should include either:  Details of any strategic planning process the site has been subject to that has minimised impacts on biodiversity from the proposed use or development, or  A description of the opportunities taken to locate, design and manage the proposed use or development to minimise impacts on biodiversity from the removal of native vegetation. If the applicant considers no further opportunities exist to minimise impacts on biodiversity from the removal of native vegetation, then provide an explanation of the potential impacts on the proposed use or development if further minimisation was required.	Provided in Section 6.1.1.
13.	An assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.	Provided in Section 5.2.2 and Appendix 6.
14.	An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.	Provided in Section 6.1.4.

## 2. Introduction

Ryan Corner Development Pty Ltd engaged Nature Advisory Pty Ltd (formerly Brett Lane & Associates) to conduct a flora and native vegetation assessment of the revised area to be developed for the permitted Ryan Corner Wind Farm.

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Biodiversity assessment guidelines* (DEPI 2013). These Guidelines still apply due to the project history. Potential impacts on flora and fauna matters listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have also been considered.

Moyne Planning Permit 200600222-A allows for construction and operation of the Ryan Corner Wind Farm. Clause 22 of the planning permit allows for:

- The removal of no more than 3.637 hectares of native vegetation.

This investigation has been undertaken to determine whether native vegetation impacts incurred by the revised RCWF layout and associated civil works are in accordance with Moyne Planning Permit 200600222-A.

Specifically, the scope of the investigation included:

- An updated review of existing information, including the following database searches:
  - An updated review of existing information on native vegetation in the area, including:
    - DELWPs Native Vegetation Information Management system (NVIM); and
    - NatureKit.
  - The *Victorian Biodiversity Atlas* (VBA), a database administered by DELWP (2021a); and
  - The online EPBC Act *Protected Matters Search Tool* (DAWE 2021).
- A site survey involving:
  - Characterisation and mapping of native vegetation on the site, as defined in Victoria's *Biodiversity assessment guidelines* (the 'Guidelines'); and
  - Assessment of native vegetation in accordance with the Guidelines, including habitat hectare assessment and scattered tree assessment.

In responding to DELWP Environment's referral response provided in accordance with Section 55 of the *Planning and Environment Act 1987*, an assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, specifically habitat for rare or threatened species is provided as part of this report.

▪

This investigation was undertaken by a team from Nature Advisory, comprising Elinor Ebsworth (Senior Ecologist), Verity Fyfe (Senior Ecologist), Annette Cavanagh (Botanist), Nhung Nguyen (Senior GIS Analyst), Emma Loboda (GIS Analyst) and Jim Grant (Senior Ecologist & Project Manager).

## 3. Definitions, methods and assessment process

### 3.1. Definitions

#### 3.1.1. Study area

The study area for this investigation is defined as the current and previous iterations of the development footprint plus a 50-meter buffer, as shown in Figure 1: A1-C2 . The study area covers 666 hectares.

#### 3.1.2. Native vegetation

Native vegetation is currently defined in Clause 73.01 of all Victorian planning schemes as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’. The *Biodiversity assessment guidelines* define native vegetation as belonging to two categories (DEPI 2013):

- Remnant patch; or
- Scattered trees.

The definitions of these categories are provided below, along with the prescribed DELWP methods to assess them.

##### *Remnant patch*

A remnant patch of native vegetation is either:

- An area of native vegetation where at least 25 per cent of the total perennial understorey plant cover is native; and/or
- Any area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.

Remnant patch condition is assessed using the habitat hectare method (Parkes et al. 2003; DSE 2004b) whereby components of native vegetation (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage resemblance of the vegetation to its original condition.

The NVIM system (DELWP 2020c) provides modelled condition scores for native vegetation to be used in certain circumstances (see Appendix 1). All wetlands mapped on DELWP's native vegetation layer are treated as a remnant patch (DEPI 2013).

The condition score assists in defining the biodiversity equivalence score of the native vegetation and the offset targets if removal of native vegetation is approved (see Appendix 1 for details of how scoring works).

##### *Scattered trees*

The *Biodiversity assessment guidelines* define scattered trees as a native canopy tree<sup>1</sup> that does not form part of a remnant patch of native vegetation.

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<sup>1</sup> A canopy tree is a reproductively mature tree that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type.

Scattered trees are counted, the species identified and their DBH (diameter at breast height or 1.3 metres above ground) measured or estimated.

### 3.2. Field methods

The initial field assessment was conducted on the 12<sup>th</sup> to 14<sup>th</sup> July, 2017, with the updated assessment undertaken on the following dates:

- 25<sup>th</sup>, 28<sup>th</sup> and 30<sup>th</sup> September 2020;
- 5<sup>th</sup> October 2020;
- 13<sup>th</sup>, 16<sup>th</sup> and 18<sup>th</sup> November 2020;
- 6<sup>th</sup> January 2021;
- 23<sup>rd</sup> February 2021;
- 1<sup>st</sup>, 2<sup>nd</sup> and 15<sup>th</sup> March 2021; and
- 4<sup>th</sup> May 2021.

During these assessments, the study area was surveyed on foot.

Sites in the study area found to support native vegetation or with potential to support listed matters were mapped through a combination of aerial photograph interpretation and ground-truthing using a hand-held GPS (accurate to approximately five metres).

Whilst this assessment was not designed to provide an exhaustive inventory of flora species in the study area, all efforts were made to schedule the site assessment at a time of year when the majority of native vegetation life forms are likely to be present. The season timing of the survey and condition of vegetation was considered suitable to ascertain the extent and condition of native vegetation.

A targeted survey for spring-flowering listed species was undertaken on the 13<sup>th</sup>, 16<sup>th</sup> and 18<sup>th</sup> November 2020 and 8<sup>th</sup> and 9<sup>th</sup> November 2021. During these surveys, transects located five metres apart were walked in areas of suitable habitat (Plains Grassland, Plains Grassy Wetland and Aquatic Hermland) proposed to be impacted at the time. In this manner, all areas of suitable habitat for listed species now proposed to be impacted have undergone targeted survey.

### 3.3. Planning permit and application requirements

Moyne Planning Permit 200600222-A allows for use and development of land for the Ryan Corner Wind Farm and the removal of native vegetation. Clause 22 of the planning permit is relevant to the current investigation and requires the removal of no more than 3.637 hectares of native vegetation.

### 3.4. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these species require the approval of the Australian Minister for the Environment.

If there is a possibility of a significant impact on nationally threatened species or communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide after 20 business days whether the project will be a 'controlled action' under the EPBC Act, in which case it cannot be undertaken without the approval of the Minister. This approval depends

on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Implications under the EPBC Act for the current proposal are discussed in Section 6.2.

### 3.5. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists threatened and protected species and ecological communities (DELWP 2019, DELWP 2021b). Any removal of protected flora, which includes threatened flora species and the plants that make up threatened communities, listed under the FFG Act from public land requires a Protected Flora Licence or Permit under the Act, obtained from DELWP.

The FFG Act only applies to private land where a license is required to remove grass trees, tree ferns and sphagnum moss for sale, or where an Interim Conservation Order has been made to protect critical habitat for a threatened species or community. As no such habitat has ever been declared, this mechanism under the FFG Act has never been implemented.

Implications under the FFG Act for the current proposal are discussed in Section 6.3.

### 3.6. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

Weed species listed on the CaLP Act that have been recorded in the study area are discussed in Section 6.4.

## 4. Existing information and results

### 4.1. Site description, zoning and overlays

The study area for this investigation is defined as the current and previous iterations of the development footprint plus a buffer of up to 50 meters, as shown in Figure 1.

The Ryan Corner Wind Farm layout consists of a network of 52 approved turbines, including 17 turbines to the west of Riverside/Harris Road and 35 turbines to the east of Riverside/Harris Road. The second entrance point for the wind farm (off Port Fairy – Hamilton Road) has already been constructed (in 2012). The study area spans 11 farm properties; five that occur between Hamilton-Port Fairy Road and Riverside/Harris Road, and six properties that occur west of Riverside/Harris Road.

The study area occurred across two DELWP mapped bioregions; most of the site falls within the Victorian Volcanic Plain (VVP) bioregion, while the area in the south western portion of the site (along Youls Road) falls within the Warrnambool Plain (WaP) bioregion. The majority of the study area (in the VVP) supported predominantly dark clay soils on an undulating landscape of stony knoll rises and low-lying seasonal wetlands. The south-western section of the study area (in the WaP) supported sandy sedimentary soils, with gently sloping topography. The study area falls within the Glenelg Hopkins CMA. The study area is located within the Moyne local government area. The wind farm layout is in areas currently mapped as Farming Zone (FZ). No overlays occur within the study area.

The majority of the study area has a long history of farming use, and is predominantly grazing land for cattle and sheep. Surrounding land also supported farmland. An area of plantation forestry sits to the north-west of the study area.

Vegetation in the study area consisted largely of pasture grasses and agricultural weeds, with sparsely scattered native vegetation on stony rises and within seasonally inundated wetlands. The majority of the study area consisted of highly modified vegetation. The highest quality and least disturbed native vegetation occurs along the roadside of Riverside Road. Extant native vegetation has been impacted by altered drainage and farming practices, and all areas had moderate to high levels of weed invasion.

### 4.2. Native vegetation

#### 4.2.1. Patches of native vegetation

Pre-European EVC mapping (DELWP 2020a) indicated that the study area and surrounds would have supported Damp Sand Herb Rich Woodland (EVC 3), Plains Grassy Woodland (EVC 55\_63), Plains Grassy Wetland (EVC 125), Plains Grassland (EVC 132), Stony Knoll Shrubland (EVC 649) and Aquatic Herbland (EVC 653) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition and soil characteristics, suggested that the following EVCs were present in the study area:

- Damp Sand Herb Rich Woodland (EVC 3);
- *Higher-rainfall* Plains Grassy Woodland (EVC 55\_63);
- Plains Grassy Wetland (EVC 125);
- *Heavier soils* Plains Grassland (EVC 132\_61);



- Stony Knoll Shrubland (EVC 649); and
- Aquatic Herbland (EVC 653).

A description of these EVCs is provided within the EVC benchmarks in Appendix 5.

69 remnant patches (referred to herein as habitat zones) comprising the abovementioned EVCs and totalling 38.086 hectares were identified in the study area. A description of each habitat zone is provided in Table 1. All native vegetation recorded in the study area is shown in Figure 1.

In addition, 45.439 hectares of DELWP mapped wetlands occurred within the study area, however these areas did not meet the criteria for a patch of native vegetation during the site assessment. DELWP mapped wetlands are treated as patches of native vegetation and given a DELWP modelled score in accordance with the *Biodiversity Assessment Guidelines*.

**Table 1: Description of habitat zones in the study area**

Habitat Zone	EVC	Description
A	Plains Grassy Wetland (EVC 125)	<p>Dominated by Common Tussock Grass and Rush species</p> <p>Scattered Blackwood shrubs around the edge of the habitat zone from the adjacent knoll vegetation</p> <p>High cover or native grasses, Common Tussock Grass, Kangaroo Grass, and Rushes. High native herb diversity, such as Prickfoot, Dock, Sheep's Burr</p> <p>High Bryophyte cover</p> <p>Moderate weed cover, moderate presence of high threat species</p> <p>Good recruitment potential</p> <p>Good organic litter cover dominated by native organic litter</p> <p>Wetland inundated at the time of the survey</p> <p>Habitat zone surrounded on roadside by other high-quality vegetation such as stony knoll shrubland</p>
B, C	Plains Grassy Wetland (EVC 125)	<p>Two habitat zones in the same paddock with very similar vegetation</p> <p>Dominated by Common Tussock Grass and Spike Sedge; scattered Rush species and Spiny-headed Mat-rush</p> <p>Some native herb cover. Moderate diversity</p> <p>No bryophyte or lichen cover</p> <p>Very high weed cover including high threat species</p> <p>Low organic litter</p> <p>Seasonally inundated areas, water present at the time of the survey</p> <p>Impacted by grazing.</p>
D	Stony Knoll Shrubland (EVC 649)	<p>Austral Bracken the dominant native species, scattered Sweet Bursaria shrubs forming a sparse shrub layer</p> <p>Some Sweet Bursaria shrubs present, scattered native grasses such as Kangaroo Grass and Weeping Grass, some native herbs, Kidneyweed, Pennywort. Maidenhair fern</p> <p>Bryophyte cover moderate, many rocks present to support good lichen cover</p> <p>Very high weed cover, some high threat species</p> <p>Very low organic litter cover</p> <p>Low quality stony knoll shrublands frequently impacted by grazing</p>

Habitat Zone	EVC	Description
E, X, Y	Stony Shrubland (EVC 649) Knoll (EVC)	<p>Austral Bracken the dominant native species, scattered Sweet Bursaria shrubs present but very sparse</p> <p>Low diversity understorey, dominated by Austral Bracken, and some Kangaroo Grass and Wallaby Grasses</p> <p>Moderate bryophyte and lichen cover</p> <p>Very high weed cover and presence of high threat species</p> <p>Observed recruitment</p> <p>No organic litter</p> <p>Very low-quality stony knoll shrublands impacted by grazing and high threat weed invasion</p>
F, G, I, J, K, L	Damp Sand Herb Rich Woodland (EVC 3)	<p>Dominant species Blackwood and Black Wattle, no canopy species present.</p> <p>Understorey predominantly grasses; Kangaroo Grass, Common Tussock Grass, one native herb species Common Woodruff, sparsely scattered through habitat zones</p> <p>No bryophyte or lichen cover</p> <p>High weed cover and high presence of high threat species</p> <p>Moderate recruitment</p> <p>Good organic litter cover derived from exotic species</p> <p>No logs present</p> <p>Habitat zones along Youls road, all within WaP bioregion.</p>
H	Plains Grassy Wetland (EVC 125)	<p>Small wetland on the roadside and adjacent paddock</p> <p>Vegetation comprised Water Ribbons, which were dominant, and other floating vegetation</p> <p>Low weed cover</p> <p>Wetland was inundated at the time of the survey</p> <p>Habitat zone along Youls road, falling within WaP bioregion.</p>
M, N, O	Plains Grassy Wetland (EVC 125)	<p>Habitat zones dominated by Common Tussock Grass and Rushes</p> <p>Very low diversity, no other grasses or herbs present</p> <p>No bryophyte or lichen cover</p> <p>Moderate weed cover with high presence of high threat species</p> <p>Moderate organic litter cover derived from native grasses</p> <p>Areas of seasonal inundation.</p> <p>Impacted by grazing from cattle</p>
P	Stony Shrubland (EVC 649) Knoll (EVC)	<p>Austral Bracken the dominant native species, scattered Coast Beard Heath shrubs forming a sparse shrub later</p> <p>Sparse, scattered native grasses such as Kangaroo Grass, wallaby grass and Weeping Grass, no native herbs, low diversity</p> <p>Bryophyte and lichen cover very high due to availability of bare ground and basalt rocks across habitat zone</p> <p>Low weed cover, some high threat species present</p> <p>No organic litter cover</p> <p>Low quality stony knoll shrubland on the roadside, impacted by moving stock and surrounding farm land use</p>

Habitat Zone	EVC	Description
Q, R	<i>Heavier soils</i> Plains Grassland (EVC 132_61)	Dominated by Kangaroo Grass Some other grasses such as Common Tussock Grass present, as well as herbs, Common Woodruff, Sheep's Burr; Low diversity Moderate bryophyte and lichen cover Moderate weed cover, presence of high threat species but not dominant Low recruitment potential High organic litter cover derived from native source Roadside grassland impacted by surrounding land uses Well connected to other habitat zones along Riverside road Habitat zones Q and R qualified as the EPBC Act Listed Community NTGVVP and the FFG Act listed community W(B)PGC.
S, AD	Plains Grassy Wetland (EVC 125)	Wetlands dominated by Common Tussock Grass Some other grasses such as wallaby grass present; low diversity Good bryophyte and lichen cover High weed cover, presence of high threat species but not dominant Low organic litter cover derived from exotic source Wetland inundated at the time of survey
T, U, V	Plains Grassy Wetland (EVC 125)	Wetlands dominated by Common Tussock Grass Some other grasses such as rush and sedge species present. Some native herb cover, Prickfoot and Sheep's Burr. Low diversity No bryophyte & lichen cover High weed cover, presence of high threat species Low organic litter cover Wetlands inundated at the time of survey
ZB	Plains Grassy Wetland (EVC 125)	Dominated by Common Tussock Grass and rushes Very low diversity, no other grasses or herbs present No bryophyte or lichen cover Moderate weed cover with high presence of high threat species Moderate organic litter cover derived from native grasses Areas of seasonal inundation, water was present at the time of the survey Impacted by grazing from cattle
AA	Aquatic Herbland (EVC 653)	Occurring within a farm dam Inundated at time of survey Dominated by Small Spike-sedge and Water Ribbons, with Creeping Brookweed and Crane's Bill Low weed cover, dominated by Water-buttons Moderate organic litter cover derived from native wetland species
AB, BB	Stony Knoll Shrubland (EVC 649)	Austral Bracken the dominant native species, scattered Sweet Bursaria shrubs forming a moderate shrub layer Sweet Bursaria shrubs present, scattered native grasses such as Kangaroo Grass and Weeping Grass, some native herbs, Kidneyweed, Sheep's Burr. Maidenhair fern and Rock Fern. Bryophyte cover low, many rocks present to support good lichen cover High weed cover, some high threat species Low organic litter cover derived from introduced grass species Stony knoll shrubland impacted by low-density grazing

Habitat Zone	EVC	Description
AC, AF, AG, BA, BC, ED, EE, FA, FE, FG	Plains Grassy Wetland (EVC 125)	Wetlands dominated by Common Tussock-grass, Tall Sedge and Australian Sweet-grass Some native herb cover, Prickfoot and Common Woodruff. Moderate diversity No bryophyte & lichen cover Moderate weed cover, presence of high threat species Moderate organic litter cover derived from native wetland grasses Habitat zones AC, AG and BC qualified as the EPBC Act Listed Community SHWTLP.
AE	Aquatic Herbland (EVC 653)	Large Aquatic Herbland occurring in a seasonal wetland Inundated at time of survey Dominated by Australian Sweetgrass, Tall Spike-sedge, Small Spike-sedge and Common Tussock-grass High herb diversity, including Matted Pratia, Prickfoot, Small Loosestrife, Creeping Brookweed, Buttercup and Crane's Bill High weed cover, dominated by Flatweed Moderate organic litter cover derived from native wetland species
EA, EB, EC, FF, FH	Stony Shrubland Knoll (EVC 649)	Native grasses the dominant native species, including Kangaroo Grass, wallaby-grasses, spear-grasses and Weeping Grass. Austral Bracken present. Scattered native herbs including Kidneyweed and Sheep's Burr Bryophyte cover high, moderate soil crust cover. Moderate weed cover, some high threat species Low organic litter cover derived from native grass species Stony knoll shrubland impacted by low-density grazing
AO, HC, HE, HH, HI, HJ, HL, HO, HP	Plains Grassy Wetland (EVC 125)	Small patch of Plains Grassy Woodland supporting native Common Tussock-grass, Wallaby grass and Rush. Very low cover of native herbs present, representative species being Kidney-weed and Dock. High cover of weeds, mostly attributable to Rye Grass, with some Toowoomba Canary-grass, Spear Thistle, Clover and Barley Grass also present. Bryophyte cover minimal, as was organic litter.
AR, HD, HF, HG, HK, HL, HM, HN, JA	Stony Shrubland Knoll (EVC 649)	Dominated by Austral Bracken amongst exposed rocks on rises. Weeping Grass was also common, as well as Kangaroo Grass and Spear grass. Sparse cover of Common Tussock-grass and Wallaby grass. Herb cover was minimal and was represented by Dock. Weed species present included Toowoomba Canary-grass, Rough Dog's-tail, Clover and Rye Grass, although this cover was moderate. Organic litter cover mostly native in origin. Moderate cover of bryophytes as well as bare ground.

Habitat Zone	EVC	Description
HQ	Higher Rainfall Plains Woodland (EVC 55_63)	These patches lacked a canopy or shrub layer. They supported a moderate cover of native Wallaby Grass, Spear Grass, Kangaroo Grass and Weeping Grass. There was a low cover of Austral Bracken and bryophytes. Herb cover was minimal and was represented by Dock. Weed species present was high and included Rough Dog's-tail, Barley Grass, Cape weed and Rye Grass. Organic litter cover was high and was non-native in origin. No logs were present and bryophyte cover was moderate.
IA	Plains Grassy Wetland (EVC 125)	Wetlands dominated by Common Tussock Grass Some other grasses such as wallaby grass present; low diversity Low bryophyte and lichen cover High weed cover, high threat species dominant High organic litter cover derived from exotic source
IB, IC	Stony Knoll Shrubland (EVC 649)	Native grasses the dominant native species, including wallaby-grasses, spear-grasses and Weeping Grass. Scattered native herbs including Sheep's Burr Bryophyte cover high High weed cover, dominated by high threat species Low organic litter cover derived from exotic grass species Stony knoll shrubland impacted by low-density grazing
KA, KB	Plains Grassy Wetland (EVC 125)	Large wetlands dominated by Australian Sweet-grass and rushes. Low native herb cover but good diversity, including Common Loosestrife, Matted Pratia and Buttercup. No bryophyte & lichen cover Moderate weed cover, presence of high threat species High organic litter cover derived from native wetland grasses Habitat zones KA and KB qualified as the EPBC Act Listed Community SHWTLP.
KC, KD	Plains Grassy Wetland (EVC 125)	Ephemeral wetlands dominated by Common Tussock-grass, Australian Sweet-grass and rushes. Low native herb cover and diversity. No bryophyte & lichen cover High weed cover, presence of high threat species High organic litter cover derived from exotic grasses

The habitat hectare assessment results for these habitat zones are provided in Table 2. More detailed habitat scoring results are presented in Appendix 2.

**Table 2: Summary of habitat hectare assessment results**

Habitat Zone	EVC no.	Area (ha)	Condition score (out of 100)	Listed ecological communities (EPBC Act)*
A	125	0.130	57	
AA	653	0.416	31	
AB	649	0.119	33	
AC	125	0.650	40	SHWTLP
AD	125	0.112	16	
AE	653	5.903	43	

Habitat Zone	EVC no.	Area (ha)	Condition score (out of 100)	Listed ecological communities (EPBC Act)*
AF	125	0.176	40	
AG	125	3.374	41	SHWTLP
AO	125	0.224	56	
AR	125	0.109	48	
B	125	0.131	24	
BA	125	0.156	34	
BB	649	0.052	39	
BC	125	0.997	24	SHWTLP
C	125	1.814	24	
D	649	0.114	28	
E	649	0.136	22	
EA	649	0.158	27	
EB	649	0.201	27	
EC	649	0.257	35	
ED	125	0.263	45	Potential SHWTLP
EE	125	0.228	40	
EF	649	0.040	27	
F	3	0.059	13	
FA	649	2.019	33	
FE	125	3.543	40	
FF	649	0.084	35	
FG	125	0.130	37	
FH	649	0.184	26	
G	3	0.029	13	
H	125	0.079	24	
HC	125	0.107	19	
HD	649	0.021	34	
HE	125	0.003	34	
HF	649	0.012	19	
HG	649	0.116	19	
HH	125	0.025	24	
HI	125	0.446	28	
HJ	125	0.229	24	
HK	649	0.133	19	
HL	125	0.265	34	
HM	649	0.036	19	
HN	649	0.131	16	
HO	125	0.236	24	
HP	125	0.833	34	
HQ	55_63	0.549	11	
I	3	0.057	13	
IA	125	0.372	27	

Habitat Zone	EVC no.	Area (ha)	Condition score (out of 100)	Listed ecological communities (EPBC Act)*
IB	649	0.046	17	
IC	649	0.069	17	
J	3	0.071	13	
JA	649	0.055	34	
K	3	0.233	13	
KA	125	0.916	25	SHWTLP
KB	125	0.832	25	SHWTLP
KC	125	0.146	20	
KD	125	0.504	20	
L	3	0.109	13	
M	125	0.986	18	
N	125	0.281	18	
O	125	0.933	18	
P	649	0.140	43	
Q	132_61	0.342	34	NTGVVP
R	132_62	0.664	34	NTGVVP
S	125	4.723	16	
T	125	0.475	14	
X	649	0.071	30	
Y	649	0.070	30	
ZB	125	0.962	18	
<b>TOTAL</b>		<b>38.086</b>		








\*Listed ecological communities are discussed in Section 4.4.

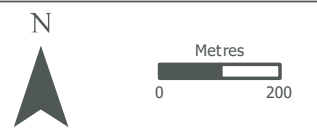
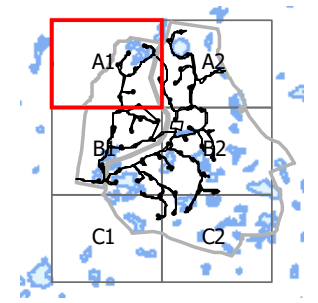
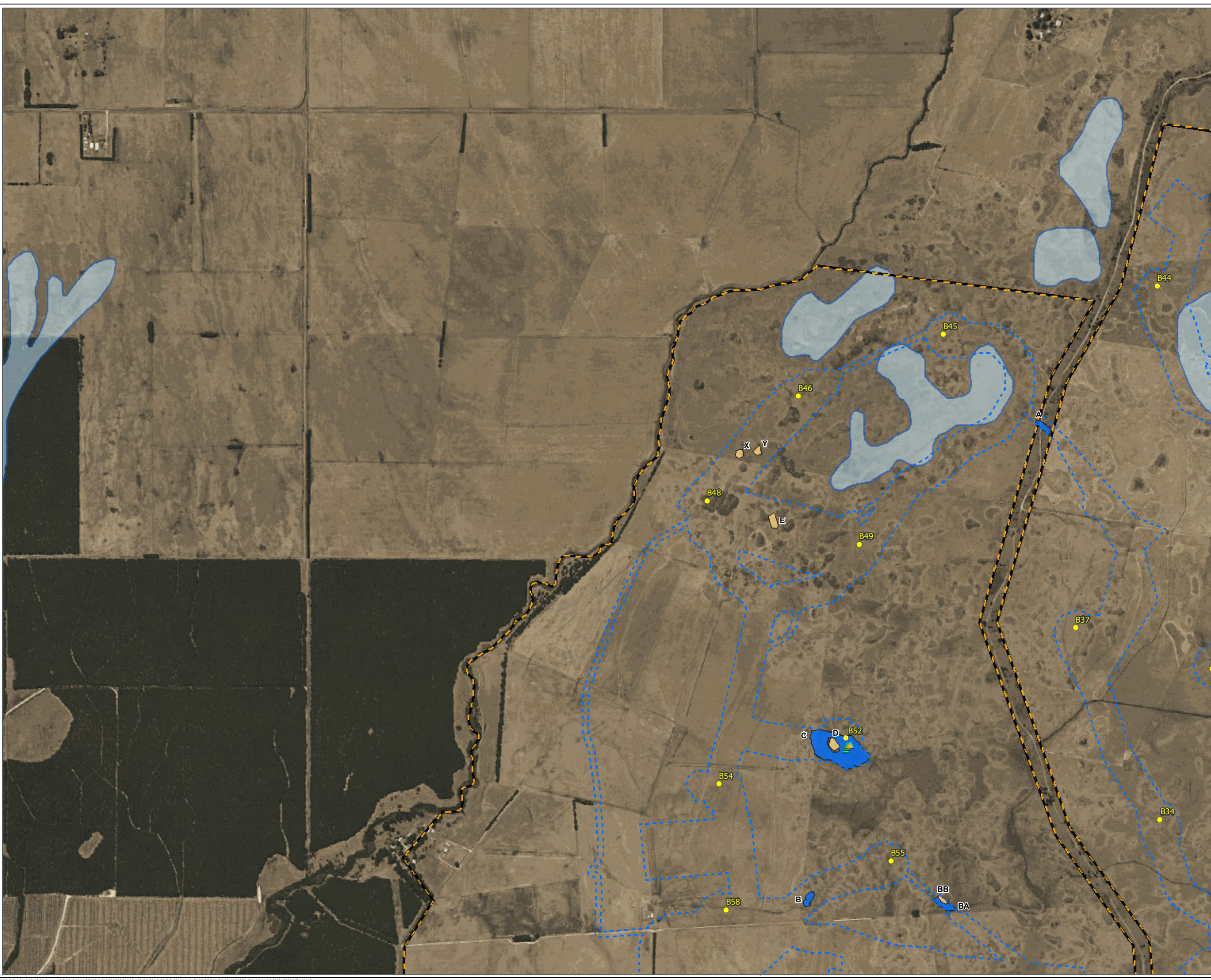
#### 4.2.1. Scattered trees

No scattered trees were recorded in the study area.

**Figure 1-A1: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

-  Combined study area
-  Proposed turbine locations
- Native vegetation**
-  Plains Grassy Wetland (EVC 125)
-  Stony Knoll Shrubland (EVC 649)
-  Pale Swamp-everlasting
-  Swamp Fireweed
-  DELWP wetlands



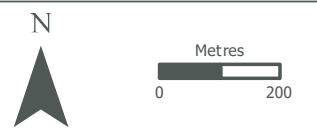
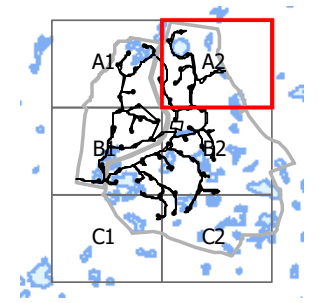
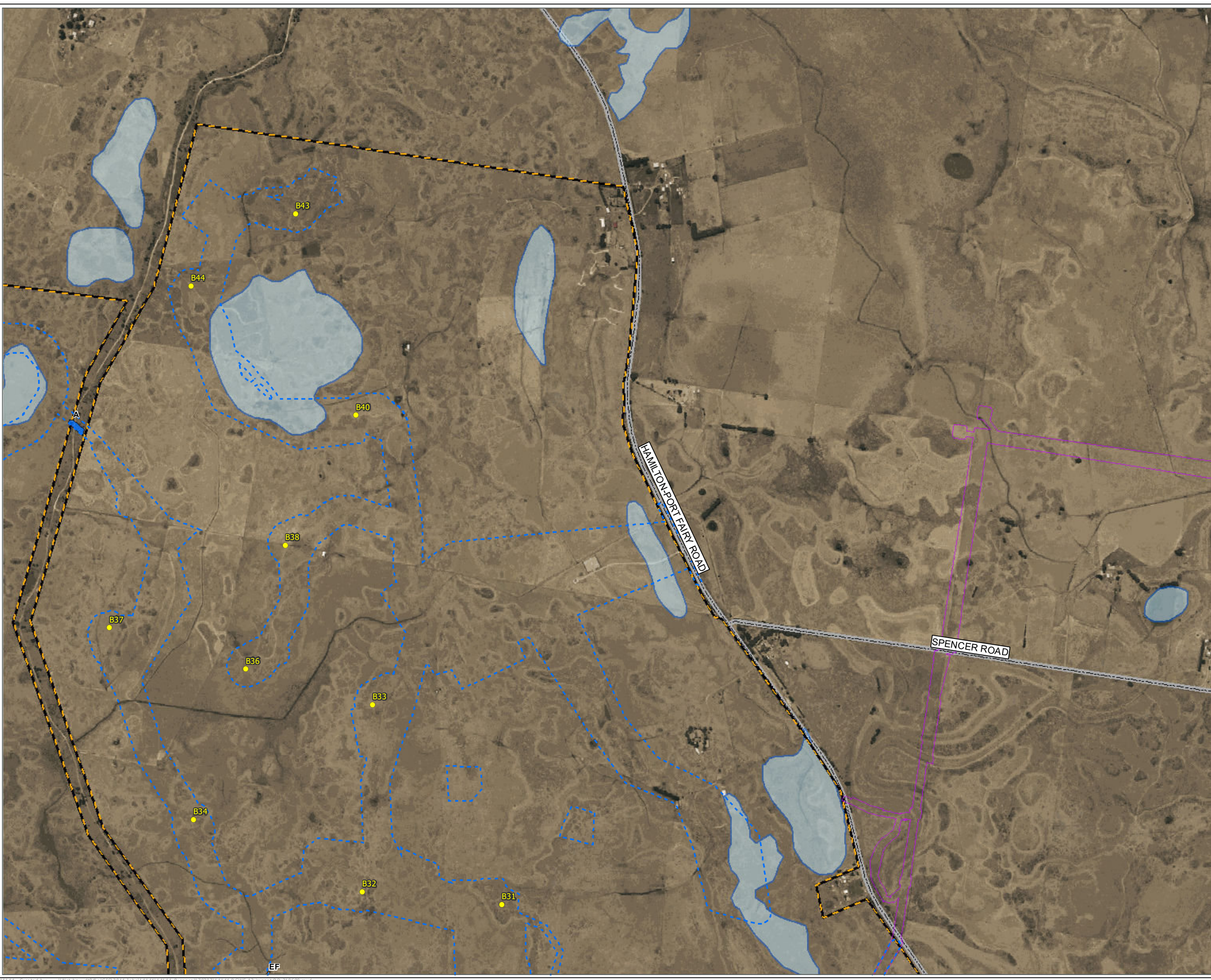
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**Figure 1-A2: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

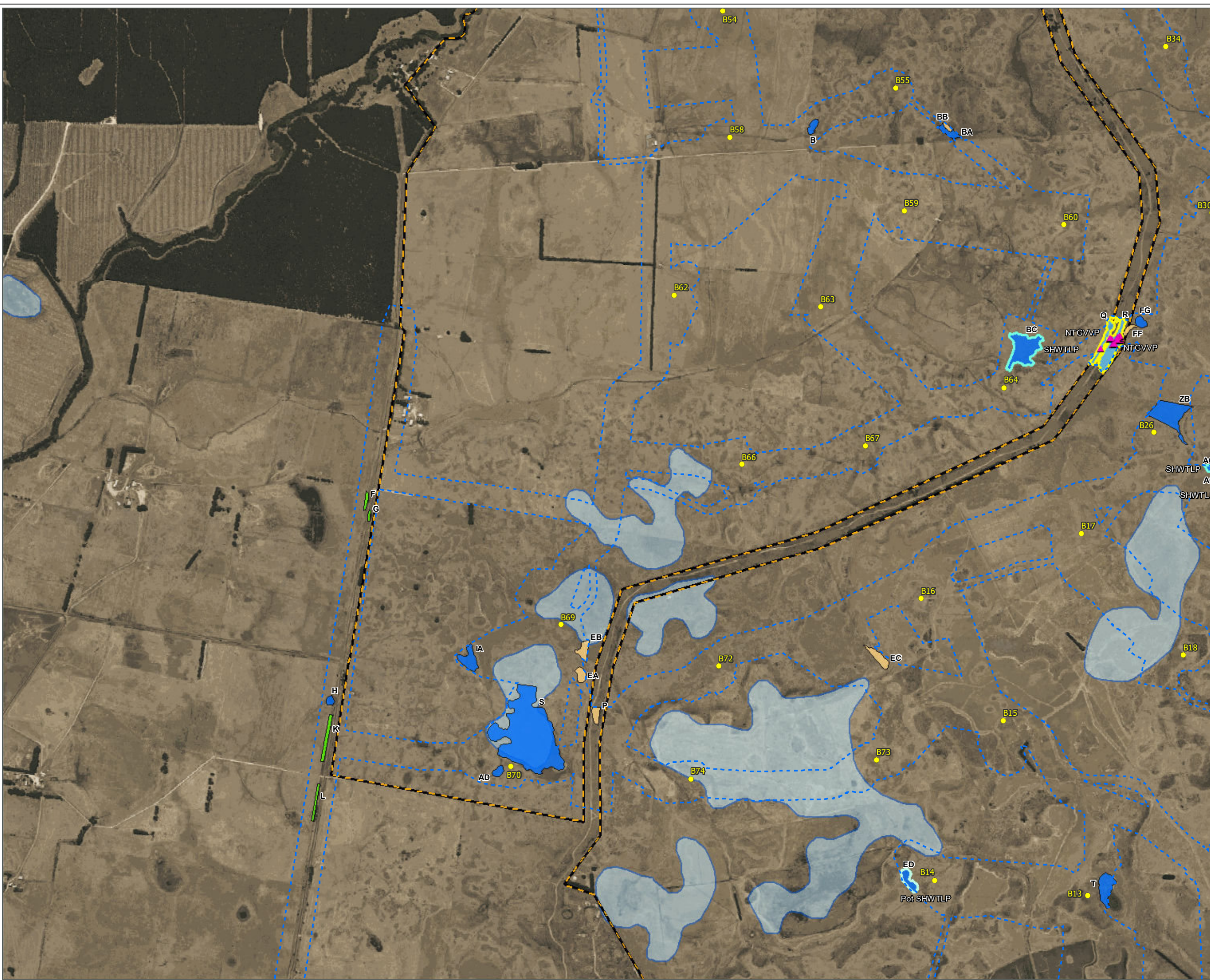
- Combined study area
- Combined TXL study area
- Proposed turbine locations
- Native vegetation**
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - DELWP wetlands



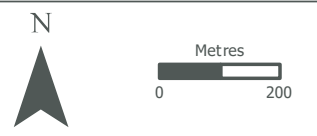
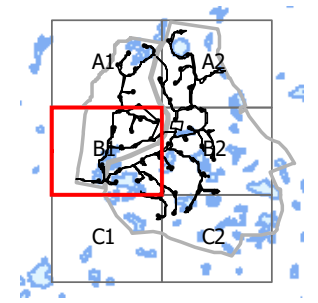
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**Figure 1-B1: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021



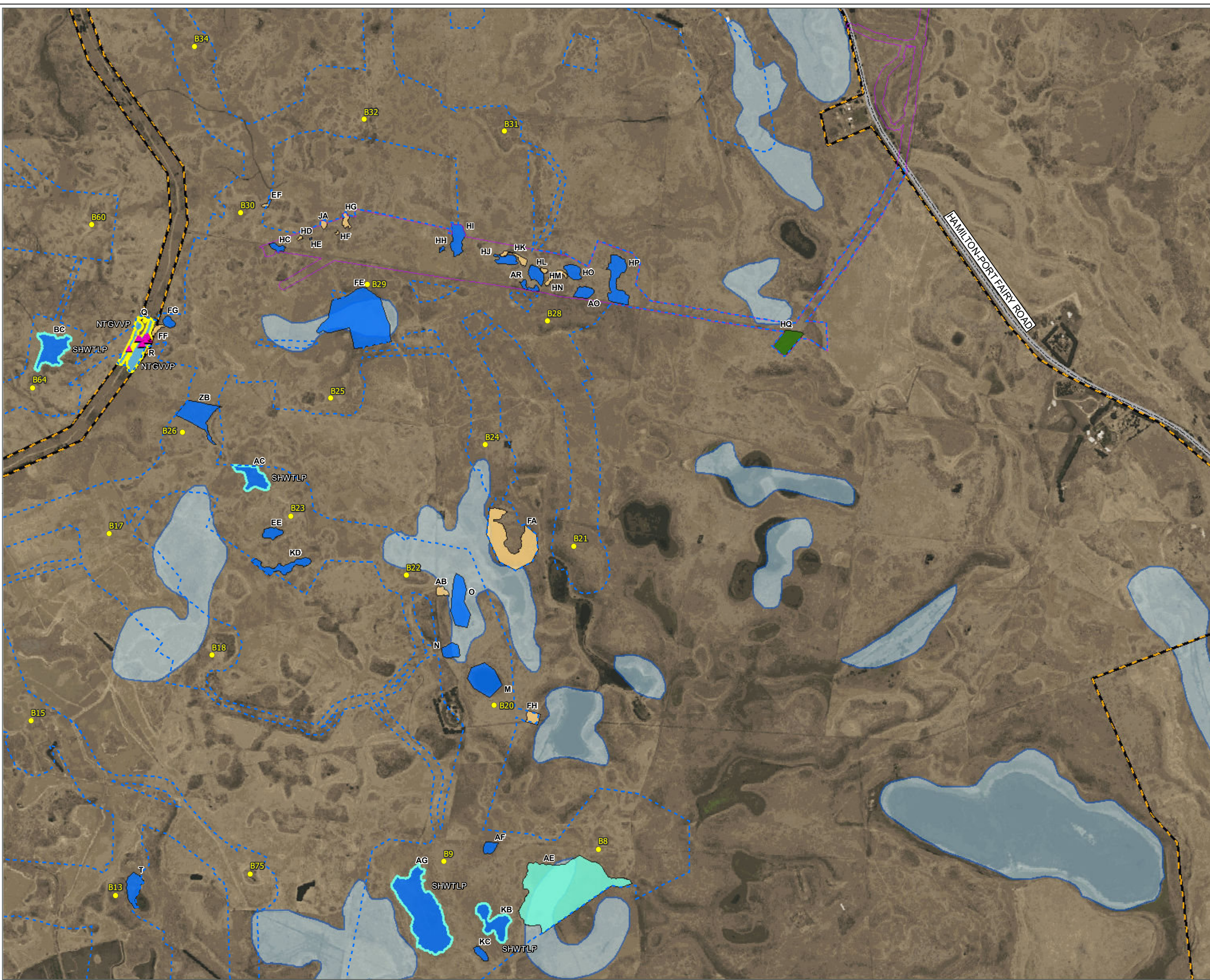
- Combined study area
- Proposed turbine locations
- Native vegetation**
- Damp Sands Herb-rich Woodland (EVC 3)
- Plains Grassland - Heavier-soils (EVC 132\_61)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- ▲ Basalt Leek Orchid
- Listed ecological communities**
- NTGVVP
- SHWTLP
- Potential SHWTLP
- DELWP wetlands



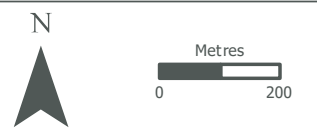
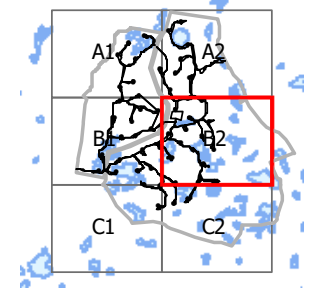
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**Figure 1-B2: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021



- Combined study area
  - Combined TXL study area
  - Proposed turbine locations
- Native vegetation**
- Aquatic Herbland (EVC 653)
  - Higher Rainfall Plains
  - Grassy Woodland(EVC 55\_63)
  - Plains Grassland - Heavier-soils (EVC 132\_61)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
  - ▲ Basalt Leek Orchid
- Listed ecological communities**
- NTGVVP
  - SHWTLP
  - DELWP wetlands

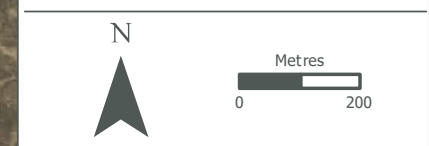
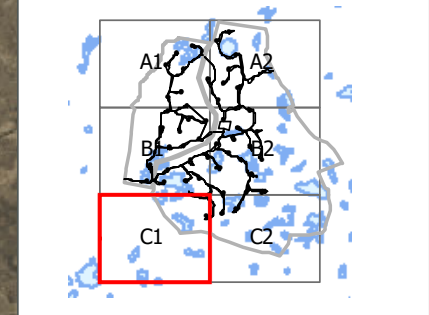


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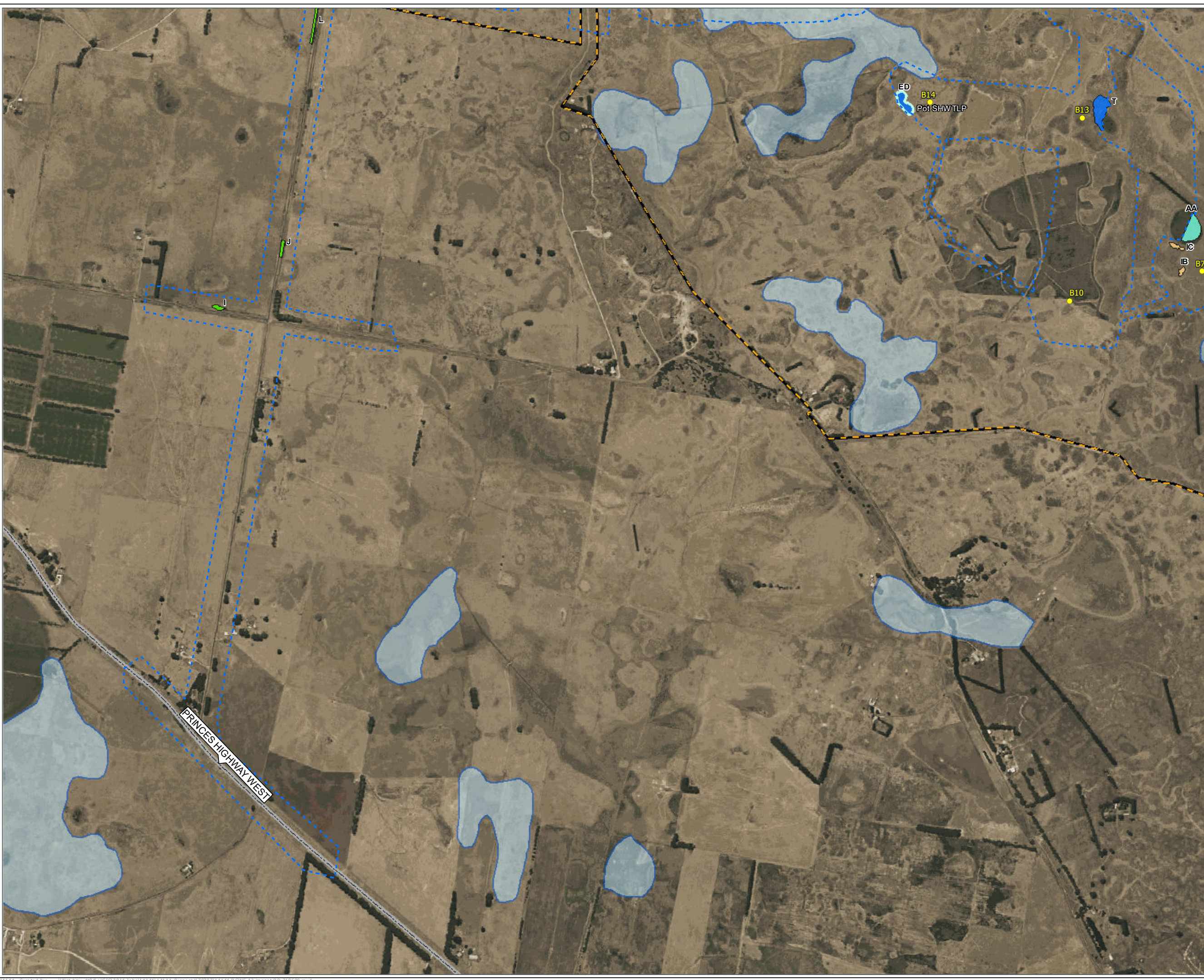
**Figure 1-C1: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

- Combined study area
- Proposed turbine locations
- Native vegetation**
  - Aquatic Herbland (EVC 653)
  - Damp Sands Herb-rich Woodland (EVC 3)
  - Plains Grassy Wetland (EVC 125)
  - Stony Knoll Shrubland (EVC 649)
- Listed ecological communities**
  - Potential SHWTLP
  - DELWP wetlands



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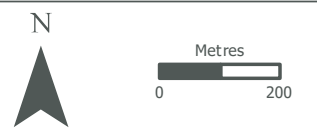
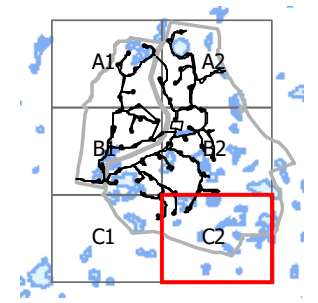


**Figure 1-C2: Impacted EVC 125 for spring surveys Nov 2021**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021



- Combined study area
- Proposed turbine locations
- Native vegetation**
- Aquatic Herbland (EVC 653)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- Listed ecological communities**
- SHWTLP
- DELWP wetlands



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### 4.3. Flora species

#### 4.3.1. Species recorded

During the field assessments 77 plant species were recorded. Of these, 53 (69%) were indigenous and 24 (31%) were introduced or non-indigenous native in origin (Appendix 3).

#### 4.3.1. Listed flora species

VBA records (DELWP 2021a) and the EPBC Protected Matters Search Tool (DAWE 2021) indicated that within the search region there were records of, or there occurred potential suitable habitat for, 14 species listed under the Commonwealth EPBC Act and 32 listed under the state FFG Act, including 10 listed under both Acts.

The likelihood of occurrence in the study area of species listed under the EPBC Act and FFG Act is addressed in Table 3. Species considered 'likely to occur' are those that have a very high chance of being in the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the 'potential to occur' are those for which suitable habitat exists, but recent records are scarce.

This analysis indicates that the following 14 listed flora species are likely to occur or have the potential to occur:

- River Swamp Wallaby-grass
- Wavy Swamp Wallaby-grass
- Winged Water-starwort
- Curly Sedge
- Leafy Twig-sedge
- Pale Swamp Everlasting
- Golden Cowslips
- Clover Glycine
- Purple Blown-grass
- Showy Lobelia
- Pretty Leek-orchid
- Basalt Leek-orchid
- Swamp Fireweed
- Swamp Everlasting

Targeted surveys were undertaken in areas of suitable habitat (Plains Grassland, Aquatic Herbland and Plains Grassy Wetland) within the proposed impact area at the time for the above-listed species on the 13<sup>th</sup>, 16<sup>th</sup> and 18<sup>th</sup> November 2020 and 8<sup>th</sup> and 9<sup>th</sup> November 2021, to coincide with the flowering period for all species.

One species listed as vulnerable under the EPBC Act, Swamp Fireweed (*Senecio psilocarpus*), was recorded within the study area. 15 individuals were recorded within Habitat Zone C, on private land (as shown in Figure 1).

A further two species listed under the FFG Act, Basalt Leek-orchid (*Prasopphyllum viretrum*) and Pale Swamp-everlasting (*Coronidium gunnianum*), were recorded within the study area. Thirty-four individuals of Basalt Leek-orchid were recorded within Habitat Zones Q and R on Riverside Road, while one Pale Swamp-everlasting was recorded in Habitat Zone C, on private land, (as shown in Figure 1).

The proposed footprint for the project has since been amended to avoid the above-listed species.

No additional flora species listed under the EPBC Act or FFG Act were recorded within the targeted survey area, and these are now considered unlikely to occur.

**Table 3: Listed flora species and the likelihood of their occurrence in the study area**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	VU		River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels (DAWE 2020).	None	N/A	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas</b> .
Wavy Swamp Wallaby-grass	<i>Amphibromus sinuatus</i>		en	Apparently confined to permanent swamps in cool, sometimes elevated sites (Walsh 1994).	2	13/11/2019	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas</b> .
Velvet Apple-berry	<i>Billardiera scandens s.s.</i>		en	Dry open forests and woodlands(RBGV 2021).	1	01/01/1889	No suitable habitat - <b>unlikely to occur</b> .
Winged Water-starwort	<i>Callitriche umbonata</i>		en	Damp or swamp habitats, found creeping or rooted in mud or floating in shallow fresh water (RBGV 2021).	1	01/01/1894	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas</b> .



Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Curly Sedge	<i>Carex tasmanica</i>		en	Occurs in seasonally wet, fertile, heavy basalt clay soils, usually around the margins of slightly saline drainage lines or freshwater swamps. The dominant vegetation type varies, but is often grassy/sedgy and generally lacks trees (Carter 2010). Known occurrences are localised around Heywood, Portland, Port Fairy, Karish (Lake Weeranganuk), Craigieburn, Kalkallo and Wollert (Victorian Biodiversity Atlas 2015).	2	3/04/2018	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas</b> .
Leafy Twig-sedge	<i>Cladium procerum</i>		en	Swamps, streams, lakes and able to tolerate low to moderate salinity levels (RBGV 2021).	2	5/02/2008	Suitable habitat in Plains Grassy Wetland and Aquatic Herbland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas</b> .
Pale Swamp Everlasting	<i>Coronidium gunnianum</i>		cr	Grasslands and on soils that are prone to inundation (RBGV 2021).	3	13/11/2019	Suitable habitat in Plains Grassy Wetland and Plains Grassland areas - <b>potential to occur</b> . <b>Recorded during targeted surveys in HZ C</b> . Not recorded in impact areas. Now considered <b>unlikely to occur in impact areas</b> .

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Matted Flax-lily	<i>Dianella amoena</i>	EN	cr	Lowland grassland and grassy woodlands on well-drained to seasonally waterlogged fertile sandy loams to heavy cracking soils derived from sedimentary or volcanic Geology. It is widely distributed from eastern to south-western Victoria (DAWE 2020).	None	N/A	Habitat highly modified, no records nearby – <b>unlikely to occur.</b>
Swamp Flax-lily	<i>Dianella callicarpa</i>		en	Seasonally inundated, permanently moist or waterlogged basalt, in remnant <i>Leptospermum lanigerum</i> scrub (RBGV 2021).	5	17/11/2009	No suitable habitat - <b>unlikely to occur.</b>
Golden Cowslips	<i>Diuris behrii</i>		en	Flat grassy areas on heavy soils (Entwisle 1994).	1	1/11/2007	Suitable habitat in Plains Grassland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>
Western Peppermint	<i>Eucalyptus falciformis</i>		vu	Occurs on sandy soils in near-coastal heathy woodland from Anglesea area west to the SA border, sometimes adjacent to wetter vegetation (RBGV 2021).	4	4/02/1993	No eucalypts recorded within study area – <b>unlikely to occur.</b>
Coast Ballart	<i>Exocarpos syrticola</i>		en	Confined to coastal dunes and cliffs on and west of Wilsons Promontory, but locally common (Jeanes 1999).	26	22/11/2011	No suitable habitat - <b>unlikely to occur.</b>
Clover Glycine	<i>Glycine latrobeana</i>	VU	vu	Found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. In Victoria, populations occur in lowland grasslands, grassy woodlands and sometimes in grassy heath (DAWE 2020).	10	17/12/2019	Suitable habitat in Plains Grassland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Coast Ixodia	<i>Ixodia achillaeoides subsp. arenicola</i>	VU		Confined to coastal vegetation in the Cape Bridgewater-Portland area (Short 1999).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>
Creeping Rush	<i>Juncus revolutus</i>		en	Damp saline or subsaline sites in southern Victoria (Albrecht & Walsh 1994).	1	19/12/1974	No suitable habitat - <b>unlikely to occur.</b>
Purple Blown-grass	<i>Lachnagrostis punicea subsp. filifolia</i>		en	Seasonally wet, heavy clay soils (Walsh 1994).	5	22/11/2011	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>
Showy Lobelia	<i>Lobelia beagleholei</i>		vu	Confined in Victoria to the south-west, occurring almost exclusively on black organic loam soils, in the vicinity of swamps and drainage lines, rarely on red clays (RBGV 2021).	1	01/01/1891	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>
Oval-leaf Logania	<i>Logania ovata</i>		en	Mainly on the south-western coasts near Portland, Port Fairy and near Peterborough in Victoria, where occasional on sandy soils usually derived from limestone (RBGV 2021).	2	01/01/1894	No suitable habitat - <b>unlikely to occur.</b>
Coast Fescue	<i>Poa billardierei</i>		en	Of scattered occurrence on coastal sand dunes from near the NSW border to Nelson in the far south-west, but infrequently collected in recent times and possibly receding as the similar, introduced Marram-grass ( <i>Ammophila arenaria</i> ) advances (Walsh 1994).	3	9/12/2003	No suitable habitat - <b>unlikely to occur.</b>

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Dune Poa	<i>Poa poiformis</i> <i>var. ramifer</i>		en	Sand dunes and sea cliffs (Walsh 1994).	1	25/11/2010	No suitable habitat - <b>unlikely to occur.</b>
Pretty Leek-orchid	<i>Prasophyllum anticum</i>		cr	Grassland on moist to wet black basaltic loam (RBGV 2021).	12	23/10/2018	Suitable habitat in Plains Grassland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>
Gorae Leek-orchid	<i>Prasophyllum diversiflorum</i>	EN	cr	Wet grasslands or inundated swamps among tussocks (Jones 2006).	4	19/11/1998	No suitable habitat due to modification through grazing. <b>Unlikely to occur.</b>
Dense Leek-orchid	<i>Prasophyllum spicatum</i>	VU	cr	Occurs in coastal and near-coastal heathland and heathy woodland. Soils are generally sandy, with some sites seasonally waterlogged (Duncan 2010).	2	1/11/2000	No suitable habitat - <b>unlikely to occur.</b>
Basalt Leek-orchid	<i>Prasophyllum viretrum</i>		cr	Moist to wet grassland on dark basaltic loam (Jones & Rouse 2006).	164	13/11/2019	Suitable habitat in Plains Grassland areas - <b>potential to occur.</b> 34 individuals recorded within Zone Q and R; however, <b>does not occur in impact areas.</b>

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Green-striped Greenhood	<i>Pterostylis chlorogramma</i>	VU	en	Occurs in mixed Box-Stringybark forest with a shrubby understorey, often with <i>Pteridium esculentum</i> as a major component on sandy or clay loam soils (Duncan et al. 2009).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>
Leafy Greenhood	<i>Pterostylis cucullata</i>	VU		Tea-tree scrubs on tall sandy and calcareous dunes, in moist, open or even deep shaded locations (Jones 1994).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>
Coast Bush-pea	<i>Pultenaea canaliculata</i>		en	Scattered and uncommon on coastal dunes and limestone cliffs from the South Australian border to Wilsons Promontory (e.g. Portland, Warrnambool, Cape Otway, Sorrento) (Corrick 1996).	2	01/01/1893	No suitable habitat - <b>unlikely to occur.</b>
Lacey River Buttercup	<i>Ranunculus amplus</i>		cr	Mostly on swamp margins, sometimes partially submerged, with leaves and inflorescences emergent (RBGV 2021).	2	27/10/2015	Suitable habitat in Plains Grassy Wetland and Aquatic Herbland areas - <b>potential to occur.</b> Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>
Large-headed Fireweed	<i>Senecio macrocarpus</i>	VU	cr	In Victoria, Large-fruit Fireweed occurs most commonly in grasslands on red-brown earth soils. It may also occur in grassy woodlands and open woodlands predominantly in the Western (Basalt) Plains grassland on red brown earth soils found on recent Quaternary (basalt) deposits (DAWE 2020).	None	N/A	Habitat highly modified, no nearby records - <b>unlikely to occur.</b>

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Swamp Fireweed	<i>Senecio psilocarpus</i>	VU		Herb-rich winter-wet swamps on volcanic clays or peaty soils (Walsh 1999). Known from approximately 10 sites between Wallan, about 45 km north of Melbourne, and Honans Scrub in south-eastern South Australia (TSSC 2008).	13	13/11/2019	Suitable habitat in Plains Grassy Wetland areas - <b>potential to occur. Recorded during targeted surveys in HZ C.</b> Not recorded in impact areas. Now considered <b>unlikely to occur in impact areas.</b>
Coast Dandelion	<i>Taraxacum cygnorum</i>	VU	cr	Woodland and scrub on limestone (Scarlett 1999).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>
Blotched Sun-orchid	<i>Thelymitra benthamiana</i>		en	Found mostly in heathland, heathy woodlands and open forests on well-drained sand and clay loams (Weber & Entwisle 1994).	1	30/10/1992	No suitable habitat - <b>unlikely to occur.</b>
Metallic Sun-orchid	<i>Thelymitra epipactoides</i>	EN	en	Grows primarily in mesic coastal heathlands, grasslands and woodlands, but is also found in drier inland heathlands, open forests and woodlands. Substrates may be moist or dry sandy loams or loamy sands. Critical habitat has not been determined but the species is likely to require open conditions, which may be created by soil disturbance or fire, for recruitment (DAWE 2020).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>
Spiral Sun-orchid	<i>Thelymitra matthewsii</i>	VU	en	Slightly elevated sites to 300m in well-drained soils (sandy loams to gravelly limestone soils) in light to dense forest; sometimes in coastal sandy flats (Weber & Entwisle 1994).	None	N/A	No suitable habitat - <b>unlikely to occur.</b>

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Parsley Xanthosia	<i>Xanthosia leiophylla</i>		en	Sandy heathland and heathy woodland, mostly in the south-west (RBGV 2021).	1	14/11/2011	No suitable habitat - <b>unlikely to occur.</b>
Swamp Everlasting	<i>Xerochrysum palustre</i>	VU	cr	Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils. Commonly associated genera include <i>Amphibromus</i> , <i>Baumea</i> , <i>Carex</i> , <i>Chorizandra</i> , <i>Craspedia</i> , <i>Eleocharis</i> , <i>Isolepis</i> , <i>Lachnagrostis</i> , <i>Lepidosperma</i> , <i>Myriophyllum</i> , <i>Phragmites australis</i> , <i>Themeda triandra</i> and <i>Villarsia</i> (DAWE 2020).	2	19/02/2009	Suitable habitat in Plains Grassy Wetland and Aquatic Herbland areas - <b>potential to occur</b> . Not recorded during targeted surveys. Now considered <b>unlikely to occur in impact areas.</b>

**Notes:** EPBC = threatened species status under EPBC Act (CR = critically endangered; EN = endangered; VU = vulnerable); FFG = threatened species status under the FFG Act (cr = critically endangered; en = endangered; vu = vulnerable)

#### 4.4. Listed ecological communities

The EPBC Protected Matters Search Tool (DAWE 2021) indicated that six ecological communities listed under the EPBC Act had the potential to occur in the study area (Table 4). Of these, two EPBC Act-listed ecological communities, *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) and *Seasonal Herbaceous Wetlands of the Temperate Lowland Plains* (SHWTLP), were recorded in the study area. Habitat Zones Q and R would also qualify as the FFG Act listed *Western (Basalt) Plains Grassland Community* (W(B)PGC).

**Table 4: EPBC Act listed ecological communities and likelihood of occurrence in the study area**

Ecological Community	EPBC	Occurrence in the study area
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	EN	Study area is inland. <b>Does not occur.</b>
Giant Kelp Marine Forests of South East Australia	EN	Study area is inland. <b>Does not occur.</b>
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	CR	Roadside remnants of woodland recorded in the study area lacked a canopy and large tree component, and had a high cover of introduced flora in the understorey; therefore, did not meet the condition thresholds for the listed community. <b>Does not occur.</b>
Natural Temperate Grassland of the Victorian Volcanic Plain	CR	Recorded within two habitat zones either side of Riverside/Harris Road. Each of these habitat zones were dominated by Kangaroo Grass and supported a high proportionate cover of native grasses (>75%). <b>Occurs in Habitat Zones Q and R.</b>
Seasonal herbaceous Wetlands (freshwater) of the Temperate Lowland Plain	CR	Recorded in the study area in five patches, which met the condition thresholds for native species cover and presence of herbaceous species. <b>Occurs in Habitat Zones AC, AG, BC, KA and KB.</b> <b>Potential to occur in Habitat Zone ED</b> (subject to survey at appropriate time of year). Other wetlands in the study area failed to meet the condition thresholds for native species cover, no longer had herbaceous species present, had greater than 50% cover of introduced species or were too small.
Subtropical and Temperate Coastal Saltmarsh	VU	No saltmarsh vegetation was recorded in the study area. <b>Does not occur.</b>

**Notes:** EPBC = status under EPBC Act: CR = critically endangered; EN = endangered; VU = vulnerable.



## 5. Assessment of impacts

### 5.1. Proposed development

The Ryan Corner Wind Farm will constitute a network of 52 approved turbines, including 17 turbines to the west of Riverside/Harris Road and 35 turbines to the east of Riverside/Harris Road. It will also involve access tracks to all turbines, plus a concrete batching plant, site compound, on-site substation and underground cabling, as shown in Figure 2. It is understood that where underground cabling crosses Riverside Road, it will be directionally drilled to avoid impacts to high-quality roadside vegetation. Impacts arising from the off-site transmission line are addressed in a separate report and planning permit, and are therefore not considered here.

To determine impacts to native vegetation the footprint, as shown in Figure 2, was overlaid with the native vegetation mapped as part of this investigation. The project can and will be completed within the footprint designated in this report. It is understood that the northern two cable crossings of Riverside Road will be directionally drilled. The southern cable with access track will be trenched adjacent to the track in an area without native vegetation. Therefore, no impact was accounted for at Riverside Road.

Cumulative impacts of the wind farm and the external transmission line will be addressed in the transmission line's native vegetation impact assessment and planning permit application for the removal of native vegetation.

### 5.2. Impacts of proposed development

Various design measures have been undertaken for this proposal to avoid and minimise impacts to native vegetation. These are detailed in Section 6.1.1.

#### 5.2.1. Native vegetation

The current proposal footprint will result in the loss of a total 'extent' of 3.836 hectares of native vegetation as represented in Figure 2 and documented in the BIOR report provided by DELWP (Appendix 6). This comprised:

- The loss of 1.915 hectares of native vegetation from remnant patches;
- The loss of 1.921 hectares of native vegetation from DELWP mapped wetlands; and
- No scattered trees.

It is understood that no native vegetation has been approved for removal associated with the project within the last five years other than the existing permit (200600222-A), the subject of this assessment.

Therefore the total extent of removal for determining 'extent risk' is 3.836 hectares. Representative photographs of native vegetation proposed for removal are provided in Appendix 4.

#### 5.2.2. Modelled species important habitat

The current proposal footprint will not have a proportional impact on modelled habitat above the specific offset threshold for any rare or threatened species listed on DELWP's advisory lists as determined by DELWP and presented in Appendix 6.

#### 5.2.3. Listed flora species

Targeted surveys determined that three listed flora species occurred in the proposed footprint at the time. These are:

- Swamp Fireweed;

- Pale Swamp-everlasting; and
- Basalt Leek-orchid.

The development footprint has subsequently been amended to avoid all instances of these listed species, as shown in Figure 2; as such, the proposed development will not impact any EPBC or FFG Act listed flora species.










#### **5.2.4. Threatened ecological communities**

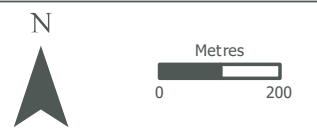
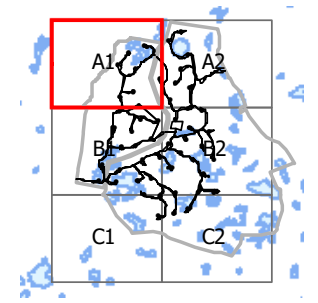
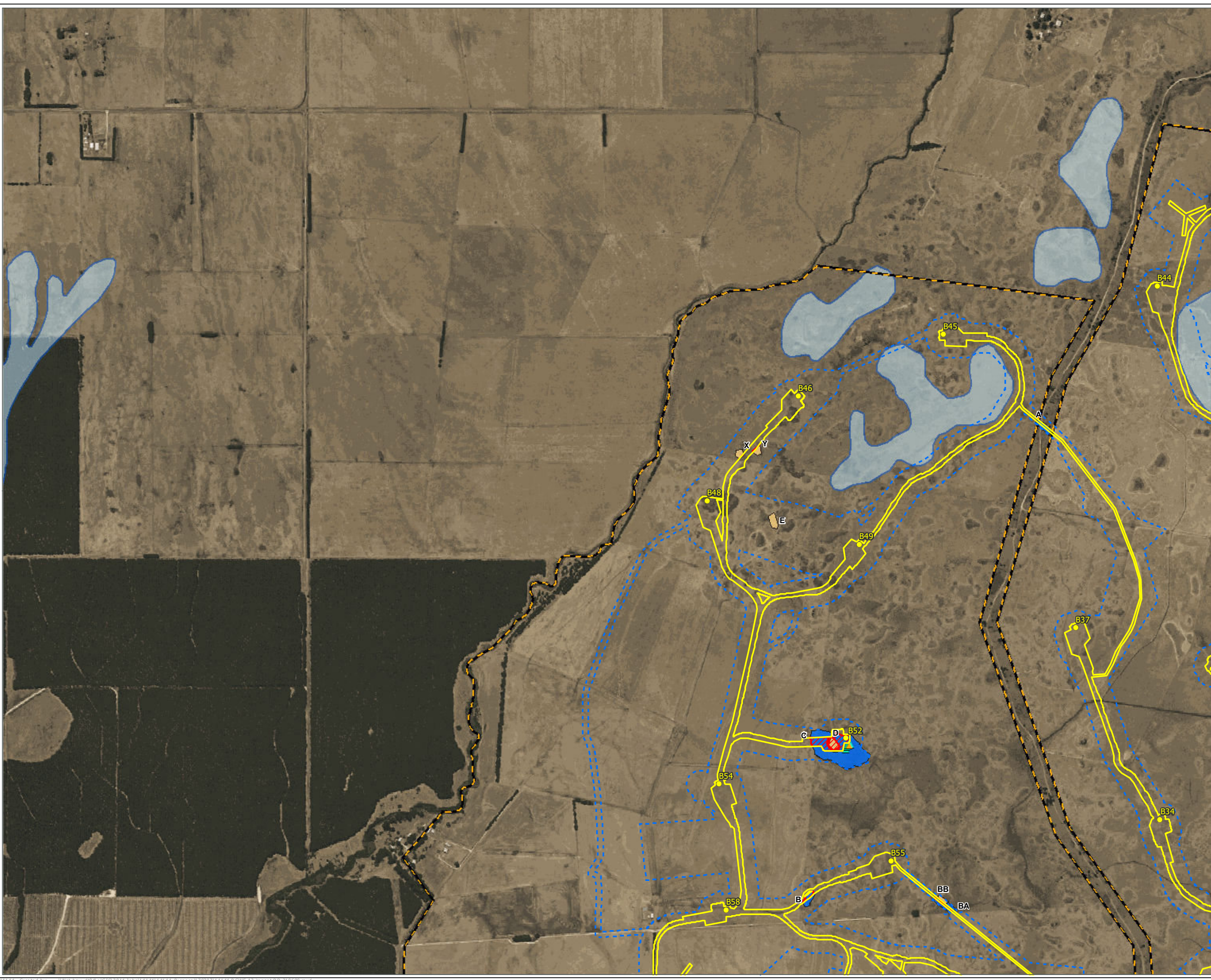
Two EPBC Act listed communities occur within the study areas. These are *Seasonal Herbaceous Wetland of the Temperate Lowland Plain* (SHWTLP) and *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP), which also qualifies as the FFG Act listed community *Western (Basalt) Plains Grassland Community* (W(B)PGC).

The proposed development footprint has been designed to avoid all instances of these listed communities (confirmed and potential), as shown in Figure 2; as such, the proposed development will not impact any EPBC or FFG Act listed communities.

**Figure 2-A1: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

-  Combined study area
  -  Development footprint
  -  Proposed turbine locations
- Native vegetation**
-  Plains Grassy Wetland (EVC 125)
  -  Stony Knoll Shrubland (EVC 649)
  -  Pale Swamp-everlasting
  -  Swamp Fireweed
  -  DELWP wetlands
  -  Native vegetation to be removed

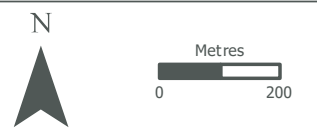
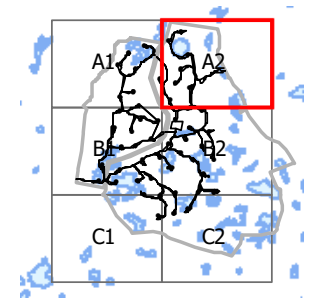
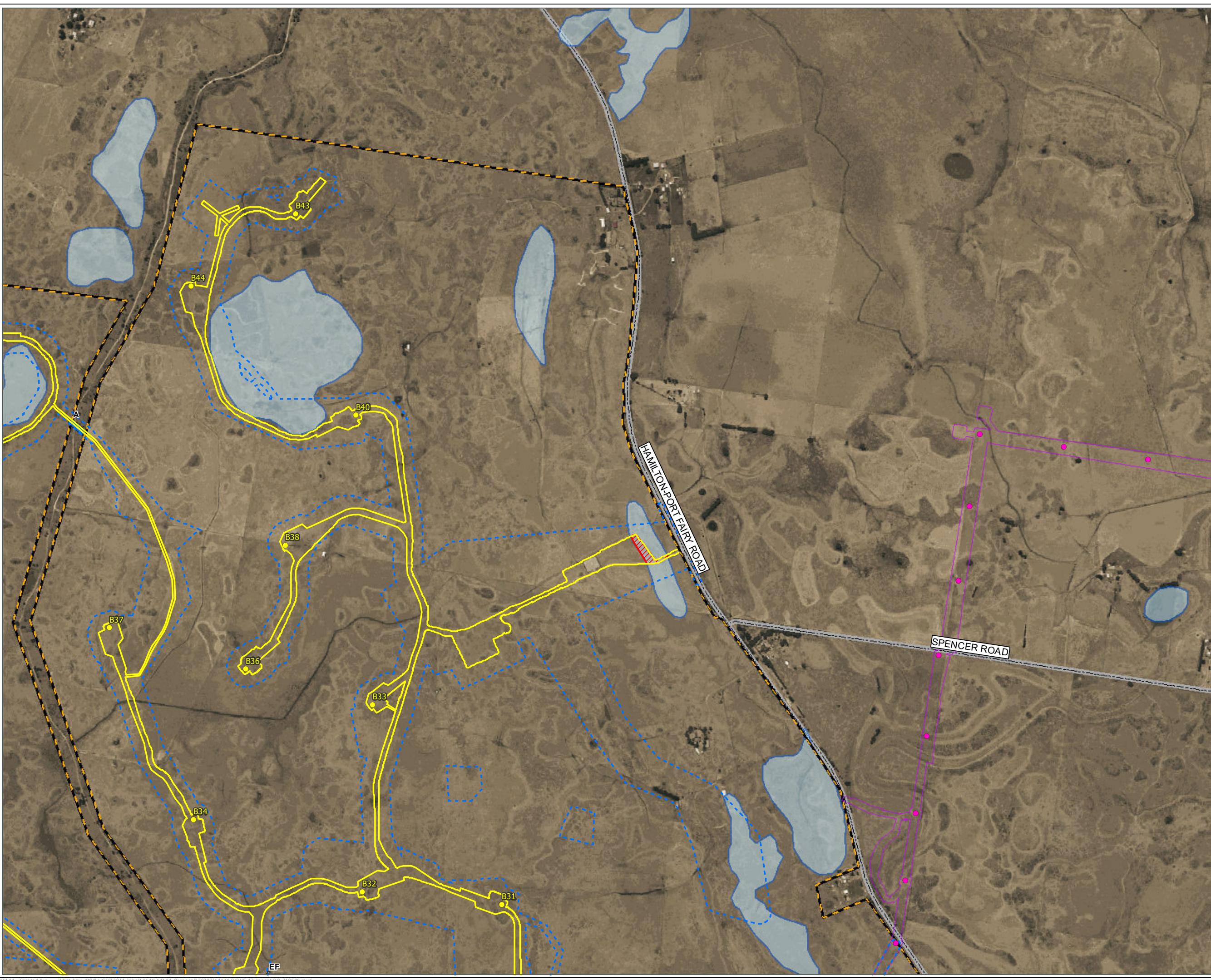


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**Figure 2-A2: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

- - - Combined study area
- Combined TXL study area
- Development footprint
- Proposed turbine locations
- Pole location
- Native vegetation**
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- DELWP wetlands
- Native vegetation to be removed

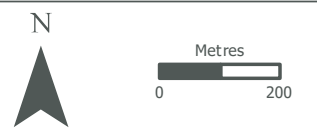
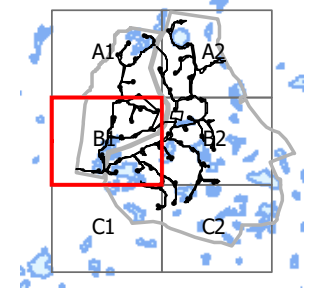


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**Figure 2-B1: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

- Combined study area
- Development footprint
- Proposed turbine locations
- Native vegetation**
- Damp Sands Herb-rich Woodland (EVC 3)
- Plains Grassland - Heavier-soils (EVC 132\_61)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- Basalt Leek Orchid
- Listed ecological communities**
- NTGVVP
- SHWTLP
- Potential SHWTLP
- DELWP wetlands
- Native vegetation to be removed

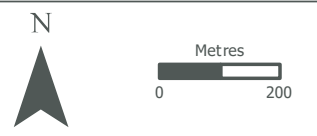
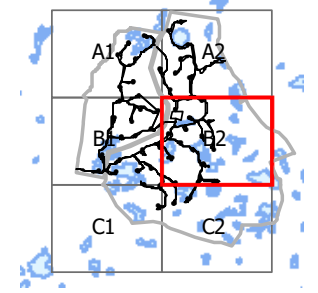


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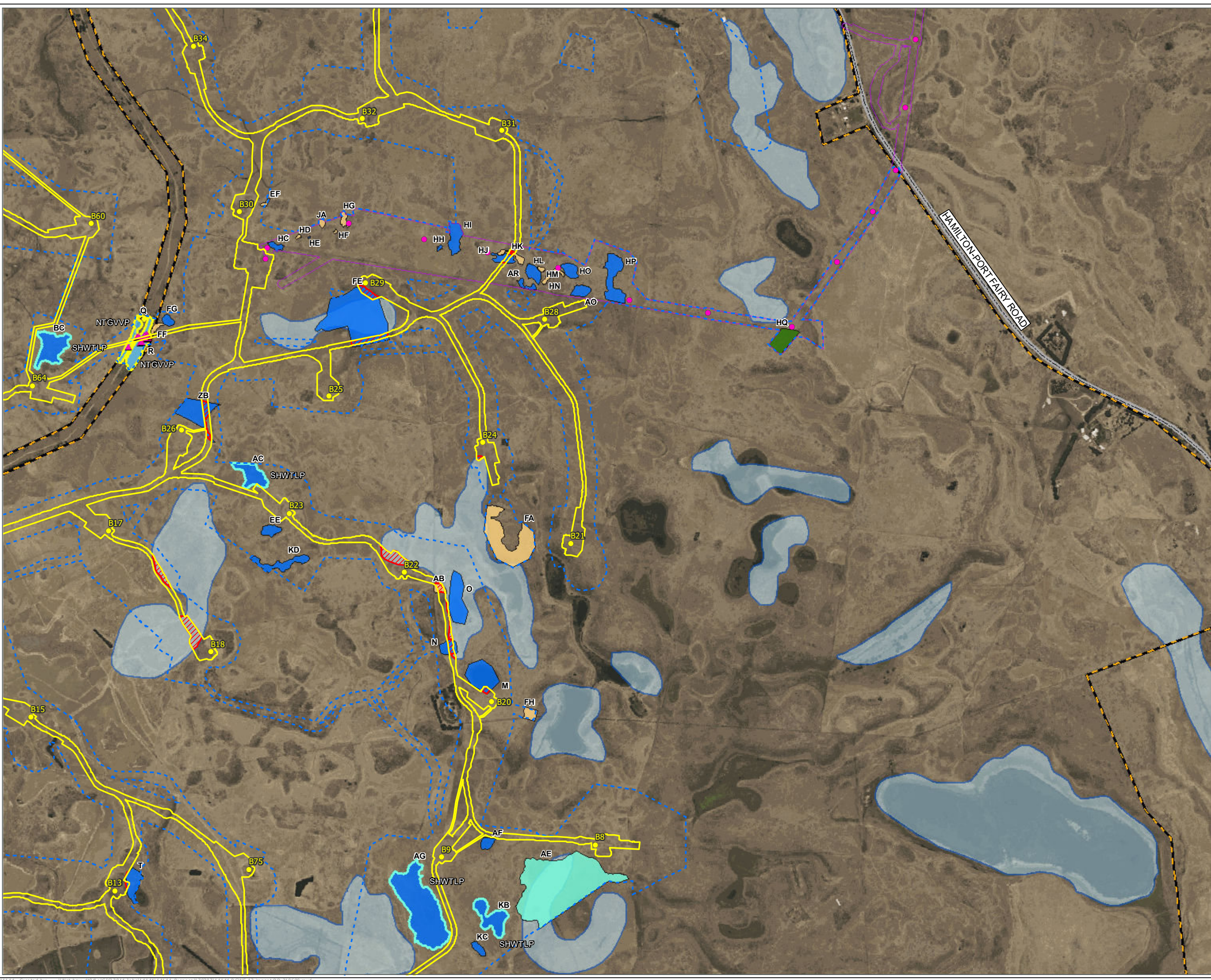
**Figure 2-B2: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

- ⋯ Combined study area
- Combined TXL study area
- Development footprint
- Proposed turbine locations
- Pole location
- Native vegetation**
- Aquatic Herbland (EVC 653)
- Higher Rainfall Plains Grassy Woodland (EVC 55\_63)
- Plains Grassland - Heavier-soils (EVC 132\_61)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- ▲ Basalt Leek Orchid
- Listed ecological communities**
- NTGVVP
- SHWTLP
- DELWP wetlands
- ▨ Native vegetation to be removed



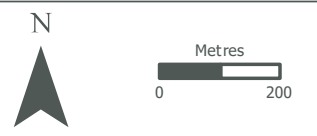
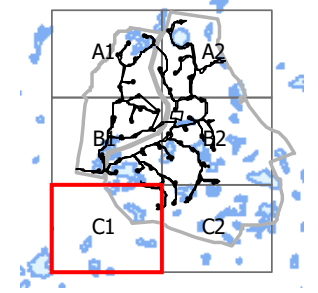
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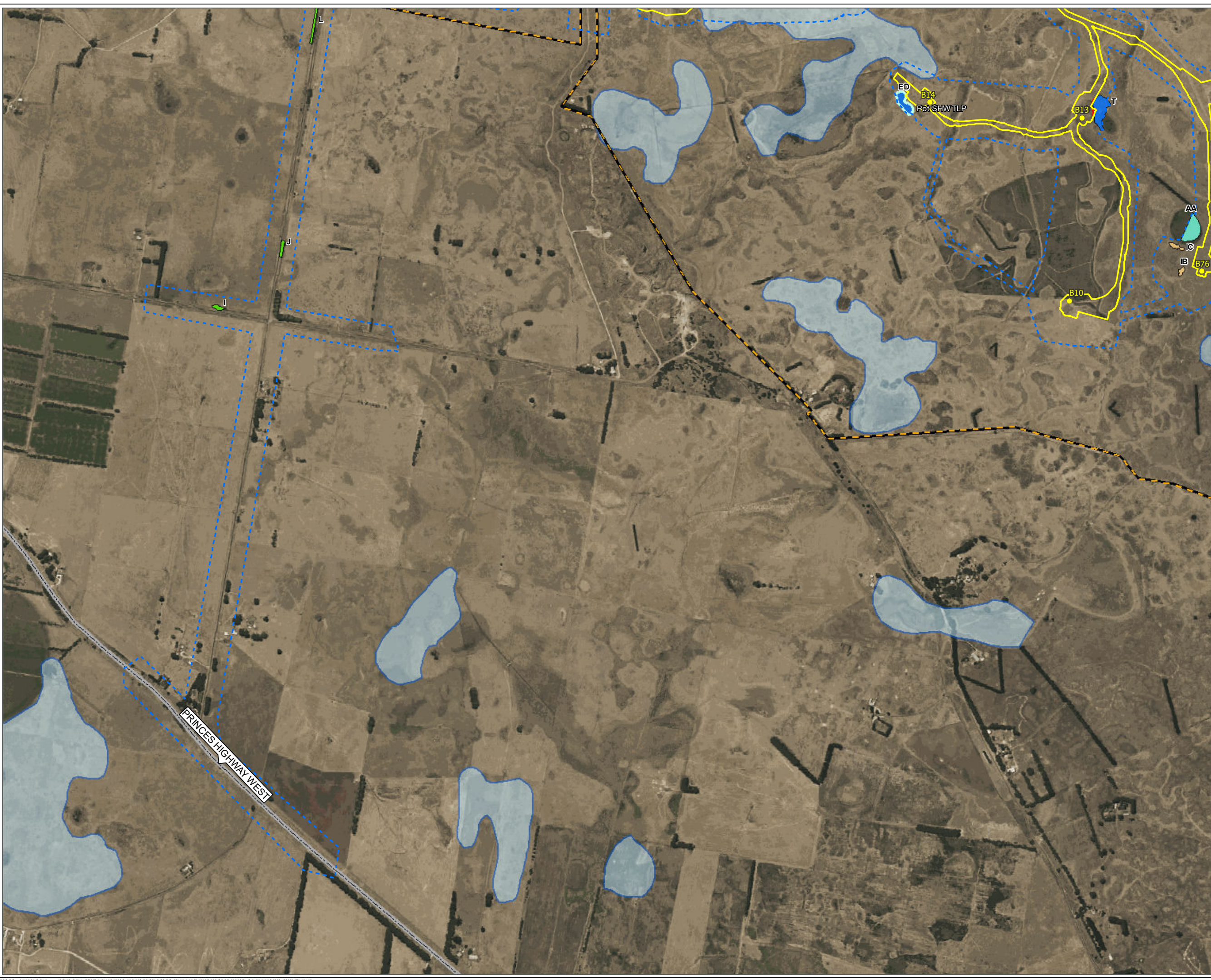
**Figure 2-C1: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021

- Combined study area
- Development footprint
- Proposed turbine locations
- Native vegetation**
- Aquatic Hermland (EVC 653)
- Damp Sands Herb-rich Woodland (EVC 3)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- Listed ecological communities**
- Potential SHWTLP
- DELWP wetlands
- Native vegetation to be removed



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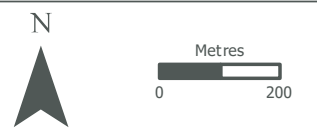
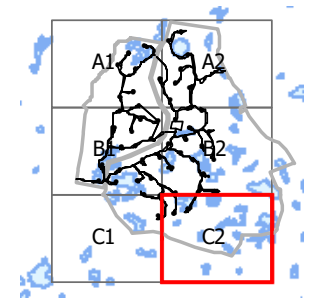


**Figure 2-C2: RCWF native vegetation to be impacted**

**Project:** Ryan Corner Wind Farm  
**Client:** Ryan Corner Development Pty Ltd  
**Date:** 23/11/2021



- Combined study area
- Development footprint
- Proposed turbine locations
- Native vegetation**
- Aquatic Hermland (EVC 653)
- Plains Grassy Wetland (EVC 125)
- Stony Knoll Shrubland (EVC 649)
- Listed ecological communities**
- SHWTLP
- DELWP wetlands
- Native vegetation to be removed



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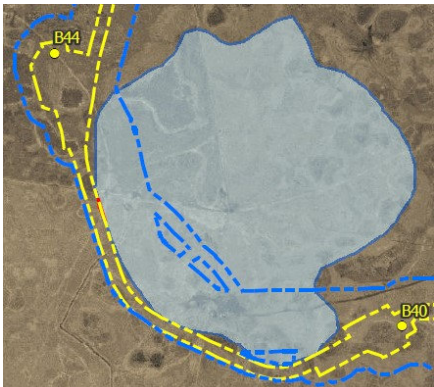

## 6. Implications under legislation and policy

### 6.1. Implications under the Biodiversity Assessment Guidelines

#### 6.1.1. Avoid and minimise statement

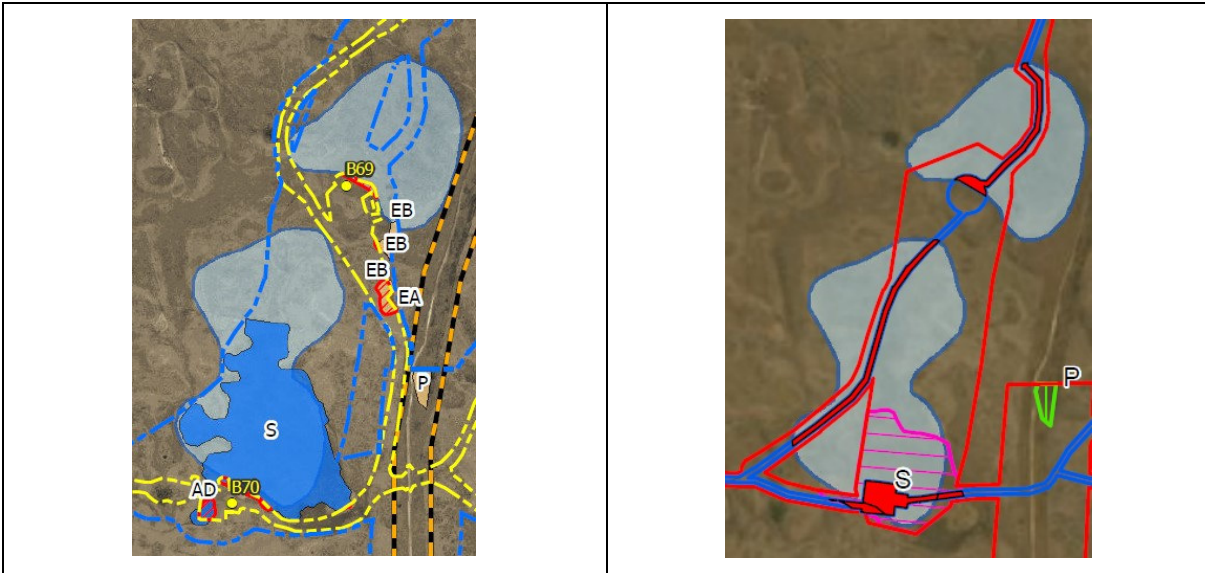
In accordance with the Guidelines, all applications to remove native vegetation must provide an avoid and minimise statement which details any efforts undertaken to avoid the removal of, and minimise the **impacts on biodiversity and other values of native vegetation, and how these efforts focussed on areas of native vegetation that have the most value.** Efforts to avoid and minimise impacts to native vegetation in the current application are presented as follows:

- Wherever possible, the wind farm layout has been designed to avoid and minimise impacts on native vegetation including:
  1. Several re-designs have been implemented to further avoid impacts to native vegetation. Access tracks and turbines have been re-sited to avoid and minimise impacts on native vegetation including DELWP mapped wetlands following assessments of native vegetation by ERM in 2007 and BL&A /Nature Advisory in 2017, 2020 and 2021. Examples of how the access tracks have been realigned to avoid impacts on native vegetation are provided below: Track realignment between turbines B40 & B44; Intermediate turbine removed.

2021 Layout (yellow) – <u>No impact to the wetland</u>	2017 Layout (red) – Road crossing through the wetland
	

2. Track realignment between turbines B69 & B70; Turbine B70 micro-sited and track realigned to avoid impact to nominated wetland.

2021 Layout (yellow) – Significantly minimized impact to the wetlands	2017 Layout (red) – Road crossing through the wetland
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3. Redesigned tracks between turbines B72, B73 & B74; Access tracks to turbines B72, B73 & B74 redesigned to avoid impact to the nominated wetland.

<p>2021 Layout (yellow) – Significantly reduced impact to the wetland.</p>	<p>2017 Layout (red) – Road crossing through the wetland</p>

- 
- 
- Designing drainage at impacted DELWP wetlands to not disrupt the current behaviour of the wetlands where infrastructure (access tracks, cabling, turbine hardstands) is installed within the wetland. This is undertaken to avoid indirect impacts on the DELWP wetlands. Adoption of specific construction techniques to assist in reducing impacts on native vegetation. This has led to a revised construction footprint which remains more than adequate to cover all construction activities comfortably.
- Avoiding all EPBC listed species and communities identified to be present within the wind farm site.
- A broader and more conservative footprint was used in the more recent report. This initially resulted in much higher indicative impacts, most of which have now once again been reduced through redesign and further avoidance. The footprint is more than adequate to cover all construction activities comfortably. See Appendix 8 Diagram of turbine footprint.

- The previous wind farm layout included multiple crossings of Riverside/Harris Road. Given the high-quality native vegetation mapped along this road, the proposed layout will now use directional drilling for cable crossings of Riverside/Harris Road to avoid impacts to native vegetation.

Further avoidance and minimisation are not possible due to:

- A need to remain within the 100m micro siting envelope; and
- Siting of tracks along fence lines to reduce the number of boundary crossings as requested by landowners to reduce disruptions to farming activities.
- Every effort will be made to further avoid and minimise removal of any of the native vegetation approved for removal as works progress.

Indirect impacts to DELWP wetlands have been avoided in informing the wind farm layout by hydrological modelling and associated designs to ensure that the current drainage and surface water flow is not changed by introducing the wind farm to the site. See Appendix 9 Hydrological Design Assessment Ryan Corner Wind Farm 05/11/2021.

Impacts to any and all EPBC listed communities and species have been avoided.

The proposed development footprint will not impact on any EPBC listed communities and species.

As cabling will be directionally drilled under Riverside Road, no impacts will occur to the EPBC Act listed community *Natural Temperate Grassland of the Victorian Volcanic Plain*, or to the FFG Act listed species Basalt Leek-orchid, *Prasophyllum viretrum*. Access tracks have been realigned and the construction footprint has been amended to avoid impacts on identified EPBC listed communities and species.

### 6.1.2. Risk-based assessment pathway for the site

#### Location risk

The area of proposed native vegetation removal contained mapped areas of the following *location risk* categories:

- Location Risk A – covering the majority of the site.
- Location Risk B – covering negligible areas in the north eastern and southern parts of the site.
- Location Risk C – very small areas in the northern portion of the site.

#### Extent risk

The *Biodiversity Impact and Offset Requirement* (BIOR) report provided by DELWP (Appendix 6) has determined that the extent of loss proposed is 3.836 hectares. It is understood that no native vegetation has been approved for removal associated with the project within the last five years other than the existing permit. (Planning Permit No. 200600222A).

#### Risk-based assessment pathway

Based on the criteria outlined in the Guidelines stipulate that the proposal will be assessed under the **Moderate** risk assessment pathway.

### 6.1.3. Offset requirements

Offsets required to compensate for the proposed removal of native vegetation zones have been determined using site-based habitat hectare scores and additional modelled data provided in the BIOR report (Appendix 6). These are presented below.

- 0.953 *general*/biodiversity equivalence units

Offsets must:

- Be located within the Glenelg Hopkins Catchment Management Authority area or the Moyne Shire local government area; and
- Have a minimum strategic biodiversity score of 0.348.

Under the Biodiversity Assessment Guidelines *all* offsets must be secured prior to the removal of native vegetation. In accordance with Condition 26 of the Planning Permit, evidence that the required offset for the project has been secured must be provided to the satisfaction of the Minister for Planning prior to the removal of any native vegetation.

#### 6.1.4. Offset statement

The offset target for the current proposal will be achieved via a third-party offset.

Evidence that the required offset is available is provided in Appendix 7. The required offset would be secured following approval of the planning permit amendment application to remove no more than 3.836 hectares of native vegetation and prior to the removal of any native vegetation.

#### 6.2. EPBC Act

The EPBC Act protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these species require the approval of the Australian Minister for the Environment.

Based on the relevant guidelines, the proposed development is unlikely to result in a significant impact on EPBC Act-listed values presented below.

- *Seasonal Herbaceous Wetlands of the Temperate Lowland Plains* (SHWTLP);
- *Natural Temperate Grasslands of the Victorian Volcanic Plains* (NTGVVP); or
- Swamp Fireweed (*Senecio psilocarpus*).

Therefore, there are no implications under the EPBC Act.

#### 6.3. FFG Act

The Victorian FFG Act lists threatened and protected species and ecological communities (DELWP 2019, DELWP 2021b). Any removal of threatened flora species or communities (or protected flora) listed under the FFG Act from public land requires a Protected Flora Permit under the Act, obtained from DELWP.

The FFG Act only applies to private land in relation to the commercial collection of grasstrees, tree-ferns and sphagnum moss.

No FFG Act values listed as threatened or protected are susceptible to impacts from the proposed development on public land. There are therefore no implications under the FFG Act.

#### 6.4. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that landowners (or a third party to whom responsibilities have been legally transferred) must eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds.

Property owners who do not eradicate Regionally prohibited weeds or prevent the growth and spread of Regionally controlled weeds for which they are responsible, may be issued with a Land Management Notice or Directions Notice that requires specific control work to be undertaken.

In accordance with the *Catchment and Land Protection Act 1994*, the noxious weed species listed below, which were recorded in the study area, must be controlled.

- Spear Thistle
- Variegated Thistle
- Gorse

Precision control methods that minimise off-target kills (e.g. spot spraying) should be used in environmentally sensitive areas (e.g. within or near native vegetation, waterways, etc.).

### 6.5. Construction mitigation recommendations

Additional recommendations to avoid indirect impacts to vegetation during construction are provided below:

- Establish appropriate vegetation protection zones around areas of native vegetation to be retained prior to works. Vegetation protection zones should be fenced and clearly signed.
- Ensure all construction personnel are appropriately briefed prior to works, and that no construction personnel, machinery, equipment or stockpiles are placed inside vegetation protection zones.

## 7. References

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## Appendix 1: Details of the assessment process in accordance with the Permitted clearing of native vegetation: Biodiversity assessment guidelines (DEPI 2013)

### Native Vegetation Information Management system (NVIM)

The online Native Vegetation Information Management system (NVIM) is an interactive mapping tool, which provides some of the information required to accompany a permit to remove native vegetation. It does not replace the application process.

The information provided by NVIM can include the following (described in more detail below):

- The *location risk* of the native vegetation;
- The *condition* of the native vegetation – used for the low-risk assessment pathway only;
- The *strategic biodiversity score* of the native vegetation proposed to be removed; and
- The *native vegetation offset* requirement – used for the low risk assessment pathway only.

### Biodiversity assessment guidelines

#### Guidelines objective

As set out in *Permitted clearing of native vegetation – Biodiversity assessment guidelines* ('the Guidelines') the objective for permitted clearing of native vegetation in Victoria is 'No net loss in the contribution made by native vegetation to Victoria's biodiversity'. The key strategies for ensuring this outcome when considering an application to remove native vegetation are:

- Avoiding the removal of native vegetation that makes a significant contribution to Victoria's biodiversity;
- Minimising impacts on Victoria's biodiversity from the removal of native vegetation; and
- Where native vegetation is permitted to be removed, ensuring it is offset in a manner that makes an equivalent contribution to Victoria's biodiversity made by the native vegetation to be removed.

**Note:** if native vegetation does not meet the definition of either a remnant patch or scattered trees, the Guidelines are not required to be applied.

#### Risk-based assessment pathways

The first step in determining the type of assessment required for any site in Victoria is to determine the risk to biodiversity associated with the proposed native vegetation removal and therefore the risk-based assessment pathway for the proposed native vegetation removal. There are three risk-based pathways for assessing an application to remove native vegetation, below.

- Low risk
- Moderate risk
- High risk

This risk-based assessment pathway is determined by two factors, outlined below.

**Extent risk** – the area in hectares proposed to be removed *or* the number of scattered trees. *Note:* extent risk also includes any native vegetation clearing for which permission has been granted in the last five years.

**Location risk** – the likelihood that removing native vegetation in a location will have an impact on the persistence of a rare or threatened species classified into three categories: Location A, Location B and Location C.

The risk-based pathway for assessing an application to remove native vegetation is determined by the following matrices for remnant patches and scattered trees:

Extent (remnant patches)	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High
Extent (scattered trees)	Location A	Location B	Location C
< 15 scattered trees	Low	Moderate	High
≥ 15 scattered trees	Moderate	High	High

All native vegetation within any subdivision plot of less than 0.4 hectares is deemed to be lost; For applications with combined removal of both remnant patch and scattered trees, the extent of the scattered trees is converted to an area by assigning a standard area of 0.070 hectares per tree – the total extent is then used to determine the risk-based pathway.

The presence of any Location B or Location C risk categories within an area of proposed native vegetation removal means this whole area of removal is considered to belong to that category for the purpose of determining the risk-based assessment pathway.

#### Strategic biodiversity score

The strategic biodiversity score generated by NVIM acts as a measure of the site's importance for Victoria's biodiversity relative to other locations across the landscape. It is calculated based on a weighted average of scores across an area of native vegetation proposed for removal on a site.

#### Habitat importance

Habitat importance mapping produced by DELWP is based on one or a combination of habitat importance models, habitat distribution models or site record data. It identifies the following:

- *Habitat importance for dispersed species* – based on habitat distribution models and assigned a habitat importance score ranging from 0 to 1; and
- *Highly localised habitats* – considered to be equally important for a particular species and assigned a habitat importance score of 1.

Habitat importance mapping is used to determine the type of offset required under the moderate and high risk assessment pathways.

#### Biodiversity equivalence

Biodiversity equivalence scores are used to quantify losses in the contribution to Victoria's biodiversity from removing native vegetation and gains in this contribution from a native vegetation offset.

There are two types of biodiversity equivalence scores depending on whether or not the site makes a contribution to the habitat of a Victorian rare or threatened species.

- A *general* biodiversity equivalence score is a measure of the contribution native vegetation on a site makes to Victoria's biodiversity overall and applies when no habitat importance scores are applicable according to the equation:

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

- A *specific* biodiversity equivalence score is a measure of the contribution that native vegetation on a site makes to the habitat of a particular rare or threatened species – calculated for each such species for which the site provides important habitat (using habitat importance scores provided by DELWP) according to the equation:

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

#### Offset requirements

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a risk factor to address the risk of offset failing:

- A *general* offset applies if the removal of native vegetation impacts Victoria's overall biodiversity and has an offset risk factor of 1.5 applied according to the equation:

$$\text{General risk-adjusted offset requirement} = \text{general biodiversity equivalence score (clearing site)} \times 1.5$$

- A *specific* offset applies if the native vegetation makes a significant impact to habitat for a rare or threatened species determined by a *specific-general offset test*. It applies to each species impacted and has an offset risk factor of 2 applied according to the equation:

$$\text{Specific risk-adjusted offset requirement} = \text{specific biodiversity equivalence score (clearing site)} \times 2$$

**Note:** if native vegetation does not meet the definition of either a remnant patch or scattered trees an offset is not required.

**Summary of the Guidelines assessment process**

Decision guidelines	Offset requirements
<p style="text-align: center;"><b>Low-risk assessment pathway</b></p> <p>An application for removal cannot be refused on biodiversity grounds (unless it is not in accordance with any property vegetation plan that applies to the site).</p> <p><i>Note: this guideline also applies to native vegetation that does not meet the definition of either a remnant patch or scattered trees.</i></p>	<p>General offset applies:</p> <ul style="list-style-type: none"> <li>▪ General offset = general biodiversity equivalence score (clearing site) x 1.5</li> <li>▪ Offset must be located in the same CMA^ or Local Government Area as the removal</li> <li>▪ Offset must have a strategic biodiversity score at least 80% of the native vegetation removed</li> </ul> <p>Offsets must be secured before the removal of native vegetation.</p>
<p style="text-align: center;"><b>Moderate-risk assessment pathway</b></p> <p>The responsible authority will consider:</p> <ul style="list-style-type: none"> <li>▪ The strategic biodiversity score and habitat importance score of the native vegetation proposed to be removed</li> <li>▪ Any property vegetation plan that applies to the site</li> <li>▪ Whether reasonable steps have been taken to ensure that impacts of the proposed removal of native vegetation on biodiversity have been minimised with regard to the contribution to biodiversity made by the native vegetation to be removed and the native vegetation to be retained</li> <li>▪ Whether an offset has been identified that meets the requirements</li> </ul>	<p>If the proportional impact on modelled habitat for a rare or threatened species is above a predetermined threshold, a specific offset applies for that species:</p> <ul style="list-style-type: none"> <li>▪ Specific offset = specific biodiversity equivalence score (clearing site) x 2</li> <li>▪ Offset must be located in the same species habitat anywhere in Victoria as determined by DELWP habitat importance mapping</li> </ul> <p>General offsets apply where the specific offset threshold is not exceeded.</p>

- The need to remove native vegetation to create defensible space to reduce the risk of bushfire
- Offsets must be secured before the removal of native vegetation.

### High-risk assessment pathway

In addition to the considerations for the moderate pathway the responsible authority will determine whether the native vegetation to be removed makes a significant contribution to Victoria’s biodiversity. This includes considering:

- Impacts on important habitat for rare or threatened species, particularly highly localised habitat
- Proportional impacts on remaining habitat for rare or threatened species
- If the removal of the native vegetation will contribute to a cumulative impact that is a significant threat to the persistence of a rare or threatened species
- The availability of, and potential for, gain from offsets

As for the moderate pathway

\* Habitat hectares = condition score (out of 1) x extent (hectares)

**Appendix 2: Detailed habitat hectare assessment results**

Habitat Zone		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Bioregion		VVP	VVP	VVP	VVP	VVP	WaP	WaP	WaP	WaP	WaP	WaP	WaP	VVP	VVP	VVP	
EVC Number		125	125	125	649	649	3	3	125	3	3	3	3	125	125	125	
Total area of Habitat Zone (ha)		0.130	0.131	1.814	0.114	0.136	0.059	0.029	0.079	0.057	0.071	0.233	0.109	0.986	0.281	0.933	
Site Condition	Large Old Trees /10	0	0	0	0	0	0	0	N/A	0	0	0	0	0	0	0	
	Tree Canopy Cover /5	0	0	0	0	0	0	0	N/A	0	0	0	0	0	0	0	
	Lack of Weeds /15	6	6	6	2	2	0	0	9	0	0	0	0	4	4	4	
	Understorey /25	20	10	10	15	10	5	5	5	5	5	5	5	5	5	5	
	Recruitment /10	10	0	0	3	3	5	5	3	5	5	5	5	3	3	3	
	Organic Matter /5	5	0	0	0	0	2	2	0	2	2	2	2	2	0	0	0
	Logs /5	0	0	0	0	0	0	0	N/A	0	0	0	0	0	0	0	0
	Site condition standardising multiplier*	1.36	1.36	1.36	1.36	1.36	1.00	1.00	1.36	1.00	1.00	1.00	1.00	1.00	1.36	1.36	1.36
<i>Site Condition subtotal</i>		<i>56</i>	<i>22</i>	<i>22</i>	<i>27</i>	<i>20</i>	<i>12</i>	<i>12</i>	<i>23</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>12</i>	<i>16</i>	<i>16</i>	<i>16</i>	
Landscape Context	Patch Size /10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Neighbourhood /10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Distance to Core /5	0	1	1	0	1	0	0	0	0	0	0	0	1	1	1	
<b>Total Condition Score /100</b>		<b>57</b>	<b>24</b>	<b>24</b>	<b>28</b>	<b>22</b>	<b>13</b>	<b>13</b>	<b>24</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>18</b>	<b>18</b>	<b>18</b>	
EPBC Act listed ecological communities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

\* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).

Habitat Zone		P	Q	R	S	T	X	Y	ZB	AA	AB	AC	AD
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC Number		649	132_61	132_61	125	125	649	649	125	653	649	125	125
Total area of Habitat Zone (ha)		0.140	0.342	0.664	4.723	0.475	0.071	0.070	0.962	0.416	0.119	0.650	0.112
Site Condition	Large Old Trees	/10	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Tree Canopy Cover	/5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Lack of Weeds	/15	9	13	13	2	2	0	0	4	9	6	9
	Understorey	/25	15	5	5	5	5	15	15	5	10	10	15
	Recruitment	/10	6	0	0	0	0	6	6	3	0	3	0
	Organic Matter	/5	0	5	5	2	2	0	0	0	3	4	5
	Logs	/5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Site condition standardising multiplier*		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
<i>Site Condition subtotal</i>		<i>41</i>	<i>31</i>	<i>31</i>	<i>12</i>	<i>12</i>	<i>29</i>	<i>29</i>	<i>16</i>	<i>30</i>	<i>31</i>	<i>39</i>	<i>12</i>
Landscape Context	Patch Size	/10	1	2	2	2	1	1	1	1	1	1	2
	Neighbourhood	/10	0	0	0	1	0	0	0	0	0	1	0
	Distance to Core	/5	1	1	1	1	1	0	0	1	0	0	1
<b>Total Condition Score</b>		<b>/100</b>	<b>43</b>	<b>34</b>	<b>34</b>	<b>16</b>	<b>14</b>	<b>30</b>	<b>30</b>	<b>18</b>	<b>31</b>	<b>33</b>	<b>40</b>
EPBC Act listed ecological communities		-	NTGWV	NTGWV	-	-	-	-	-	-	-	SHWVLP	-

\* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).

Habitat Zone		AE	AF	AG	BA	BB	BC	EA	EB	EC	ED	EE	EF	FA	FE	
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	
EVC Number		653	125	125	125	649	125	649	649	649	125	125	649	649	125	
Total area of Habitat Zone (ha)		5.903	0.176	3.374	0.156	0.052	0.997	0.158	0.201	0.257	0.263	0.228	0.040	2.019	3.543	
Site Condition	Large Old Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Tree Canopy Cover	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Lack of Weeds	/15	6	9	9	4	6	4	9	9	6	6	9	9	4	4
	Understorey	/25	15	15	15	10	15	10	5	5	15	15	15	5	15	15
	Recruitment	/10	6	0	0	6	3	0	0	0	0	6	0	0	0	3
	Organic Matter	/5	3	5	5	4	4	3	5	5	4	5	5	5	4	5
	Logs	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Site condition standardising multiplier*		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
<i>Site Condition subtotal</i>			<i>41</i>	<i>39</i>	<i>39</i>	<i>33</i>	<i>38</i>	<i>23</i>	<i>26</i>	<i>26</i>	<i>34</i>	<i>44</i>	<i>39</i>	<i>26</i>	<i>31</i>	<i>37</i>
Landscape Context	Patch Size	/10	2	1	2	1	1	1	1	1	1	1	1	1	1	2
	Neighbourhood	/10	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Distance to Core	/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Condition Score</b>		<b>/100</b>	<b>43</b>	<b>40</b>	<b>41</b>	<b>34</b>	<b>39</b>	<b>24</b>	<b>27</b>	<b>27</b>	<b>35</b>	<b>45</b>	<b>40</b>	<b>27</b>	<b>33</b>	<b>40</b>
EPBC Act listed ecological communities			-	-	SHWTLP	-	-	SHWTLP	-	-	-	Potential SHWTLP	-	-	-	-

\* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).



Habitat Zone		FF	FG	FH	HC	HD	IA	IB	IC	KA	KB	KC	KD	AO	AR	
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	
EVC Number		649	125	649	125	649	125	649	649	125	125	125	126	125	649	
Total area of Habitat Zone (ha)		0.084	0.130	0.184	0.107	0.021	0.372	0.046	0.069	0.916	0.832	0.146	0.504	0.224	0.109	
Site Condition	Large Old Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Tree Canopy Cover	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Lack of Weeds	/15	6	6	4	6	6	4	0	0	4	4	0	0	4	4
	Understorey	/25	15	10	10	10	5	5	5	5	10	10	10	10	15	15
	Recruitment	/10	0	6	0	3	0	6	3	3	0	0	0	0	6	0
	Organic Matter	/5	3	4	4	5	2	4	4	4	3	3	4	4	4	4
	Logs	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Site condition standardising multiplier*		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	<i>Site Condition subtotal</i>		<i>33</i>	<i>35</i>	<i>24</i>	<i>33</i>	<i>18</i>	<i>26</i>	<i>16</i>	<i>16</i>	<i>23</i>	<i>23</i>	<i>19</i>	<i>19</i>	<i>34</i>	<i>26</i>
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	8	8	
	Neighbourhood	/10	1	1	1	0	0	0	0	0	1	1	0	0	5	5
	Distance to Core	/5	0	0	0	0	0	0	0	0	0	0	0	4	4	
<b>Total Condition Score</b>		<b>/100</b>	<b>35</b>	<b>37</b>	<b>26</b>	<b>34</b>	<b>19</b>	<b>27</b>	<b>17</b>	<b>17</b>	<b>25</b>	<b>25</b>	<b>20</b>	<b>20</b>	<b>51</b>	<b>43</b>
EPBC Act listed ecological communities			-	-	-	-	-	-	-	-	SHWTLP	SHWTLP	-	-	-	-

\* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).

Habitat Zone		HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	JA		
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP		
EVC Number		125	649	649	125	125	125	649	125	649	649	125	125	55_63	649		
Total area of Habitat Zone (ha)		0.003	0.012	0.116	0.025	0.446	0.229	0.133	0.265	0.036	0.131	0.236	0.833	0.549	0.055		
Site Condition	Large Old Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A		
	Tree Canopy Cover	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A		
	Lack of Weeds	/15	6	6	6	2	2	2	6	6	6	6	2	6	2	6	
	Understorey	/25	10	5	5	10	10	10	5	10	5	5	10	10	5	5	
	Recruitment	/10	3	0	0	3	3	3	0	3	0	0	3	3	0	0	
	Organic Matter	/5	5	2	2	2	5	2	2	5	2	2	2	5	2	2	
	Logs	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	
	Site condition standardising multiplier*		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.00	1.36
	<i>Site Condition subtotal</i>		<i>26</i>	<i>15</i>	<i>15</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>15</i>	<i>26</i>	<i>15</i>	<i>15</i>	<i>20</i>	<i>26</i>	<i>7</i>	<i>15</i>	
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Neighbourhood	/10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Distance to Core	/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total Condition Score</b>		<b>/100</b>	<b>27</b>	<b>16</b>	<b>16</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>16</b>	<b>27</b>	<b>16</b>	<b>16</b>	<b>21</b>	<b>27</b>	<b>9</b>	<b>16</b>	
EPBC Act listed ecological communities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

\* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004).

## Appendix 3: Flora species recorded in the study area

Origin	Common name	Scientific name	EPBC	FFG	CaLP Act
	Black Wattle	<i>Acacia mearnsii</i>			
	Blackwood	<i>Acacia melanoxylon</i>			
	Prickly Moses	<i>Acacia verticillata</i>			
	Australian Sheep's Burr	<i>Acaena ovina</i>			
*	Sheep Sorrel	<i>Acetosella vulgaris</i>			
	Common Maidenhair	<i>Adiantum aethiopicum</i>			
*	Hair Grass	<i>Aira</i> spp.			
*	Sweet Vernal-grass	<i>Anthoxanthum odoratum</i>			
	Umbellifer	<i>Apiaceae</i> spp.			
*	Cape weed	<i>Arctotheca calendula</i>			
	Common Woodruff	<i>Asperula conferta</i>			
	Spear Grass	<i>Austrostipa</i> spp.			
*	Lesser Quaking-grass	<i>Briza minor</i>			
	Sweet Bursaria	<i>Bursaria spinosa</i>			
	Purslane	<i>Calandrinia</i> spp.			
	Milky Beauty-heads	<i>Calocephalus lacteus</i>			
	Tall Sedge	<i>Carex appressa</i>			
	Common Grass-sedge	<i>Carex breviculmis</i>			
	Sedge	<i>Carex</i> spp.			
	Poong'ort	<i>Carex tereticaulis</i>			
*	Sticky Mouse-ear Chickweed	<i>Cerastium glomeratum</i>			
	Rock Fern	<i>Cheilanthes</i> spp.			
*	Spear Thistle	<i>Cirsium vulgare</i>			R
	Pale Swamp-everlasting	<i>Coronidium gunnianum</i>		cr	
*	Water Buttons	<i>Cotula coronopifolia</i>			
	Sieber Crassula	<i>Crassula sieberiana</i>			
	Common Water-ribbons	<i>Cyanogeton procerum</i>			
*	Dog's Tail	<i>Cynosurus</i> spp.			
*	Cocksfoot	<i>Dactylis glomerata</i>			
	Kidney-weed	<i>Dichondra repens</i>			
	Common Spike-sedge	<i>Eleocharis acuta</i>			
	Tall Spike-sedge	<i>Eleocharis sphacelata</i>			
	Prickfoot	<i>Eryngium vesiculosum</i>			
	Knobby Club-sedge	<i>Ficinia nodosa</i>			
	Saw Sedge	<i>Gahnia</i> spp.			
	Crane's Bill	<i>Geranium</i> spp.			
	Australian Sweet-grass	<i>Glyceria australis</i>			
*	Yorkshire Fog	<i>Holcus lanatus</i>			
*	Barley	<i>Hordeum (monospecific)</i>			
	Pennywort	<i>Hydrocotyle</i> spp.			
*	Flatweed	<i>Hypochaeris radicata</i>			
*	Iris	<i>Iris</i> spp.			

Origin	Common name	Scientific name	EPBC	FFG	CaLP Act
*	Jointed Rush	<i>Juncus articulatus</i> subsp. <i>articulatus</i>			
	Toad Rush	<i>Juncus bufonius</i>			
	Pale Rush	<i>Juncus pallidus</i>			
	Rush	<i>Juncus</i> spp.			
	Jersey Cudweed	<i>Laphangium luteoalbum</i>			
	Coast Beard-heath	<i>Leucopogon parviflorus</i>			
	Matted Pratia	<i>Lobelia pedunculata</i>			
*	Perennial Rye-grass	<i>Lolium perenne</i>			
	Spiny-headed Mat-rush	<i>Lomandra longifolia</i>			
	Small Loosestrife	<i>Lythrum hyssopifolia</i>			
	Weeping Grass	<i>Microlaena stipoides</i> var. <i>stipoides</i>			
*	Lesser Broomrape	<i>Orobanche minor</i>			
	Grassland Wood-sorrel	<i>Oxalis perennans</i>			
	Wood Sorrel	<i>Oxalis</i> spp.			
*	Toowoomba Canary-grass	<i>Phalaris aquatica</i>			
*	Buck's-horn Plantain	<i>Plantago coronopus</i>			
	Common Tussock-grass	<i>Poa labillardierei</i>			
	Basalt Leek-orchid	<i>Prasophyllum viretrum</i>		cr	
	Austral Bracken	<i>Pteridium esculentum</i>			
	Buttercup	<i>Ranunculus</i> spp.			
*	Onion Grass	<i>Romulea rosea</i>			
	Small-leaf Bramble	<i>Rubus parvifolius</i>			
	Dock	<i>Rumex</i> spp.			
	Tongue Dock	<i>Rumex stenoglottis</i>			
	Brown-back Wallaby-grass	<i>Rytidosperma duttonianum</i>			
	Wallaby Grass	<i>Rytidosperma</i> spp.			
	Creeping Brookweed	<i>Samolus repens</i> var. <i>repens</i>			
	Swamp Fireweed	<i>Senecio psilocarpus</i>	VU		
*	Variegated Thistle	<i>Silybum marianum</i>			R
	Kangaroo Grass	<i>Themeda triandra</i>			
*	White Clover	<i>Trifolium repens</i> var. <i>repens</i>			
*	Clover	<i>Trifolium</i> spp.			
*	Gorse	<i>Ulex europaeus</i>			C
	Ivy-leaf Violet	<i>Viola hederacea</i>			
	Sprawling Bluebell	<i>Wahlenbergia gracilis</i>			

**Notes:** EPBC = threatened species status under the EPBC Act (VU = vulnerable); FFG-T = threatened species status under the EPBC Act (cr = critically endangered) **CaLP Act:** declared noxious weeds under the CaLP Act (S = State Prohibited Weeds [any infestations are to be reported to DELWP. DELWP is responsible for control of State Prohibited Weeds]; P = Regionally Prohibited Weeds [Land owners must take all reasonable steps to eradicate regionally prohibited weeds on their land]; C = Regionally Controlled Weeds [Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land]; R = Restricted Weeds [Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited].

\* = introduced to Victoria

Appendix 4: Representative photographs of native vegetation recorded in the study area



Habitat Zone A



Habitat Zone B, C



Habitat Zones F, G, I, J, K, L



Habitat Zone D



Habitat Zones F, G, I, J, K, L



Habitat Zone H



Habitat Zone M, N, O, ZB



Habitat Zone Q, R



Habitat Zone S



Habitat Zone T, U, V



Habitat Zone X, Y



Habitat Zone AA



Habitat Zone AB



Habitat Zone AC



Habitat Zone AD



Habitat Zone AE



Habitat Zone AF



Habitat Zone AG



Habitat Zone BA



Habitat Zone BB



Habitat Zone BC



Habitat Zone EA



Habitat Zone EB



Habitat Zone EC





Habitat Zone ED



Habitat Zone EE



Habitat Zone EF



Habitat Zone FA



Habitat Zone FE



Habitat Zone FF



Habitat Zone FG



Habitat Zone FH



Habitat Zone HC



Habitat Zone HD

## Appendix 5: EVC benchmarks

### Victorian Volcanic Plain:

- *Higher-rainfall* Plains Grassy Woodland (EVC 55\_63);
- Plains Grassy Wetland (EVC 125)
- *Heavier soils* Plains Grassland (EVC 132\_61)
- Stony Knoll Shrubland (EVC 649)
- Aquatic Herbland (EVC 653)

### Warrnambool Plain:

- Damp Sands Herb-rich Woodland (EVC 3)
- Plains Grassy Wetland (EVC 125)

# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 55\_63: Higher Rainfall Plains Grassy Woodland

#### Description:

An open, eucalypt woodland to 15 m tall or acacia/sheoak woodland to 10 m tall. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. This variant occupies areas receiving greater than 700 mm annual rainfall.

#### Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha
<i>Acacia melanoxylon</i>	40 cm	
<i>Allocasuarina verticillata</i>	40 cm	

#### Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus viminalis</i>	Manna Gum
	<i>Acacia melanoxylon</i>	Blackwood
	<i>Allocasuarina verticillata</i>	Drooping Sheoak

#### Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	3	10%	MS
Small Shrub	2	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	3	5%	LH
Medium Herb	8	15%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Medium to Small Tufted Graminoid	12	45%	MTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Acacia pycnantha</i>	Golden Wattle
MS	<i>Acacia paradoxa</i>	Hedge Wattle
SS	<i>Pimelea humilis</i>	Common Rice-flower
PS	<i>Astroloma humifusum</i>	Cranberry Heath
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
MH	<i>Leptorhynchus squamatus</i>	Scaly Buttons
MH	<i>Chysocephalum apiculatum</i>	Common Everlasting
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Acaena echinata</i>	Sheep's Burr
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
LTG	<i>Austrostipa mollis</i>	Supple Spear-grass
LTG	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa morrisii</i>	Soft Tussock-grass
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
MTG	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	Stiped Wallaby-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass

#### Recruitment:

Continuous

# EVC 55\_63: Higher Rainfall Plains Grassy Woodland - Victorian Volcanic Plain bioregion

## Organic Litter:

10 % cover

## Logs:

10 m/0.1 ha.

## Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low

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# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 125: Plains Grassy Wetland

#### Description:

This EVC is usually treeless, but in some instances can include sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata*. A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas.

#### Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	5	5%	LH
Medium Herb	6	10%	MH
Small or Prostrate Herb	3	10%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	8	30%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL

#### LF Code

#### Species typical of at least part of EVC range

#### Common Name

LH	<i>Epilobium billardierianum</i>	Variable Willow-herb
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
LH	<i>Epilobium billardierianum ssp. cinereum</i>	Grey Willow-herb
MH	<i>Potamogeton tricarinatus s.l.</i>	Floating Pondweed
MH	<i>Lilaeopsis polyantha</i>	Australian Lilaeopsis
MH	<i>Utricularia dichotoma s.l.</i>	Fairies' Aprons
SH	<i>Eryngium vesiculosum</i>	Prickfoot
SH	<i>Neopaxia australasica</i>	White Purslane
SH	<i>Lobelia pratioides</i>	Poison Lobelia
LTG	<i>Juncus flavidus</i>	Gold Rush
LTG	<i>Deyeuxia quadriseta</i>	Reed Bent-grass
LTG	<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass
LTG	<i>Poa labillardierei</i>	Common Tussock-grass
MTG	<i>Triglochin procerum s.l.</i>	Water Ribbons
MTG	<i>Glyceria australls</i>	Australian Sweet-grass
MTG	<i>Juncus holoschoenus</i>	Joint-leaf Rush
MTG	<i>Austrodanthonia duttoniana</i>	Brown-back Wallaby-grass
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
MNG	<i>Eleocharis pusilla</i>	Small Spike-sedge

#### Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

#### Organic Litter:

20% cover

#### Logs:

5 m/0.1 ha.(where trees are overhanging the wetland)

# EVC 125: Plains Grassy Wetland - Victorian Volcanic Plain bioregion

## Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
TTG	<i>Cyperus tenellus</i>	Tiny Flat-sedge	high	low

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# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 132\_61: *Heavier-soils* Plains Grassland

#### Description:

Treeless vegetation mostly less than 1 m tall dominated by largely graminoid and herb life forms. Occupies fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least 500 mm annual rainfall.

#### Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	2	5%	LH
Medium Herb	12	20%	MH
Small or Prostrate Herb	4	5%	SH
Large Tufted Graminoid	1	5%	LTG
Medium to Small Tufted Graminoid	13	40%	MTG
Medium to Tiny Non-tufted Graminoid	4	5%	MNG
Bryophytes/Lichens and Soil Crust*	na	20%	BL

\* Note: treat as one life form in this EVC

LF Code	Species typical of at least part of EVC range	Common Name
SS	<i>Pimelea humilis</i>	Common Rice-flower
LH	<i>Rumex dumosus</i>	Wiry Dock
MH	<i>Calocephalus citreus</i>	Lemon Beauty-heads
MH	<i>Acaena echinata</i>	Sheep's Burr
MH	<i>Leptorhynchus squamatus</i>	Scaly Buttons
MH	<i>Eryngium ovinum</i>	Blue Devil
SH	<i>Solenogyne dominii</i>	Smooth Solenogyne
SH	<i>Lobelia pratioides</i>	Poison Lobelia
LTG	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
LTG	<i>Dichelachne crinita</i>	Long-hair Plume-grass
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass
MTG	<i>Elymus scaber</i> var. <i>scaber</i>	Common Wheat-grass
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Thelymitra pauciflora</i> s.l.	Slender Sun-orchid
MNG	<i>Microtis unifolia</i>	Common Onion-orchid
SC	<i>Convolvulus erubescens</i>	Pink Bindweed

#### Recruitment:

Episodic/Fire or Grazing. Desirable period between disturbances is 5 years.

#### Organic Litter:

10% cover



# EVC 132\_61: *Heavier-soils* Plains Grassland - Victorian Volcanic Plain bioregion

## Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	low
MH	<i>Trifolium striatum</i>	Knotted Clover	high	low
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Lolium rigidum</i>	Wimmera Rye-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Nassella neesiana</i>	Chilean Needle-grass	high	high
MNG	<i>Cynosurus echinatus</i>	Rough Dog's-tail	high	low
MNG	<i>Juncus capitatus</i>	Capitate Rush	high	low

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# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 649: Stony Knoll Shrubland

#### Description:

Stony Knoll Shrubland is a shrubland to 3 m tall or low non-eucalypt woodland to 8 m tall with a grassy understorey. It occurs on low stony rises on basalt flows. The soils are fertile and well drained but shallow with out cropping rock, causing severe summer dryness.

+ woodland only components (ignore when assessing treeless areas and standardise final score as appropriate)

#### Canopy Cover<sup>+</sup>:

%cover	Character Species	Common Name
15%	<i>Allocasuarina verticillata</i> <i>Bursaria spinosa</i>	Drooping Sheoak Sweet Bursaria

#### Understorey:

Life form	#Spp	%Cover	LF code
Medium Shrub	3	10%	MS
Prostrate Shrub	1	1%	PS
Large Herb	2	1%	LH
Medium Herb	11	10%	MH
Small or Prostrate Herb	4	5%	SH
Medium to Small Tufted Graminoid	10	25%	MTG
Tiny Tufted Graminoid	2	5%	TTG
Medium to Tiny Non-tufted Graminoid	2	5%	MNG
Ground Fern	2	5%	GF
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C
<b>Total understorey projective foliage cover</b>		<b>85%</b>	

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Hymenanthera dentata</i> s.l.	Tree Violet
MS	<i>Acacia paradoxa</i>	Hedge Wattle
PS	<i>Kennedia prostrata</i>	Running Postman
LH	<i>Senecio quadridentatus</i>	Cotton Fireweed
LH	<i>Senecio glomeratus</i>	Annual Fireweed
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH	<i>Rumex brownii</i>	Slender Dock
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Acaena ovina</i>	Australian Sheep's Burr
SH	<i>Dichondra repens</i>	Kidneyweed
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
SH	<i>Crassula sieberiana</i>	Sieber Crassula
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MTG	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
TTG	<i>Carex breviculmis</i>	Short-stem Sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken
GF	<i>Adiantum aethiopicum</i>	Common Maidenhair
SC	<i>Convolvulus erubescens</i> spp. agg.	Pink Bindweed

#### Recruitment:

Continuous

#### Organic Litter:

20 % cover

# EVC 649: Stony Knoll Shrubland - Victorian Volcanic Plain bioregion

## Logs<sup>+</sup>:

5 m/0.1 ha. (note: large log class does not apply)

## Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Schinus molle</i>	Pepper Tree	high	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
MS	<i>Genista monspessulana</i>	Montpellier Broom	high	high
SS	<i>Marrubium vulgare</i>	Horehound	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Helminthotheca echioides</i>	Ox-tongue	high	low
LH	<i>Lactuca serriola</i>	Prickly Lettuce	high	low
LH	<i>Sisymbrium officinale</i>	Hedge Mustard	high	low
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Verbascum thapsus</i> ssp. <i>thapsus</i>	Great Mullein	high	high
LH	<i>Echium plantagineum</i>	Paterson's Curse	high	high
LH	<i>Centaurium tenuiflorum</i>	Slender Centaury	high	low
LH	<i>Foeniculum vulgare</i>	Fennel	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
MH	<i>Trifolium campestre</i> var. <i>campestre</i>	Hop Clover	high	low
MH	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover	high	low
MH	<i>Lotus suaveolens</i>	Hairy Bird's-foot Trefoil	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
SH	<i>Medicago polymorpha</i>	Burr Medic	high	low
SH	<i>Trifolium glomeratum</i>	Cluster Clover	high	low
SH	<i>Modiola caroliniana</i>	Red-flower Mallow	high	low
SH	<i>Aptenia cordifolia</i>	Heart-leaf Ice-plant	high	high
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
LNG	<i>Avena fatua</i>	Wild Oat	high	low
MTG	<i>Nassella trichotoma</i>	Serrated Tussock	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Pentstemonis airoides</i> ssp. <i>airoides</i>	False Hair-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MTG	<i>Vulpia myuros</i>	Rat's-tail Fescue	high	low
MTG	<i>Bromus rubens</i>	Red Brome	high	low
MTG	<i>Avena barbata</i>	Bearded Oat	high	low
MTG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	low
SC	<i>Vicia sativa</i> ssp. <i>sativa</i>	Common Vetch	low	low

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# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 653: Aquatic Herbland

#### Description:

Herbland of permanent to semi-permanent wetlands, dominated by sedges (especially on shallower verges) and/or aquatic herbs. Occurs on fertile paludal soils, typically heavy clays beneath organic accumulations.

#### Life Forms:

Life form	#Spp	%Cover	LF code
Medium Shrub	1	1%	MS
Small Shrub	1	1%	SS
Large Herb	2	10%	LH
Medium Herb	5	40%	MH
Small or Prostrate Herb	2	10%	SH
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	4	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
<b>Total understorey projective foliage cover</b>		<b>85%</b>	

LF Code	Species typical of at least part of EVC range	Common Name
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
MH	<i>Myriophyllum simulans</i>	Amphibious Water-milfoil
MH	<i>Potamogeton tricarlinatus s.l.</i>	Floating Pondweed
MH	<i>Potamogeton pectinatus</i>	Fennel Pondweed
MH	<i>Marsilea drummondii</i>	Common Nardoo
SH	<i>Azolla filiculoides</i>	Pacific Azolla
SH	<i>Lobelia pratoides</i>	Poison Lobelia
SH	<i>Lemna disperma</i>	Duckweed
LNG	<i>Eleocharis sphacelata</i>	Tall Spike-sedge
MTG	<i>Triglochin procerum s.l.</i>	Water Ribbons
MTG	<i>Lachnagrostis filiformis</i>	Common Blown-grass
MTG	<i>Glyceria australis</i>	Australian Sweet-grass
MTG	<i>Austrodanthonia duttoniana</i>	Brown-back Wallaby-grass
MNG	<i>Eleocharis pusilla</i>	Small Spike-sedge
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge

#### Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

#### Organic Litter:

10% cover

#### Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Aster subulatus</i>	Aster-weed	high	low
LH	<i>Rumex crispus</i>	Curled Dock	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	high
MH	<i>Cotula coronopifolia</i>	Water Buttons	high	high
MTG	<i>Lolium rigidum</i>	Wimmera Rye-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low

# EVC 653: Aquatic Herbland - Victorian Volcanic Plain bioregion

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# EVC/Bioregion Benchmark for Vegetation Quality Assessment

## Victorian Volcanic Plain bioregion

### EVC 3: Damp Sands Herb-rich Woodland

#### Description:

A low, grassy or bracken-dominated eucalypt forest or open woodland to 15 m tall with a large shrub layer and ground layer rich in herbs, grasses, and orchids. Occurs mainly on flat or undulating areas on moderately fertile, relatively well-drained, deep sandy or loamy topsoils over heavier subsoils (duplex soils).

#### Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

#### Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Eucalyptus baxteri</i> s.s.	Brown Stringybark

#### Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	3	15%	T
Medium Shrub	6	15%	MS
Small Shrub	3	5%	SS
Prostrate Shrub	3	5%	PS
Large Herb	4	5%	LH
Medium Herb	15	25%	MH
Small or Prostrate Herb	6	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	12	15%	MTG
Medium to Tiny Non-tufted Graminoid	4	10%	MNG
Ground Fern	1	10%	GF
Scrambler or Climber	1	1%	SC
Bryophytes/Lichens	na	10%	BL

#### Recruitment:

Continuous

#### Organic Litter:

40 % cover

#### Logs:

15 m/0.1 ha.

# EVC 3: Damp Sands Herb-rich Woodland - Victorian Volcanic Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Exocarpos cupressiformis</i>	Cherry Ballart
T	<i>Acacia mearnsii</i>	Black Wattle
MS	<i>Banksia marginata</i>	Silver Banksia
MS	<i>Melaleuca squarrosa</i>	Scented Paperbark
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Acacia verticillata</i>	Prickly Moses
SS	<i>Hibbertia riparia</i>	Erect Guinea-flower
SS	<i>Hibbertia fasciculata</i> var. <i>prostrata</i>	Bundled Guinea-flower
SS	<i>Amperea xiphoclada</i> var. <i>xiphoclada</i>	Broom Spurge
PS	r <i>Boronia nana</i> var. <i>nana</i>	Dwarf Boronia
PS	<i>Xanthosia pusilla</i> spp. <i>agg.</i>	Heath Xanthosia
PS	<i>Acrotriche serrulata</i>	Honey-pots
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
LH	<i>Wahlenbergia gracilis</i> s.s.	Sprawling Bluebell
MH	<i>Veronica gracilis</i>	Slender Speedwell
MH	<i>Euchiton collinus</i> s.s.	Creeping Cudweed
MH	<i>Goodenia geniculata</i>	Bent Goodenia
MH	<i>Lagenophora stipitata</i>	Common Bottle-daisy
SH	<i>Nertera granadensis</i>	Matted Nertera
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
SH	<i>Kennedia prostrata</i>	Running Postman
LTG	<i>Xanthorrhoea minor</i> ssp. <i>lutea</i>	Small Grass-tree
LTG	<i>Deyeuxia quadriseta</i>	Reed Bent-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Lomandra nana</i>	Dwarf Mat-rush
MTG	<i>Austrodanthonia setacea</i> var. <i>setacea</i>	Bristly Wallaby-grass
MTG	<i>Dianella revoluta</i> s.s.	Black-anther Flax-lily
MTG	<i>Poa sieberiana</i> var. <i>sieberiana</i>	Grey Tussock-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
TTG	<i>Isolepis marginata</i>	Little Club-sedge
TTG	<i>Centrolepis strigosa</i> ssp. <i>strigosa</i>	Hairy Centrolepis
GF	<i>Pteridium esculentum</i>	Austral Bracken
SC	<i>Billardiera scandens</i> var. <i>scandens</i>	Common Apple-berry

## Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Centaurium tenuiflorum</i>	Slender Centaury	low	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
SH	<i>Medicago polymorpha</i>	Burr Medic	high	low
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	high	high
MNG	<i>Aira caryophyllea</i>	Silvery Hair-grass	high	low
MNG	<i>Aira elegantissima</i>	Delicate Hair-grass	high	low

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[Appendix 6: BIOR report](#)



# Biodiversity impact and offset requirements report

This report **does not represent an assessment by DELWP** of the proposed native vegetation removal. It provides additional biodiversity information to support moderate and high risk-based pathway applications for permits to remove native vegetation under clause 52.16 or 52.17 of planning schemes in Victoria.

Date of issue: 19/11/2021

DELWP ref: NAA\_2021\_137

Time of issue: 2:56 pm

Project ID	14144_RCWF_Removal_BIOR_211118
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## Summary of marked native vegetation

<b>Risk-based pathway</b>	<b>Moderate</b>
<b>Total extent</b>	3.836 ha
Remnant patches	3.836 ha
Scattered trees	0 trees
<b>Location risk</b>	A
<b>Strategic biodiversity score of all marked native vegetation</b>	0.435

## Offset requirements if a permit is granted

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

<b>Offset type</b>	<b>General offset</b>
<b>General offset amount (general biodiversity equivalence units)</b>	0.953 general units
<b>General offset attributes</b>	
Vicinity	Glenelg Hopkins Catchment Management Authority (CMA) <b>or</b> Moyne Shire Council
Minimum strategic biodiversity score	0.348 <sup>1</sup>

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

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

<sup>1</sup> Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

# Biodiversity impact and offset requirements report

## Next steps

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

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council. Council will then refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

The biodiversity assessment report from NVIM and this biodiversity impact and offset report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

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

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

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

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

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

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

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

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

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

# Biodiversity impact and offset requirements report

## Appendix 1 – Biodiversity impact of removal of native vegetation

### Habitat hectares

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

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
1-1-N	0.180	0.093	0.017
2-1-B	0.240	0.058	0.014
3-1-D	0.280	0.114	0.032
4-1-Y	0.300	0.010	0.003
5-1-ZB	0.180	0.180	0.032
6-1-AB	0.330	0.078	0.026
7-1-AD	0.160	0.073	0.012
8-1-BA	0.340	0.054	0.018
9-1-EA	0.270	0.121	0.033
10-1-28	0.200	0.390	0.078
11-1-32	0.600	0.366	0.220
12-1-C	0.240	0.473	0.113
13-1-Sb	0.160	0.023	0.004
14-1-Sc	0.160	0.033	0.005
15-1-BB	0.390	0.006	0.002
16-1-T1	0.140	0.021	0.003
17-1-M	0.180	0.048	0.009
18-2-33	0.600	0.001	0.001
19-3-33	0.600	0.022	0.013
20-4-33	0.600	0.050	0.030
21-5-33	0.600	0.012	0.007
22-1-X	0.300	0.000	0.000
23-0-EB	0.270	0.005	0.001
24-1-30	0.530	0.021	0.011
25-2-30	0.530	0.023	0.012
26-1-EC	0.350	0.094	0.033
27-1-26	0.230	0.110	0.025
28-1-31	0.600	0.027	0.016
29-2-27	0.580	0.178	0.103

# Biodiversity impact and offset requirements report

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
30-1-HK	0.190	0.013	0.002
31-1-HJ	0.240	0.052	0.012
32-1-33	0.600	0.018	0.011
33-1-25	0.310	0.116	0.036
34-2-25	0.310	0.170	0.053
35-1-FE	0.400	0.147	0.059
36-2-FE	0.400	0.216	0.086
37-1-27	0.580	0.416	0.241
38-1-29	0.480	0.001	0.000
39-2-29	0.480	0.001	0.000
40-1-T2	0.140	0.004	0.001
<b>TOTAL</b>			<b>1.376</b>

## Impacts on rare or threatened species habitat above specific offset threshold

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

The specific-general offset test found your proposal does not have a proportional impact on any rare or threatened species' habitats above the specific offset threshold. No specific offsets are required. A general offset is required as set out below.

## Clearing site biodiversity equivalence score(s)

The general biodiversity equivalence score for the habitat zone(s) is calculated by multiplying the habitat hectares by the strategic biodiversity score.

Habitat zone	Habitat hectares	Proportion of habitat zone with general offset	Strategic biodiversity score	General biodiversity equivalence score (GBES)
1-1-N	0.017	100.000 %	0.674	0.011
2-1-B	0.014	100.000 %	0.359	0.005
3-1-D	0.032	100.000 %	0.314	0.010
4-1-Y	0.003	100.000 %	0.454	0.001
5-1-ZB	0.032	100.000 %	0.370	0.012
6-1-AB	0.026	100.000 %	0.723	0.019
7-1-AD	0.012	100.000 %	0.279	0.003
8-1-BA	0.018	100.000 %	0.390	0.007
9-1-EA	0.033	100.000 %	0.284	0.009
10-1-28	0.078	100.000 %	0.410	0.032
11-1-32	0.220	100.000 %	0.688	0.151

# Biodiversity impact and offset requirements report

Habitat zone	Habitat hectares	Proportion of habitat zone with general offset	Strategic biodiversity score	General biodiversity equivalence score (GBES)
12-1-C	0.113	100.000 %	0.361	0.041
13-1-Sb	0.004	100.000 %	0.277	0.001
14-1-Sc	0.005	100.000 %	0.286	0.002
15-1-BB	0.002	100.000 %	0.390	0.001
16-1-T1	0.003	100.000 %	0.290	0.001
17-1-M	0.009	100.000 %	0.629	0.005
18-2-33	0.001	100.000 %	0.702	0.000
19-3-33	0.013	100.000 %	0.698	0.009
20-4-33	0.030	100.000 %	0.674	0.020
21-5-33	0.007	100.000 %	0.724	0.005
22-1-X	0.000	100.000 %	0.453	0.000
23-0-EB	0.001	100.000 %	0.286	0.000
24-1-30	0.011	100.000 %	0.286	0.003
25-2-30	0.012	100.000 %	0.286	0.003
26-1-EC	0.033	100.000 %	0.312	0.010
27-1-26	0.025	100.000 %	0.278	0.007
28-1-31	0.016	100.000 %	0.839	0.014
29-2-27	0.103	100.000 %	0.333	0.034
30-1-HK	0.002	100.000 %	0.536	0.001
31-1-HJ	0.012	100.000 %	0.403	0.005
32-1-33	0.011	100.000 %	0.646	0.007
33-1-25	0.036	100.000 %	0.285	0.010
34-2-25	0.053	100.000 %	0.353	0.019
35-1-FE	0.059	100.000 %	0.455	0.027
36-2-FE	0.086	100.000 %	0.593	0.051
37-1-27	0.241	100.000 %	0.395	0.095
38-1-29	0.000	100.000 %	0.454	0.000
39-2-29	0.000	100.000 %	0.483	0.000
40-1-T2	0.001	100.000 %	0.289	0.000

## Mapped rare or threatened species' habitats on site

# Biodiversity impact and offset requirements report

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

Species number	Species common name	Species scientific name
10045	Lewin's Rail	<i>Lewinia pectoralis pectoralis</i>
10050	Baillon's Crake	<i>Porzana pusilla palustris</i>
10111	Gull-billed Tern	<i>Gelochelidon nilotica macrotarsa</i>
10154	Wood Sandpiper	<i>Tringa glareola</i>
10170	Australian Painted Snipe	<i>Rostratula benghalensis australis</i>
10177	Brolga	<i>Grus rubicunda</i>
10186	Intermediate Egret	<i>Ardea intermedia</i>
10187	Eastern Great Egret	<i>Ardea modesta</i>
10195	Australian Little Bittern	<i>Ixobrychus minutus dubius</i>
10197	Australasian Bittern	<i>Botaurus poiciloptilus</i>
10212	Australasian Shoveler	<i>Anas rhynchotis</i>
10214	Freckled Duck	<i>Stictonetta naevosa</i>
10215	Hardhead	<i>Aythya australis</i>
10216	Blue-billed Duck	<i>Oxyura australis</i>
10217	Musk Duck	<i>Biziura lobata</i>
10220	Grey Goshawk	<i>Accipiter novaehollandiae novaehollandiae</i>
10238	Black Falcon	<i>Falco subniger</i>
12683	Glossy Grass Skink	<i>Pseudemoia rawlinsoni</i>
13207	Growling Grass Frog	<i>Litoria raniformis</i>
4701	Dwarf Galaxias	<i>Galaxiella pusilla</i>
4882	Yarra Pygmy Perch	<i>Nannoperca obscura</i>
500682	Swamp Sheoak	<i>Casuarina obesa</i>
500798	Small Milkwort	<i>Comesperma polygaloides</i>
501456	Clover Glycine	<i>Glycine latrobeana</i>
503367	Metallic Sun-orchid	<i>Thelymitra epipactoides</i>
504655	Pale Swamp Everlasting	<i>Coronidium scorpioides</i> 'aff. <i>rutidolepis</i> (Lowland Swamps)' variant
505337	Austral Crane's-bill	<i>Geranium solanderi</i> var. <i>solanderi</i> s.s.

# Biodiversity impact and offset requirements report

## Appendix 2 – Offset requirements detail

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

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

Offsets also have required attributes:

- General offsets must be located in the same Catchment Management Authority (CMA) boundary or Local Municipal District (local council) as the clearing and must have a minimum strategic biodiversity score of 80 per cent of the clearing.<sup>2</sup>

The offset requirements for your proposal are as follows:

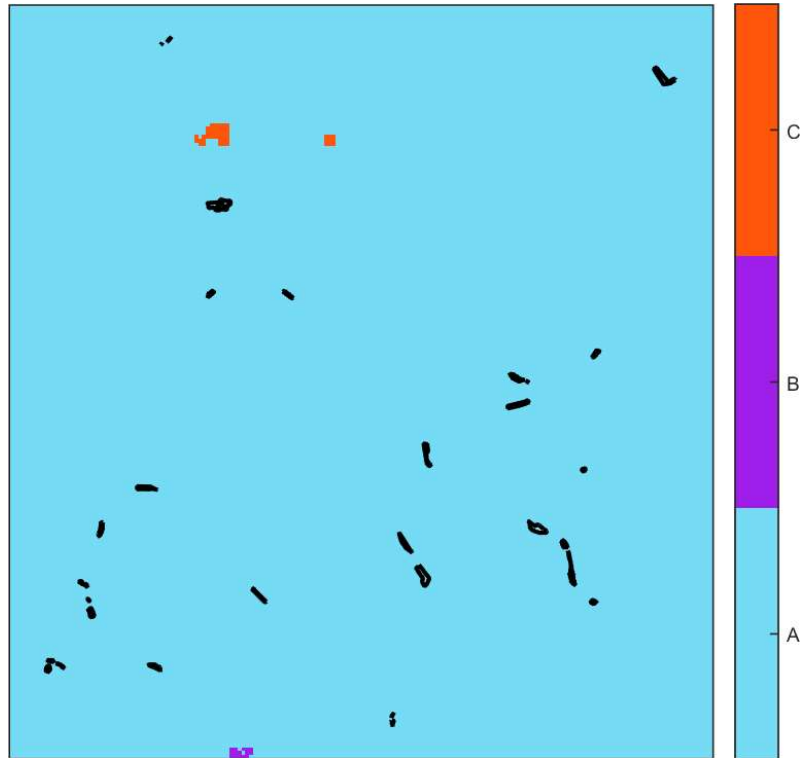
Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
General	0.635 GBES	1.5	0.953 general units	Offset must be within Glenelg Hopkins CMA or Moyne Shire Council Offset must have a minimum strategic biodiversity score of 0.348

<sup>2</sup> Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

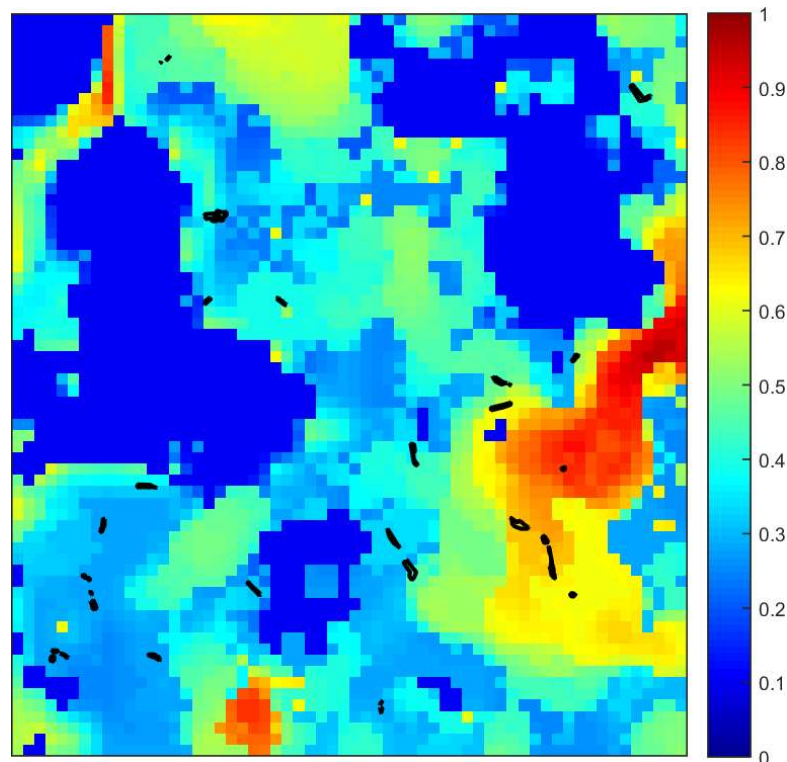
# Biodiversity impact and offset requirements report

## Appendix 3 – Images of marked native vegetation

### 1. Native vegetation location risk map



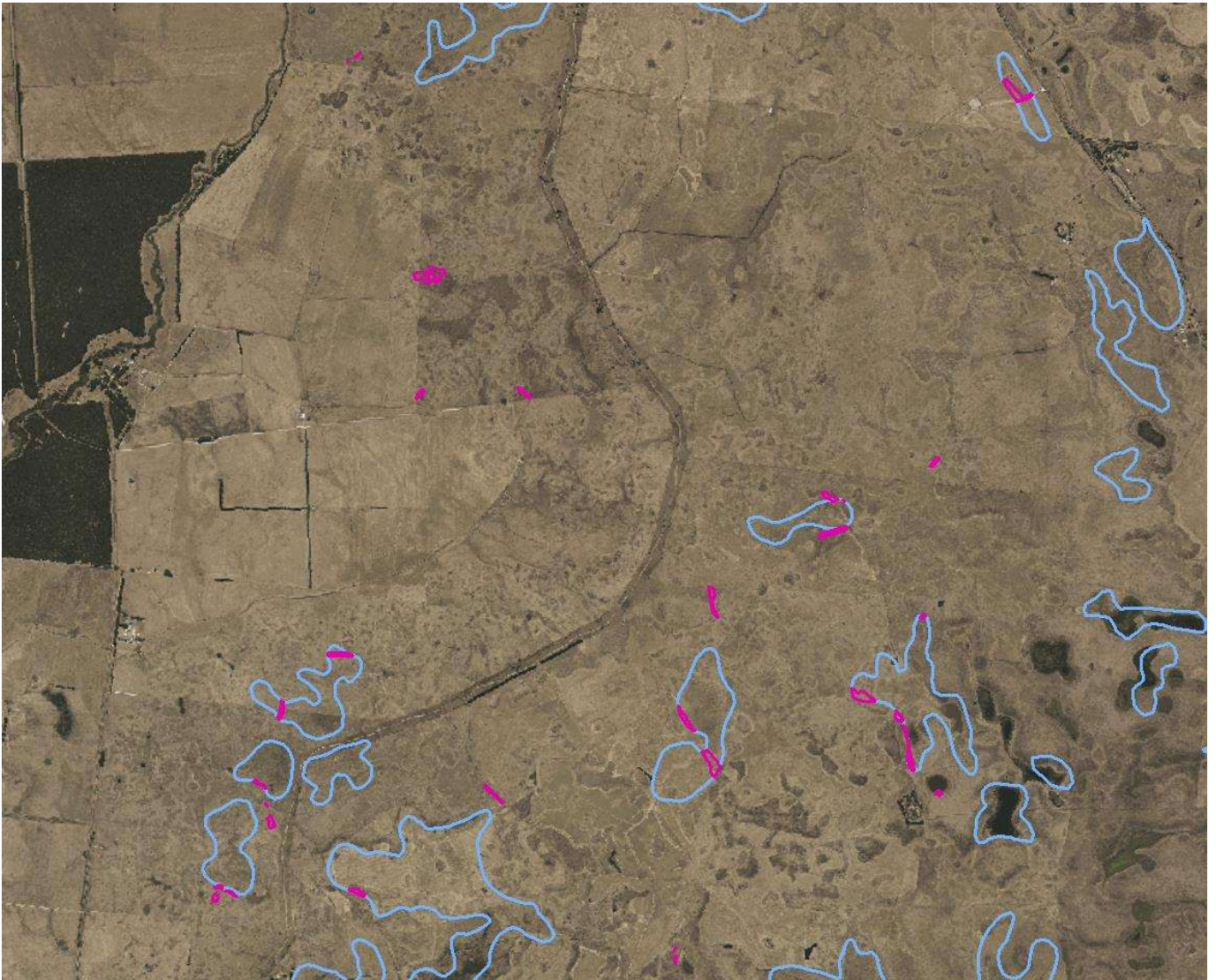
### 2. Strategic biodiversity score map





# Biodiversity impact and offset requirements report

## 3. Aerial photograph showing marked native vegetation



# Biodiversity impact and offset requirements report

## Glossary

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

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

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

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

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

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

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

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

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

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

# Biodiversity impact and offset requirements report

<b>Habitat zone</b>	<p>Habitat zone is a discrete contiguous area of native vegetation that:</p> <ul style="list-style-type: none"><li>• is of a single Ecological Vegetation Class</li><li>• has the same measured condition.</li></ul>
<b>Highly localised habitat</b>	<p>A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.</p>
<b>Minimum strategic biodiversity score</b>	<p>The minimum strategic biodiversity score is an attribute for a general offset.</p> <p>The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.</p>
<b>Offset risk factor</b>	<p>There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.</p> <p>To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.</p> <p style="text-align: center;"><b><i>Risk factor for general offsets = 1.5</i></b></p> <p style="text-align: center;"><b><i>Risk factor for specific offset = 2</i></b></p>
<b>Offset type</b>	<p>The specific-general offset test determines the offset type required.</p> <p>When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.</p> <p>A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.</p>
<b>Proportional impact on species</b>	<p>This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.</p>

# Biodiversity impact and offset requirements report

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

$$\begin{aligned} & \textit{Risk adjusted specific biodiversity equivalence score} \\ & = \textit{specific biodiversity equivalence score clearing} \times 2 \end{aligned}$$

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

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

$$\begin{aligned} & \textit{Specific biodiversity equivalence score} \\ & = \textit{habitat hectares} \times \textit{habitat importance score} \end{aligned}$$

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

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

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

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

**Vicinity** The vicinity is an attribute for a general offset.

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

**Appendix 7: Evidence that native vegetation offset requirement is available**

# Report of available native vegetation credits

This report lists native vegetation credits available to purchase through the Native Vegetation Credit Register.

This report is **not evidence** that an offset has been secured. An offset is only secured when the units have been purchased and allocated to a permit or other approval and an allocated credit extract is provided by the Native Vegetation Credit Register.

**Date and time: 23/11/2021 04:18**

**Report ID: 11973**

## What was searched for?

### General offset

General biodiversity equivalence units	Strategic biodiversity score	Vicinity (Catchment Management Authority or Municipal district)	
0.953	0.348	CMA	Glenelg Hopkins
		or LGA	Moyne Shire

## Details of available native vegetation credits on 23 November 2021 04:18

### These sites meet your requirements for general offsets.

Credit Site ID	GBEU	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0639	1.219	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	Bio Offsets
BBA-1139_05	1.583	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	VegLink
VC_CFL-3693_01	3.719	Glenelg Hopkins	Ararat Rural City	Yes	Yes	No	VegLink
VC_CFL-3714_01	3.691	Glenelg Hopkins	Ararat Rural City	Yes	Yes	No	VegLink
VC_TFN-C2046_01	3.874	Glenelg Hopkins	Southern Grampians Shire	Yes	Yes	No	Ecocentric, Ethos, VegLink

### These potential sites are not yet available, land owners may finalise them once a buyer is confirmed.

Credit Site ID	GBEU	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
VC_CFL-3755_01	4.665	Glenelg Hopkins	Glenelg Shire	Yes	Yes	No	Contact NVOR

CMA - Catchment Management Authority

LGA - Municipal District or Local Government Authority

## Next steps

### If applying for approval to remove native vegetation

Attach this report to an application to remove native vegetation as evidence that your offset requirement is currently available.

### If you have approval to remove native vegetation

Below are the contact details for all brokers. Contact the broker(s) listed for the credit site(s) that meet your offset requirements. These are shown in the above tables. If more than one broker or site is listed, you should get more than one quote before deciding which offset to secure.

## Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not available
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 8578 4250 or 1300 834 546	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

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For more information contact the DELWP Customer Service Centre 136 186 or the Native Vegetation Credit Register at [nativevegetation.offsetregister@delwp.vic.gov.au](mailto:nativevegetation.offsetregister@delwp.vic.gov.au)

### Disclaimer

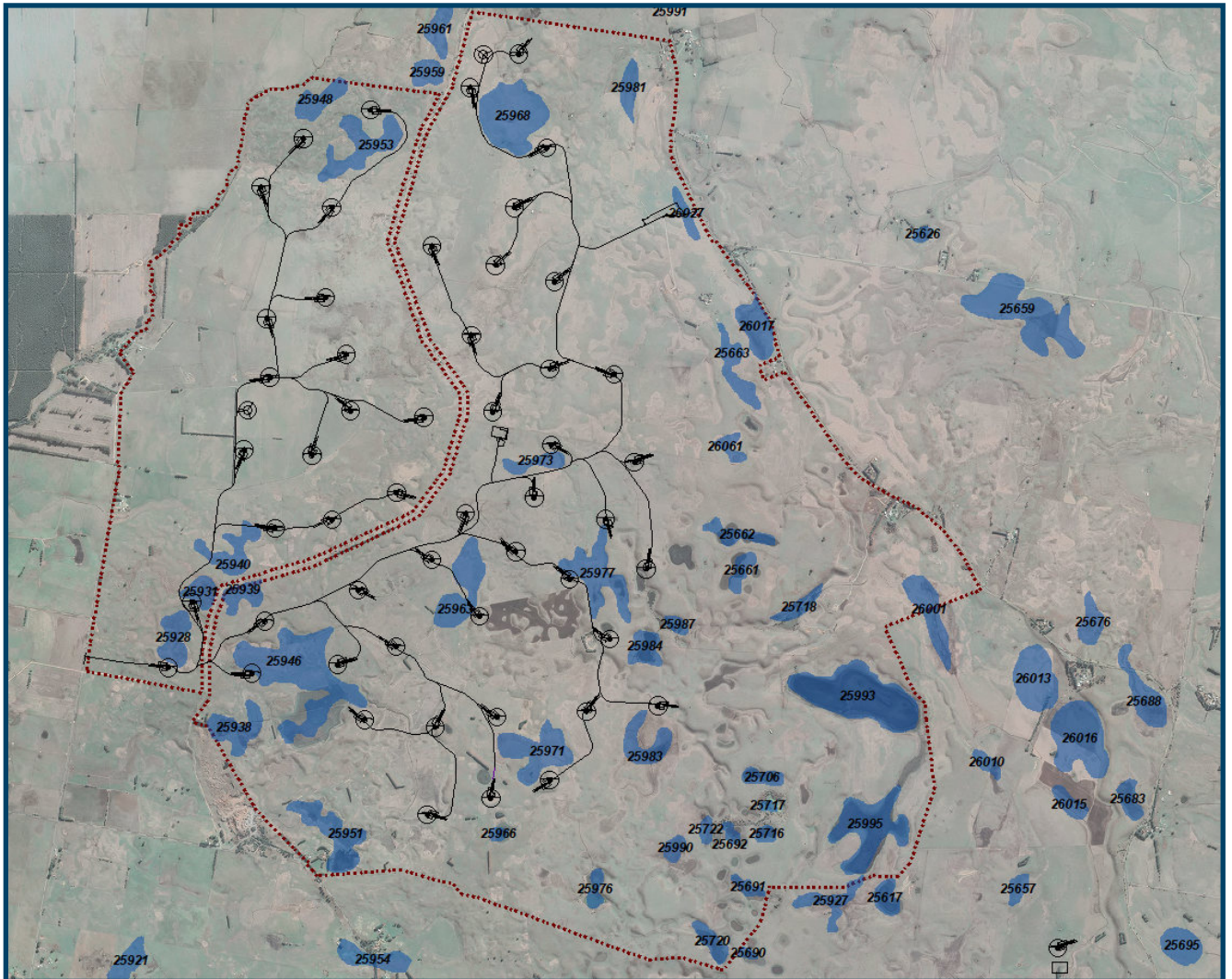
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Obtaining this publication does not guarantee that the credits shown will be available in the Native Vegetation Credit Register either now or at a later time when a purchase of native vegetation credits is planned.

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

[Appendix 8: Hydrological Design Assessment Ryan Corner Wind Farm 29/10/2021](#)





# Hydrological Design Assessment Ryan Corner Wind Farm

05/11/2021



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## 1. Objective

This report has been prepared to support Planning permit amendment application 20060222-2, Response to DELWP BSW Referral Response (Ref SP477487). In particular DELWP Referral Item 1 – Indirect Impacts.

This reports shall:

- 1) Detail the Hydrological Assessment that was completed as part of the design process
- 2) Explain the civil and drainage design philosophy

## 2. Background

Ryan Corner Development (RCD) as a subsidiary of GPG, and are the proponents of the wind farm.

The Balance of Plant (BOP) Contractor is Decmil & RJE who are contracted to design and construct the access tracks , drainage, crane hardstands, electrical installation.

GPG has completed an initial design of the wind farm. GPG has also completed a hydrological study and provided it to the BOP Contractor.

The BOP Contractor has completed the civil and drainage detailed design which shall be used for construction purposes.



### 3. Hydrological Assessment

The potential hydrological and environmental impact of the Ryan Corner wind farm was assessed, among other tasks, through a hydrological and flood risk analysis study completed by GPG hydrological engineers.

Those studies were used as a basis for developing a wind farm design which respects the current hydrology of the project area, preserving the drainage elements that already exist in the zone and designing additional drainage elements necessary to achieve continuity of the natural runoff, both to preserve the flow feeding of the existing wetlands and to respect the natural drainage of the project zone.

For this purpose, the following tasks have been carried out:

#### 3.1. Preliminary Hydrological Assessment:

GPG Engineers completed a preliminary hydrological assessment including

- Review of existing flood studies
- Review of geographic information (contours, aerial photography, etc)
- Review of the sites geology to identify areas with reduced surface drainage capacity due to their particular morphology and clay-basaltic geology
- Study of the existing hydrological network to identify catchments, water courses, hydrological sinks and wetland areas.

As a first step, GPG used existing cartographic and pluviometric information to identify the main hydrological sub-basins and their associated watercourses.

In addition, by processing with ArcGIS tool the cartographic, geological and photogrammetric information of the project zone, geographic areas with reduced surface drainage capacity due to their particular morphology and clay-basaltic geology were identified. This made it possible to identify the principal swampy areas as it is shown in Figure 1 below.

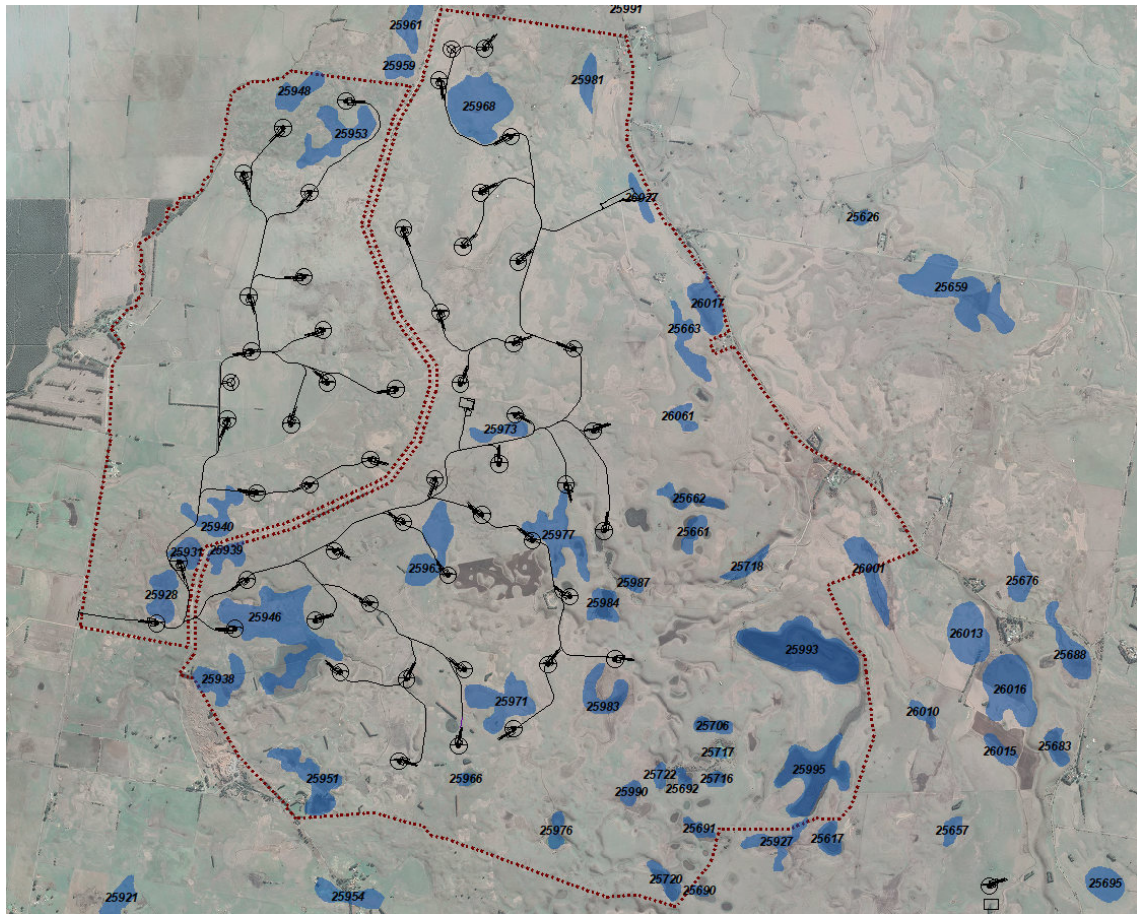


Figure 1. Officially identified layout of wetlands (in colour blue) together with the wind farm RYAN CORNER layout design.

Where an access track or crane platform partially intercepted a wetland (For example wetlands no. 25931, 25928, 25946, 25977 and 25973 in Figure 1 above), earthworks were designed to allow runoff to continue to flow towards the main core of the wetland, leaving the existing runoff to the wetland unchanged.

On the other hand, in the specific cases where a wetland is intercepted by a road (see wetlands no. 25963 and 25940 in Figure 1), drainage structures have been designed to preserve the natural runoff and hydraulic continuity of water accumulation areas.



### 3.2. Hydrological-hydraulic analysis

Additionally, in order to achieve a wind farm design that respects the natural runoff of the area, a rainfall-runoff transformation model under 2D hydrodynamic software IBER was developed for different rainfall return periods for the area of interest, conditioning the final design of the infrastructures to avoid crossing not only the officially identified wetlands but also those areas where relevant runoff is generated during passing rainfall events, projecting where necessary the drainage works that allow continuity of the natural flow of runoff. This approach has meant greater respect for the natural hydrology of the area than if the design had only been conditioned to the officially identified wetlands.

Figure 2 below shows the maximum depths of runoff obtained for the case of a 10-year return period rainfall, overlapping with the adopted wind farm layout and the wetlands officially identified by the Victorian Government.

It can be seen how the results of the maximum runoff generated by the 10-year return period rainfall envelop the officially identified wetlands, thus providing a broader and more restrictive conditioning of the wind farm design to the respect of the natural hydrology of the area.

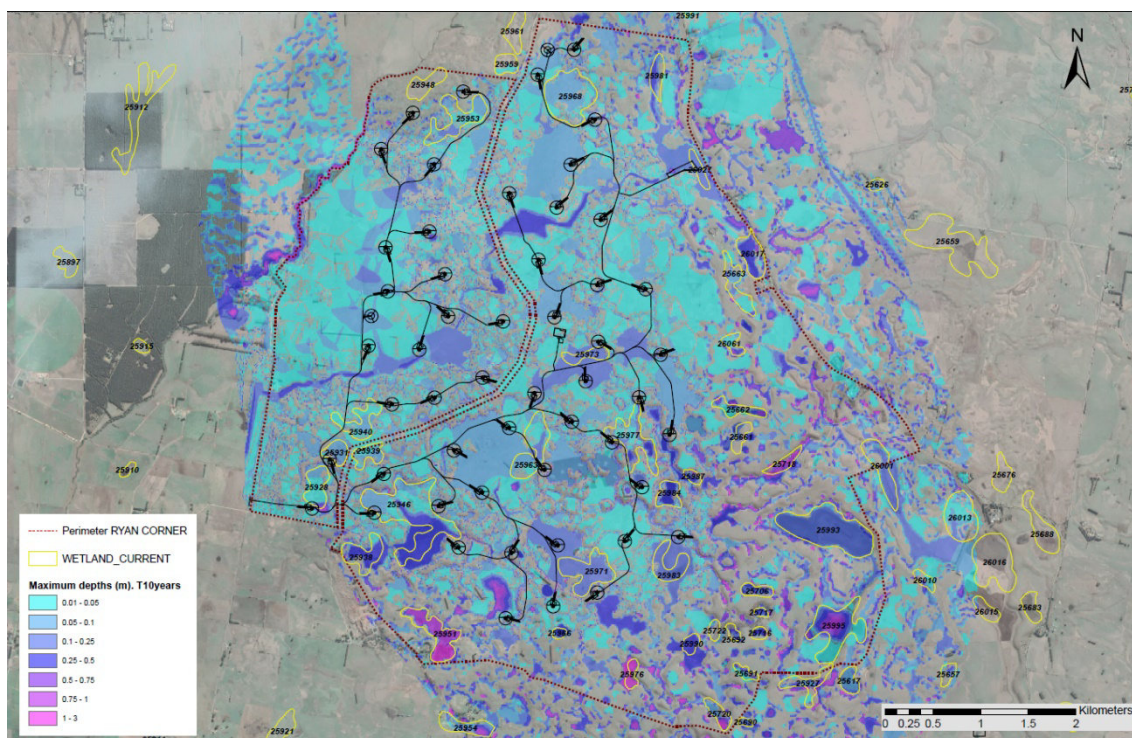


Figure 2. Maximum depths (meters) of runoff generated from a 10-year return period rainfall, together with the wind farm layout and the officially identified wetlands



## 4. Design Approach

### 4.1. Intro / background / studies

The detailed civil design for Ryan Corner Wind Farm was undertaken by the BOP Contractors consultant (Wallbridge Gilbert Aztec – WGA) and included their own Hydrology Report and Civil Design Report to accompany the civil construction drawings. GPG Engineers, and the BOP Contractor, have reviewed and commented on the design as it was progressed.

The civil and drainage design has been based on the following investigations, specifications, studies and reports:

- Topographical surveys
- Aerial Photographic Survey
- Geotechnical bore holes
- Groundwater level monitoring
- Review of existing mapped waterways and wetlands and flood modelling
- GPG / Vestas Civil Specification
- GPG Concept Road Alignment
- GPG Micro-siting of wind turbines
- GPG Flood Risk Analysis Modelling
- Tonkin and Taylor Geotechnical Investigation and Interpretative Reports
- WGA Hydrological Study (RCWF-WGA-CI-RP-0002)
- WGA Civil Design Report (RCWF-WGA-CI-RP-0001)

### 4.2. Civil Design

Roads and crane hardstands areas have been designed so that they are not submerged by predicted flood levels. Roads and crane hardstands have been aligned so that they are not located wetland areas wherever possible.

### 4.3. Drainage Design

Drainage has been designed to maintain the existing water flow of creeks, rural drainage channels and wetlands. Across the site, 22 floodways and 69 culvert crossings have been specified in the design. Each floodway and culvert have been designed for the specific conditions at each location.

To protect the access track and hardstand infrastructure, table drains will be installed on the side of the access tracks. Table drains have been designed as V drains with rock checks that will be re-seeded and revegetated.



The design approach was based on protecting the wind farm infrastructure and, designing all the necessary drainage elements to carry the runoff to the same geographical points where water would normally flow if the Ryan Corner wind farm were not built.

Under the design strategy based on keeping the natural watersheds unchanged, catchment areas of the existing wetlands have been respected so that they will continue to receive the same amount of water that they currently receive under natural conditions. Furthermore, the specific wetland areas will not be modified in any way, maintaining their current natural drainage conditions.

This can be seen in Figure 3 and Figure 4 below, where the current natural water flows identified by blue lines will continue to flow towards their corresponding wetlands without the design of the wind farm implying any modification of this natural situation.

Furthermore, based on the results of the hydrological-hydraulic model developed as well as on the geographical location of the existing wetlands in the area, the following design approach has been adopted for the specific cases where a wetland is intercepted by a road:

- Provide suitable drainage elements in the road section that intercepts the wetland in order to preserve hydraulic connectivity between the two areas of the intercepted wetland thus keeping his natural levels and hydrodynamics. The typology of these drainage elements will be based on either floodways or culverts depending on the morphology of the terrain of the area and the maximum water levels reached in the wetland after the occurrence of storms with a return period of up to 10 years.

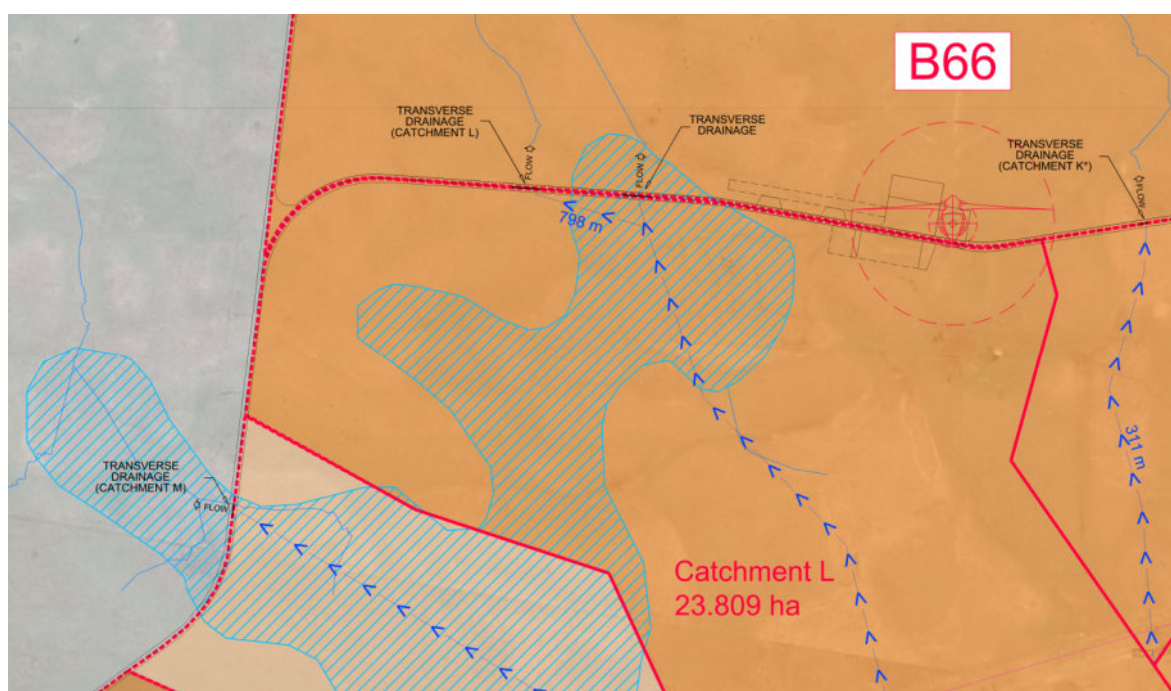


Figure 3 – Wetlands intersected by access tracks near B66



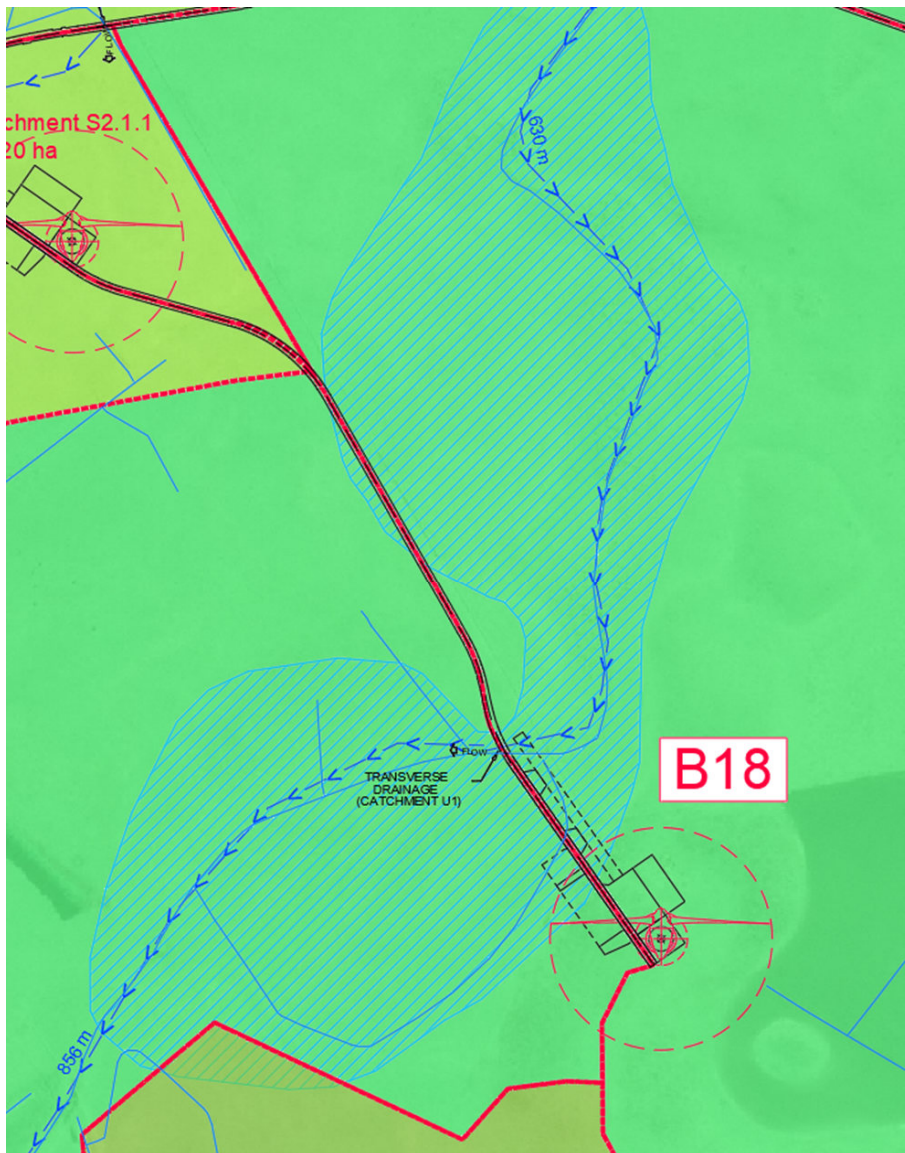


Figure 4 - Wetlands intersected by access tracks near B18

The rainfall run-off coefficient for each catchment area will be largely unchanged with only a minor increase due to the construction of hardstands and roads. Table drains and batters will be re-seeded and the unpaved built-up areas are only 2 % of the total wind farm area, therefore the run-off coefficient will not be significantly affected.

The drainage design philosophy is **not** to drain the site to prevent flooding. To retain the area's current hydrology, a deliberate decision has been made to not artificially drain any areas of the wind farm to protect wind farm infrastructure. Deliberately draining any areas of the wind farm would change the site's existing hydrology which may impact wetlands and flood plain areas.

The drainage design has been completed to ensure drainage paths are unchanged from existing. Under the design strategy based on keeping the natural watersheds unchanged, culverts and



floodways have been designed at the intersection points of the roads with the natural water flows to provide continuity to these natural water flows, ensuring drainage paths are unchanged from existing ones. If there is an existing drainage channel – this remains with culvert pipes / floodways installed across access tracks.

Under the design strategy based on keeping the natural watersheds unchanged, catchment areas of the existing wetlands have been respected so that they will continue to receive the same amount of water that they currently receive under existing conditions.

For the case of wing turbine B52, it is located in a ephemeral wetland that is not a mapped DELWP Wetland. The drainage solution adopted for all hardstands is to have adequate longitudinal and lateral slope to drain runoff away from the turbine and discharge it into the surrounding area.

Such is the case of wind turbine B52, where the general morphology of the terrain allows water to runoff the hardstands towards an existing watercourse that has been provided with a culvert in the area where it intersects the road, providing hydraulic continuity to the flow (see Figure 6 below).

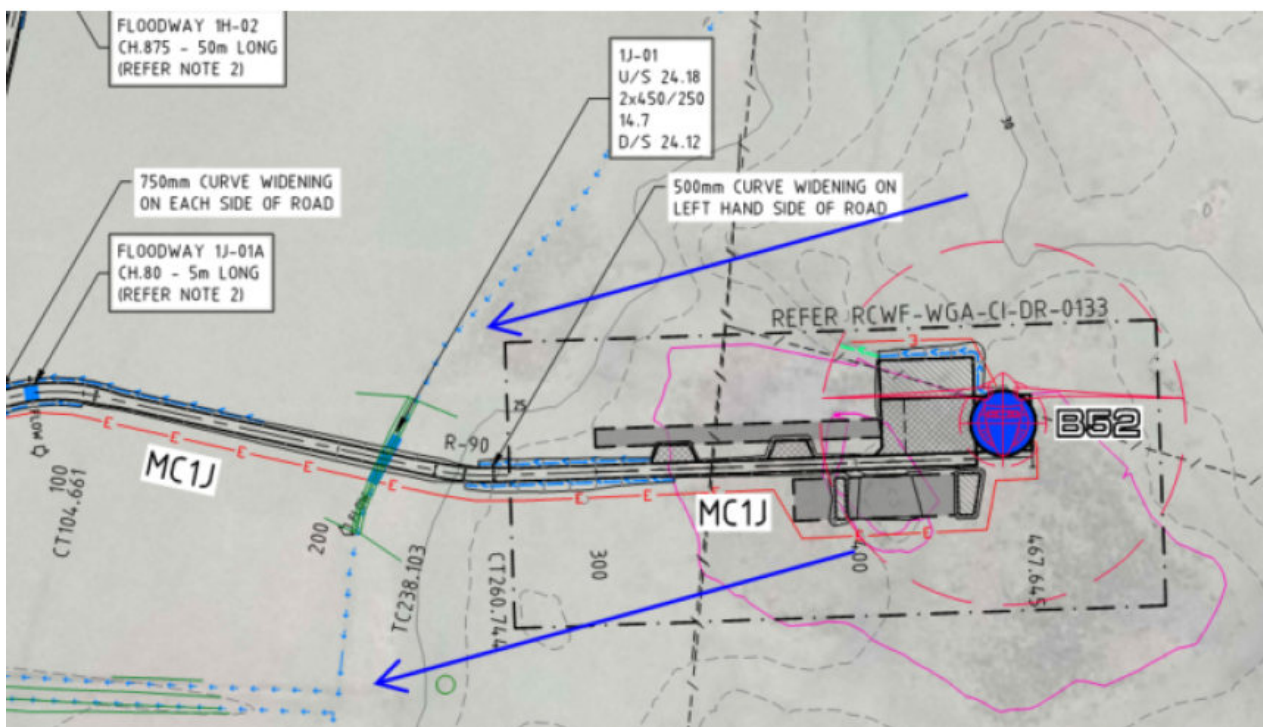


Figure 6 – B52 Wind Turbine Drainage

Apart from the runoff flow that will be generated during rainfall events, there is also an ephemeral wetland around B52. The water that accumulates on this wetland surface will continue to be fed by their corresponding catchment sub-basins.



## 5. Conclusions

The civil and drainage design for Ryan Corner Wind Farm has taken into account the existing hydrology of the area and has aimed to minimize the impact on the existing conditions.

Wherever possible, wetland areas have been avoided.

Where this has not been possible, drainage structures have been installed to retain the existing flow of water across the site.